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Marvin S. Cohen (No. 000923)  
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Telephone: 480.425.2600  
Attorneys for Desert Hills Water Co., Inc.

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2007 MAR 30 P 4: 36

AZ CORP COMMISSION  
DOCUMENT CONTROL

14F

**BEFORE THE ARIZONA CORPORATION COMMISSION**

IN THE MATTER OF APPLICATION  
OF DESERT HILLS WATER  
COMPANY FOR APPROVAL OF  
TRANSFER OF ITS UTILITY  
ASSETS TO THE TOWN OF CAVE  
CREEK, PURSUANT TO A.R.S. § 40-  
285 AND FOR CANCELLATION OF  
ITS CC&N

DOCKET NO: W-02124A-06-0717

**NOTICE OF FILING FINAL LATE  
FILED EXHIBITS NO. A-17 THROUGH  
A-18**

SACKS TIERNEY P.A., ATTORNEYS  
4250 NORTH DRINKWATER BOULEVARD  
FOURTH FLOOR  
SCOTTSDALE, ARIZONA 85251-3693

Desert Hills Water Co., Inc. ("Desert Hills") hereby late files and gives notice of late filing the following exhibits:

- A-17 Executed water supply agreement between Arizona-American Water Co., and Desert Hills Water Co., Inc. and Town of Cave Creek dated March 29, 2007.
- A-18 CH2MHill Draft Town of Cave Creek Water Master Plan, March 2007.

These are the final exhibits that will be filed by Desert Hills. Desert Hills respectfully requests that the record in this matter be closed on this date, March 30, 2007.

RESPECTFULLY SUBMITTED this 30<sup>th</sup> day of March, 2007.

SACKS TIERNEY P.A.

Arizona Corporation Commission  
**DOCKETED**  
MAR 30 2007

DOCKETED BY *SM* NR

By:   
Marvin S. Cohen  
4250 N. Drinkwater Blvd., 4th Floor  
Scottsdale, AZ 85251-3693  
Attorneys for Desert Hills Water Co., Inc

1 ORIGINAL and thirteen (13) copies of the  
2 foregoing were delivered  
3 this 30<sup>th</sup> day of March, 2007 to:

3 Docket Control  
4 Arizona Corporation Commission  
5 1200 W. Washington St.  
6 Phoenix, AZ 85007

5 Copy of the foregoing hand-delivered  
6 this 30<sup>th</sup> day of March, 2007 to:

7 Lyn Farmer  
8 Chief Administrative Law Judge  
9 Arizona Corporation Commission  
10 1200 W. Washington Street  
11 Phoenix, AZ 85007

10 Steven Olea  
11 Assistant Director, Utilities Division  
12 Arizona Corporation Commission  
13 1200 W. Washington Street  
14 Phoenix, AZ 85007  
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14 Attorney, Legal Division  
15 Arizona Corporation Commission  
16 1200 W. Washington Street  
17 Phoenix, AZ 85007  
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17 Linda Jaress  
18 Utilities Division  
19 Arizona Corporation Commission  
20 1200 W. Washington Street  
21 Phoenix, AZ 85007

20 Copy of the foregoing mailed  
21 this 30<sup>th</sup> day of March, 2007 to:

21 Gary D. Hays  
22 The Henderson Law Firm  
23 Esplanade Center III  
24 2415 East Camelback Road, Suite 1050  
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27 6613 North Scottsdale Road, Suite 200  
28 Scottsdale, AZ 85250

27   
28 \_\_\_\_\_

**EXHIBIT A-17**

## WATER SUPPLY AGREEMENT

This AGREEMENT ("Agreement") is entered into as of March 29, 2007, by and between the Town of Cave Creek, Arizona, ("Cave Creek"), an Arizona municipal corporation, and ARIZONA-AMERICAN WATER COMPANY ("Arizona-American"), an Arizona corporation. Parties to this Agreement may be referred to individually as a "Party" or collectively as the "Parties."

### RECITALS

- A. Arizona-American is a public service corporation within the meaning of Article 15, Section 2, of the Arizona Constitution, and is authorized to provide potable water service within portions of Maricopa County, Arizona, in accordance with a Certificate of Convenience and Necessity ("CC&N") granted by order of the Arizona Corporation Commission ("Commission").
- B. The Arizona-American CC&N includes its water service to an area within and adjoining the Anthem community in Maricopa County, Arizona ("Anthem Water District"). To provide potable water service within the Anthem Water District, Arizona-American, among other things, receives an allotment of untreated surface water delivered through facilities owned and operated by the Central Arizona Project and then provides transportation, treatment, storage, and distribution services for its customers.
- C. Arizona-American at its Anthem water plant has the following facilities for the production, treatment and delivery of water:
  - 1. Two groundwater wells with the capacity to provide up to 1,600 gallons per minute (gpm);
  - 2. A water treatment plant with the capacity to treat up to 7 million gallons per day (mgd);
  - 3. A hydraulic interconnection with the City of Phoenix with the capacity to take up to 11 mgd, subject, however, to a contractual limit of 5 mgd;
  - 4. A 30-inch, 8-mile raw water pipeline and pump station from the New Waddell canal to the treatment plant with a capacity of 11 mgd.
- D. Arizona-American has the capacity to provide to Cave Creek up to 2 mgd of uninterrupted water supply.
- E. Cave Creek is a municipal corporation within the meaning of Article 13 of the Arizona Constitution.
- F. Cave Creek is the sole shareholder of Desert Hills Water Company ("Desert Hills"), a public service corporation within the meaning of Article 15, Section 2, of the Arizona Constitution, and authorized to provide potable water service within portions of Maricopa County, Arizona, in accordance with a CC&N granted by order of the Commission. Desert Hills owns and operates certain wells, pumps,

booster stations, pipelines, valves, and related hardware and facilities to deliver potable water to its customers.

- G. Arizona-American and Desert Hills are parties to a June 6, 2006, Temporary Water Supply Agreement, and an August 31, 2006, Agreement to Extend Temporary Water Supply Agreement. Under these agreements, Arizona-American provides temporary water service to Desert Hills through an interim interconnection until March 31, 2007.
- H. Cave Creek intends to dissolve Desert Hills, and own and operate the assets as a municipal water utility providing service to customers within the existing Desert Hills CC&N ("Cave Creek Service Area").
- I. Cave Creek is acquiring the utility property of Cave Creek Water Company and Pacer Equities Company and is extending the Cave Creek Service Area to include the service territories of those companies.
- J. While Cave Creek intends to operate the water system serving the former Desert Hills service area and the water system serving the former Cave Creek Water Company service area as two separate departments, it plans to improve the physical interconnection between the two systems so that the Town's water supplies can be available to serve the entire Cave Creek Service Area.
- K. Cave Creek intends to secure sufficient permanent, long-term, water supplies to provide for the present and expected needs of customers in the Cave Creek Service Area.
- L. Arizona-American is willing to provide treatment services for Cave Creek's long-term water supplies and wheel the treated water through its Anthem Water District so that Cave Creek can receive its permanent water supplies, provided that the treatment and wheeling services are priced to recover Arizona-American's full cost of providing these services, without any subsidy from Arizona-American's retail customers in its Anthem Water District, and without affecting service to these customers.
- M. Until Cave Creek is able to secure its long-term water supplies, Arizona-American is willing—subject to the needs of its customers and any restrictions imposed by any law, regulation, tariff, government agency, or other water-supply agreement—to deliver and sell potable water to Cave Creek at the rates and under the terms set forth in this Agreement.
- N Potable water sales, and treatment and wheeling of Cave Creek water supplies, should be priced to recover Arizona-American's full cost-of-service, without any subsidy from Arizona-American's retail customers in its Anthem Water District.

O. Arizona-American and Cave Creek desire a permanent interconnection between the two water systems to enable mutual aid to be provided to either system in the event of a future water supply shortfall.

NOW, THEREFORE, for and in consideration of the following covenants and promises, the Parties agree as follows:

1. **Recitals**. The Recitals set forth above are true and correct, and are by this reference incorporated herein.
2. **Scope of Agreement**. This Agreement covers the terms and conditions under which: a) Cave Creek will construct a new permanent interconnection (“Permanent Interconnection”) between the Parties; and b) Arizona-American will deliver potable water to Cave Creek through the interim interconnection and the Permanent Interconnection until Cave Creek acquires its own long-term or short-term raw water supplies. Once Cave Creek acquires this supply, this Agreement covers the terms and conditions under which Arizona-American will provide 1) transportation of Cave Creek’s raw water, 2) treatment at the Anthem Water Treatment Plant and 3) wheeling of the treated water for delivery to Cave Creek at the Permanent Interconnection.
3. **Term of Agreement**. This Agreement is effective as of April 1, 2007, and continues in effect until March 31, 2017. At the end of each term of this Agreement, it will automatically renew for another 10-year term unless either party provides to the other party notice of its intent not to renew. A notice of intent not to renew must be in writing and provided no later than 180 days before the end of a term in accordance with Section 21.9.
4. **Designated Representatives**. Each Party appoints the following person to act as its Designated Representatives to act on its behalf during the term of this Agreement. A Party may, from time to time, substitute another person for that Party’s Designated Representative by providing written notice to the other Party in accordance with Section 21.9.

	<b><u>Arizona-American</u></b>	<b><u>Cave Creek</u></b>
Name	Bradley J. Cole	Town Manager
Address	15626 N. Del Webb Blvd.	37622 N Cave Creek Rd.
City, State, Zip code	Sun City, AZ 85351-1602	Cave Creek, AZ 85331
Phone Number	(623) 815-3136	480-488-6611
Fax Number	(623) 815-3141	480-488-2263
Cell Phone Number	(602) 885-0326	
Email Address	colebj@amwater.com	townmanager@cavecreek.org

5. **Permanent Interconnection.** Water deliveries under this Agreement will be made through the interim interconnection between the Anthem Water District and the Cave Creek Service Area until construction of the Permanent Interconnection between the Anthem Water District and the Cave Creek Service Area. The Permanent Interconnection will be designed and constructed at Cave Creek's expense. The design will be subject to Arizona-American's review and approval. Such approval of the design and approval to proceed with the construction shall not be unreasonably withheld. The Permanent Interconnection facilities shall include a water meter, back flow prevention and SCADA facilities. Arizona-American will own all and maintain all Interconnection facilities located on its property, including a water meter. Cave Creek will own and maintain the remainder of the Interconnection facilities and may install a check-meter on its property at its own expense. After construction of the Permanent Interconnection, all water deliveries under this Agreement will be made through the Permanent Interconnection.
6. **Meter Calibration and Maintenance.** Arizona-American shall at a minimum, annually test the accuracy of and calibrate the master meter. Advance notice of the calibration activities shall be provided to the Cave Creek representative so that Cave Creek may be present during meter calibration. Arizona-American shall be responsible for all costs of meter calibration, repair, or replacement.
7. **Potable Water Supply.** Subject to the requirements of Arizona-American's retail Anthem Water District customers and the requirements of Section 8 and Section 9, Arizona-American will provide Cave Creek with a firm supply of up to 2 mgd of potable water from the Anthem Water District ("Anthem Potable Water").
8. **Requests for Anthem Potable Water Deliveries.** By Friday of each week, Cave Creek must request deliveries of any Anthem Potable Water for the following week (Sunday – Saturday) by providing Arizona-American's Designated Representative its good-faith estimate of its water requirements. If no change is made to the previous week's water order, that water order will be assumed to be carried forward to the following week. This information is required for system-planning purposes.
9. **Anthem Potable Water Price.** The initial price for Anthem Potable Water for the first year of the term of this Agreement ("Term") will be \$2.75 per 1,000 gallons. After the first year the price for Anthem Potable Water will be the second tier rate for residential customers approved by the Corporation Commission. The second tier rate is the rate charged per 1000 gallons, for residential customers (5/8" and 3/4" meters) for consumption exceeding 4000 gallons per month up to 18,000 gallons per month. In any month, if billed residential water usage within the Desert Hills service area exceeds 18,000 gallons per average customer connection, a rate surcharge shall be applied to that month's bill for deliveries of Anthem water to Cave Creek. The monthly billed residential water usage per customer within the Desert Hills service area shall be calculated by dividing the total billed residential water usage for the month by the number of customers on the last day of the month. The surcharge shall be calculated using the following formula:

Desert Hills per customer usage for the month minus 18,000 gallons per month,  
multiplied by the number of customers at the end of the month,  
divided by 1,000,  
multiplied by the difference between the second tier rate and the third tier rate  
per 1000 gallons approved by the Corporation Commission for residential  
customers.

The following is an example of the application of the formula, assuming that in a  
particular month the per customer usage is 20,000 gallons, the number of customers  
is 1,650, the second tier rate is \$2.82 and the third tier rate is \$4.25:

$$20,000-18,000=2,000$$

$$2,000 \times 1,650 = 3,300,000$$

$$3,300,000 / 1,000 = 3,300$$

$$3,300 \times (4.25 - 2.82) = \$4,719$$

Cave Creek will provide to Arizona American by the last day of each month, the total billed consumption within the Desert Hills area and the number of customer connections for the preceeding month. Arizona American will use this data in calculating any applicable rate surcharge for the month. The monthly rate surcharge, if applicable, will be included in the bill for the following month as separate line item. This pricing structure recognizes that (a) nearly all of the water delivered to Cave Creek for the Desert Hills area is for single family residential use, (b) the reliability of water deliveries to Cave Creek for resale to its retail customers is subject to the requirements of Arizona-American's retail Anthem Water District customers and (c) this agreement does not require any additional capital investment by Arizona American. Cave Creek is agreeing to be the first customer class to suffer reduced deliveries in the event of a shortage. The revenue generated for Arizona American through this contract is a benefit to the retail customers of the utility because it reduces the utility's revenue requirements from its customers. The prices established in this agreement recover not less than the cost-of-service for Arizona-American's delivery of Anthem Potable Water to Cave Creek, without any subsidy from its retail customers in its Anthem Water District. Cave Creek may not wholesale water delivered hereunder to other water providers, including municipalities or public service corporations. Arizona American will provide to Cave Creek written notice of any future rate filings with the Arizona Corporation Commission for the Anthem system within 15 days of the date of filing. In no event shall the rate for the second tier be less than \$2.82 per thousand gallons, regardless of whether the ACC approves a lower rate.

10. **Cave Creek-Owned Water.** Cave Creek will diligently pursue acquisition of a long-term water supply or supplies to provide for the needs of its customers within the Cave Creek Service Area. (“Cave Creek-Owned Water”). Before finalizing its acquisition of the Cave Creek-Owned water, Cave Creek will submit the proposed transaction to Arizona-American for review. Arizona-American will review the proposed transaction to reasonably determine whether the Cave Creek-Owned Water would be compatible with the Anthem Water District system. Arizona-American will provide Cave Creek with the results of its determination within 15 days of receiving the information from Cave Creek. Any determination that the supply is not compatible shall state in detail the reasons for non-compatibility and suggest methods, if any, to achieve compatibility. Any Cave Creek-Owned Water delivered to Arizona-American at its CAP Water Pump Station from the interconnected Central Arizona Project (“CAP”) canal is deemed compatible, unless water quality in the interconnected CAP canal is such that Arizona-American is not taking delivery of its own CAP deliveries at the CAP Water Pump Station.
11. **Treatment and Wheeling Services.** Provided that the Cave Creek-Owned Raw Water is compatible with the Anthem Water District System, as determined by Arizona-American, Cave Creek may deliver the Cave Creek-Owned Water to Arizona-American at Arizona-American’s CAP Water Pump Station, or such other point as agreed to by the Parties, for transportation to Arizona-American’s Anthem Water Treatment Plant. Arizona-American will treat the Cave Creek-Owned Water to potable water standards and wheel it through its Anthem Water District to the Interconnection for delivery to Cave Creek. Arizona-American will treat the Cave Creek-Owned Water to the same standards it must satisfy for delivering potable water to its Anthem Water District customers. Arizona-American will only provide transportation, treatment, and wheeling services (“Treatment and Wheeling Services”) for Cave Creek to the extent that provision of such services will not adversely affect service to its Anthem Water District customers. The Parties will coordinate Treatment and Wheeling Services under terms acceptable to their Designated Representatives.
12. **Price for Treatment and Wheeling Services.** The price for Treatment and Wheeling Services will be equal to the rate for Anthem Potable Water, less Arizona-American’s water costs per 1,000 gallons for surface water for the Anthem service area.

By November 31 of each year, Arizona-American will notify Cave Creek of the price for Treatment and Wheeling Services for the next year. If Cave Creek does not wish to continue to receive these services at the new price, it may terminate this Agreement by providing notice of such intent within 30 days of receiving notice of the new price.

In the event that Cave Creek delivers Cave Creek-Owned water to the Arizona American Anthem system as potable water, Arizona-American will charge Cave Creek only for Wheeling Services.

13. **Water Deliveries**. Concerning deliveries of Anthem Potable Water and treated Cave Creek-Owned Water, Arizona-American makes no representations or warranties concerning the pressure of the water delivered or its fitness for any purpose other than its fitness for personal consumption. Arizona-American will use its reasonable best efforts to maintain satisfactory and continuous service, but does not guarantee such service. At its sole discretion, Arizona-American may receive Cave Creek-Owned Water, but deliver treated water from another source to Cave Creek at the Interconnection. Any delivery of water at the Interconnection at a pressure less than 30 pounds per square inch ("psi") will be considered an "outage". Arizona-American will give immediate notice to Cave Creek in the event of any expected or actual outage.
14. **Coordination Of Planned System Maintenance Activities** – Notice of Impending Water Shortage. Arizona-American will coordinate with Cave Creek any planned treatment plant and distribution system maintenance activities that are likely to reduce the ability of Arizona-American to provide water services to Cave Creek. Arizona-American will use its best efforts to schedule activities in order to minimize disruptions of service to Cave Creek. In the event that Anthem customer water demands and deliveries to Cave Creek exceed available supplies and no force majeure event has occurred with respect to Arizona-American water production and transmission facilities, Arizona-American shall provide to Cave Creek, at least 24 hours advance notice of a cutback in water deliveries necessitated by the water shortage condition.
15. **Force Majeure**. Arizona-American is not liable for damages occasioned by unplanned interruptions or failure to commence service or unsatisfactory service or any act or failure to act arising out of this Agreement caused by an act of God or the public enemy, accident, fire, explosions, strikes, riots, war, delay in receiving shipments of required material, order of any court or judge granted in any bona fide adverse legal proceedings or action, or any order of any commission or tribunal having jurisdiction in the premises; or without limitation by the preceding enumeration, any other act or thing reasonably beyond its control.
16. **Short-Term Anthem Potable Water Supplies**. Arizona-American will only provide Anthem Potable Water to Cave Creek in the quantities set forth in Section 7 until Cave Creek acquires the Cave Creek-Owned Water and Arizona-American begins providing Treatment and Wheeling Services. After that time, Arizona-American will provide Anthem Potable Water only during interruptions to the Cave Creek-Owned Water, or such other circumstances as may be agreed to by the Parties.
17. **Invoices**. Each month, Arizona-American will read the meter at the Permanent Interconnection to determine monthly deliveries of Anthem Potable Water and treated Cave Creek-Owned Water. By the 10<sup>th</sup> day of the following month, Arizona-American will prepare and send Cave Creek an invoice for the previous month's deliveries. Cave Creek will pay the invoice within 30 days of receipt. If Cave Creek

disputes any charges on the invoice, it still must pay the entire amount of the invoice and inform Arizona-American of the nature and amount of the disputed charge. If the Parties cannot resolve the dispute, then Cave Creek can, as its sole remedy, invoke the dispute-resolution procedures set forth in Section 20.

18. **Indemnification**. To the extent allowed by law, each Party indemnifies and holds harmless the other Party, its officers, directors, agents, and employees from and against all claims, damages, costs and expenses, including penalties and assessments, attorneys' fees and court costs, to which they or any of them may be subjected by reason of injury, death, loss, claim, penalty, assessment or damage caused or contributed to by the active or passive negligence of a Party, its agents, servants, employees, contractors or subcontractors in the performance of its obligations under this Agreement or in connection therewith. If any suit or other proceeding is brought against a Party on this account, the other Party will assume the defense at its expense and will pay all judgments rendered therein. The foregoing indemnity does not cover any negligent or wrongful acts of a Party, its officers, directors, agents or employees.

19. **Conditions Precedent/Subsequent**.

19.1. **Approval by the Commission**. This Agreement is contingent upon its approval by the Arizona Corporation Commission ("Commission").

19.2. **Desert Hills Dissolution**. This Agreement is contingent upon the Commission's approval of the dissolution of Desert Hills and the acquisition of Desert Hills' assets by Cave Creek.

19.3. **Cave Creek-Owned Water**. If Cave Creek has not obtained the Cave Creek-Owned Water by March 31, 2010, then the obligations of Arizona-American to deliver Anthem Potable Water under this Agreement shall be subject to termination at the discretion of Arizona-American. Should Arizona-American elect to terminate its obligations to deliver Anthem Potable Water under this Agreement, Arizona-American will provide a written notice to Cave Creek of its intent to terminate 180-days prior to the termination date. Cave Creek must still pay any amounts owed for deliveries of Anthem Potable Water made before that date.

20. **Dispute Resolution**. The Parties will use the following procedures to resolve disputes arising under this Agreement:

20.1. **Good Faith Negotiations**. Before any dispute under this Agreement is referred to Section 20.2 for resolution the Parties will personally meet and attempt in good faith to resolve the dispute. If the Parties cannot resolve the dispute within 14 days, or within some mutually agreeable additional time period, either Party may avail itself of the provisions of Section 20.2.

20.2. Mediation and Arbitration. If the Parties are unable to resolve a dispute under the procedures set forth in Section 20.1, the procedures of this section apply.

20.2.1. The Parties will, before resorting to arbitration, first try in good faith to settle the dispute by mediation administered by the American Arbitration Association ("AAA") under its Construction Industry Arbitration Rules or Commercial Arbitration Rules, as appropriate.

20.2.2. Any dispute not resolved by mediation will be settled by binding arbitration administered by the AAA. If the controversy or claim relates to construction, the arbitration will be conducted in accordance with the AAA's Construction Industry Arbitration Rules; otherwise the AAA's Commercial Arbitration Rules will apply.

20.2.3. The arbitrator(s) have no power to amend or modify this Agreement. Judgment on the award rendered by the arbitrator(s) may be entered in the Superior Court of Maricopa County, Arizona.

## 21. Miscellaneous Provisions.

21.1. Entire Agreement. This Agreement constitutes the complete, exclusive, and final expression of the Parties' intent; and, as such, supersedes all previous communications, representations, or agreements, written or verbal, with respect to its subject matter.

21.2. Construction. This Agreement is construed in accordance with the laws of the State of Arizona. This Agreement is intended to represent the mutual agreement of the Parties and shall not be strictly construed against either party.

21.3. Limitation on Benefits of the Agreement. In executing this Agreement, the Parties explicitly intend that:

21.3.1. There are no third party beneficiaries under this Agreement.

21.3.2. The covenants, undertakings and agreements set forth in this Agreement are solely for the benefit of, and enforceable only by, the Parties (or their respective successors and assigns as permitted hereunder).

21.3.3. No person or entity other than a Party may bring any action or enforce any provision of this Agreement against another Party.

21.4. Modification or Amendment. This Agreement may not be modified, amended, rescinded, cancelled, or waived, in whole or in part, except by a written instrument signed by both Parties.

- 21.5. Further Instruments. Each Party shall from time to time and at such time as may be required, take such further actions and execute such further documents as may be reasonably required and necessary to effectuate the provisions of this Agreement.
- 21.6. Assignment. The terms and conditions of this Agreement bind and inure to the benefit of the Parties, their successors and assigns and legal representatives. Neither Party may assign its interests hereunder without first obtaining the prior written consent of the other party, provided however, that after notifying Cave Creek of its intent to do so, Arizona-American may assign its interests under this Agreement to any of its affiliated companies without obtaining Cave Creek's consent. If either party attempts to assign its interests hereunder in a manner inconsistent with this Section, then such assignment will be null and void.
- 21.7. Waiver. A waiver of any provision of this Agreement does not waive any other provision, whether or not similar, and such waiver does not continue. Either Party may waive any provision of this Agreement intended for its benefit, provided, however, that such waiver in no way excuses the other Party from the performance of any of its other obligations under this Agreement. Neither a failure or delay on the part of a party in exercising any right, remedy, power, or privilege hereunder, nor a course of dealing between the Parties, operates as a waiver or abandonment thereof. A single or partial exercise of any right, remedy, power, or privilege hereunder does not preclude any other or further exercise thereof or the exercise of any other right, remedy, power, or privilege.
- 21.8. Headings. The headings used herein are for reference only and do not construe, define, extend, or describe the scope of this Agreement or the intent of the Parties.
- 21.9. Notice. All notices given under the terms of this Agreement must be in writing and given to the appropriate Party's Designated Representative. Notices will be provided by personal delivery, facsimile transmission, or e-mail with confirmed delivery receipt, and are effective upon receipt.
- 21.10. Time of Essence. Time is of the essence in carrying out this Agreement.
- 21.11. A.R.S. § 38-511 This Agreement is subject to, and may be terminated by the Town in accordance with, the provisions of A.R.S. § 38-511.

IN WITNESS WHEREOF, the Parties have hereunto subscribed their names this 29 day of March, 2007.

TOWN OF CAVE CREEK

ARIZONA-AMERICAN WATER COMPANY

By: Usama Abujbarah 3/20/07  
Usama Abujbarah, Town Manager

By: Paul G. Tansley  
PAUL G. TANSLEY

ATTEST:

APPROVED AS TO FORM:

Carrie Dyrek 3/20/07  
Carrie Dyrek, Town Clerk

Clifford L. Mattice 3/22/07  
Clifford L. Mattice  
Mariscal, Weeks, McIntyre &  
Friedlander  
Town Attorneys

DESERT HILLS WATER COMPANY

By: Usama Abujbarah 3/20/07  
Usama Abujbarah, President

Approved by the Town Council  
at their meeting held on:  
March 19, 2007  
Carrie Dyrek  
Cave Creek Town Clerk

Attest:

Carrie Dyrek  
Carrie Dyrek, Secretary

Marvin S. Cohen  
Marvin S. Cohen  
Sacks Tierney  
Attorneys for Desert Hills Water Co., Inc.

**EXHIBIT A-18**

---

*Draft Report*

# **Town of Cave Creek Water Master Plan**

Prepared for  
**Town of Cave Creek, Arizona**

March 2007

**CH2MHILL**  
CH2M HILL  
2625 South Plaza Drive  
Suite 300  
Tempe, AZ 85282

---

*Draft Report*

# **Town of Cave Creek Water Master Plan**

Submitted to

**Town of Cave Creek, AZ**

March 2007

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**CH2MHILL**

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# Acronyms and Abbreviations

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ACC	Arizona Corporation Commission
ac-ft/yr	acre-feet per year
ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
CAP	Central Arizona Project
CC&N	Certificate of Convenience and Necessity
CCWC	Cave Creek Water Company
DHWC	Desert Hills Water Company
gpm	gallons per minute
MCL	maximum contaminant level
mg/L	milligrams per liter
MPA	Municipal Planning Area
ppb	parts per billion
PRV	pressure reducing valves
psi	pounds per square inch
Town	Town of Cave Creek
USEPA	United States Environmental Protection Agency
WTP	water treatment plant

## SECTION 1

# Introduction

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The Town of Cave Creek, Arizona (Town) has recently acquired the assets of the Desert Hills Water Company (DHWC) and is incorporating its operation into the Town's municipal services. In addition, the Town has recently completed the acquisition of the Cave Creek Water Company (CCWC). This CCWC currently provides potable water service to the residents of the Town. This water system is supplied by both groundwater wells and surface water via a connection to the Central Arizona Project (CAP) Canal.

The objective of this project is to provide the Town with a comprehensive vision and master plan for accommodating the long-term water supply needs of the community. This master plan will take into consideration reasonable approaches for identifying, quantifying, and securing short- and long-term water resources to meet the projected requirements of the Town. It will also evaluate strategic and efficient options for developing the needed infrastructure consisting of pipelines, pumping facilities, and storage facilities to deliver water supply to the community considering the physical system characteristics of both the CCWC and the DHWC.

## 1.1 Study Overview

A study area map is presented on Figure 1-1. It includes the current Certificate of Convenience and Necessity (CC&N) boundaries for DHWC, CCWC and Sabrosa Water Company as provided by the Arizona Department of Water Resources (ADWR). The figure also shows the City of Phoenix Municipal Planning Area (MPA). Nearly half of the CC&N for DHWC falls within the City of Phoenix MPA. It is possible that the City of Phoenix will annex the land within its MPA in the future, prompting the sale and acquisition of all or part of DHWC into its water service area.

With the Town's acquisition of the DHWC and the CCWC, the CC&Ns will be dissolved by the Arizona Corporation Commission (ACC). This milestone will officially render the systems as municipally owned.

As part of the CCWC acquisition, the Town will operate the Sabrosa Water Company. The Sabrosa system is about 3.5 miles north of existing DHWC customers. The Sabrosa CC&N ranges in elevation from 2030 feet to 2190 feet.

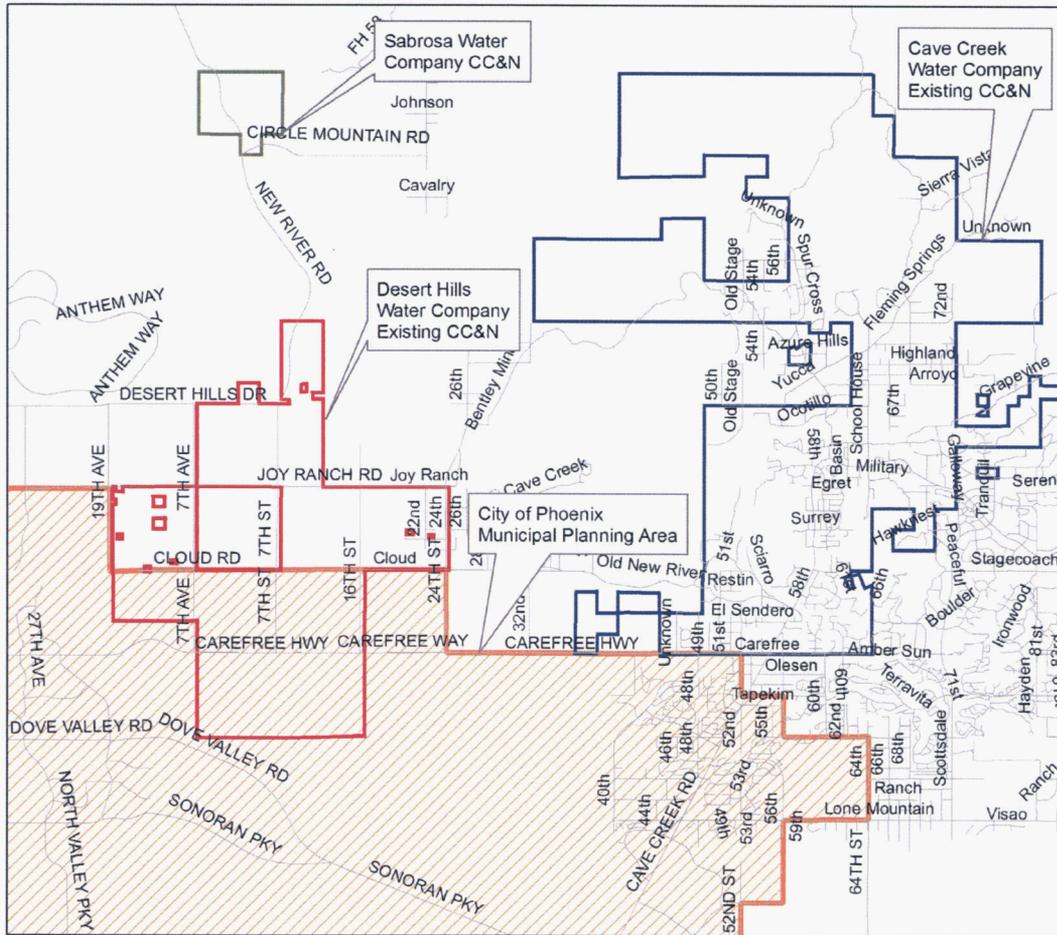
## 1.2 System Overview

### 1.2.1 Desert Hills Water Company

The DHWC began in 1970 and serves a population of about 4,000 people in a 6,800-acre area of unincorporated Maricopa County. The main source of water supply to the system has historically been groundwater. Two interconnections provide supplemental supply to areas within the DHWC system - one is from the CCWC at the eastern edge of the system, and the

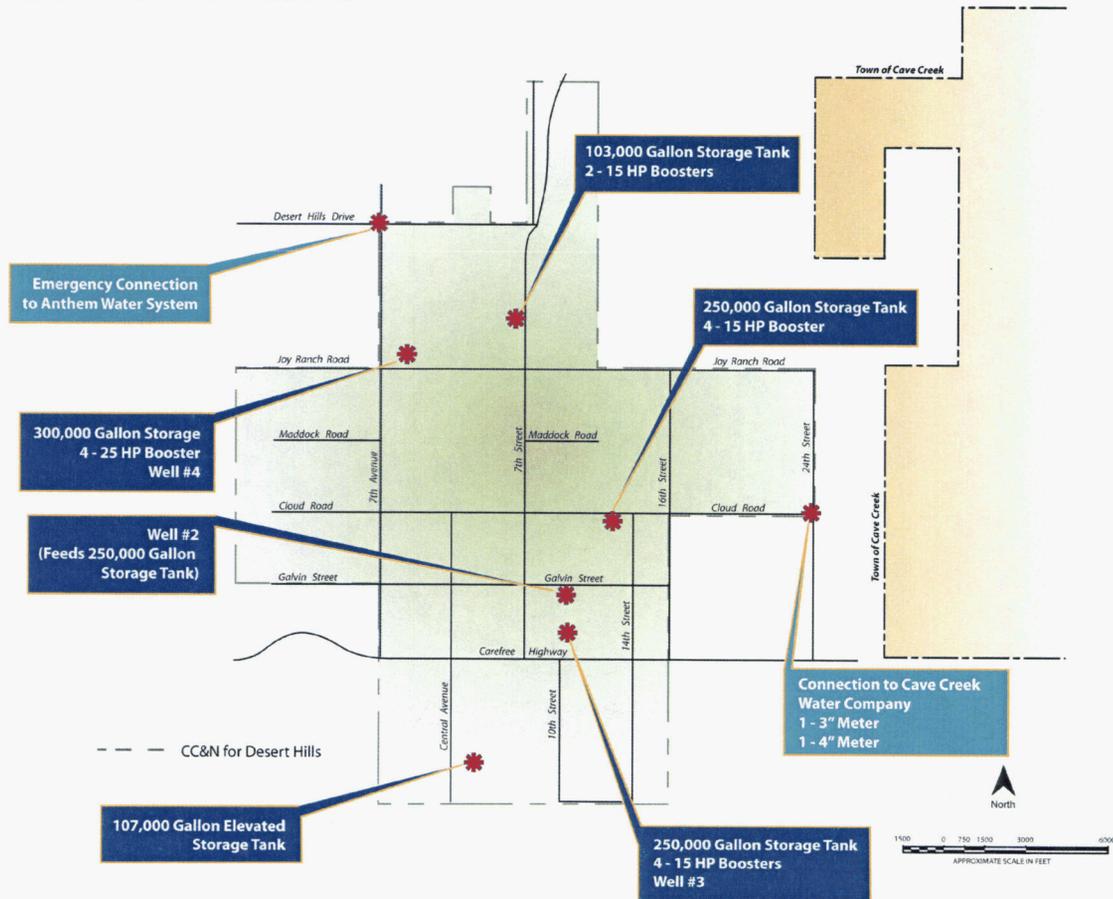
other is a temporary connection to the Anthem distribution system operated by Arizona American. Arizona American is also operating the DHWC system under contract to the Town.

**FIGURE 1-1**  
 DHWC, CCWC and Sabrosa Water Company Existing CC&N Boundaries  
 Town of Cave Creek Water Master Plan



The major water system components include three active groundwater wells, four ground storage tanks (with hydropneumatic tanks), one elevated storage tank, and four booster stations. An overview of the system is shown on Figure 1-2.

**FIGURE 1-2**  
 DHWC System Overview  
 Town of Cave Creek Water Master Plan



Details regarding DHWC wells, storage tanks, and booster station facilities are shown in Tables 1-1 through 1-3.

**TABLE 1-1**  
 Active Wells  
 Town of Cave Creek Water Master Plan

Well Name	ADWR ID No.	Drill Date	Casing Depth (feet)	Casing Diameter (inches)	Pump HP	Pump Yield (gpm)	Meter Size (inches)
Well #2	55- 631199	1972	800	8	60	200	4
Well #3	55- 087697	1981	800	8	20	100	4
Well #4	55- 559936	1997	1,000	10	75	380	4

Note:

gpm = gallons per minute

**TABLE 1-2**  
Storage Tanks  
*Town of Cave Creek Water Master Plan*

Tank Location	Quantity	Capacity (gal)
Dove Valley Rd. & Central Ave. (Elevated) <sup>a</sup>	1	107,000
7 <sup>th</sup> St. & Joy Ranch Rd. <sup>a</sup>	1	103,000
10 <sup>th</sup> St. & Carefree Hwy. <sup>a</sup>	1	250,000
14 <sup>th</sup> Street & Cloud Rd.	1	250,000
3 <sup>rd</sup> Ave. & Joy Ranch Rd. <sup>a</sup>	1	300,000
	Total	1,010,000

<sup>a</sup>Capacity obtained from DHWC system map prepared by RBF Engineers, revised January 2004.

**TABLE 1-3**  
Booster Stations  
*Town of Cave Creek Water Master Plan*

Booster Station Location	Booster Pumps		Pneumatic Tanks	
	Quantity	Horsepower	Quantity	Capacity (gallons)
10 <sup>th</sup> St. & Carefree Hwy.	4	15	1	5,000
7 <sup>th</sup> St. & Joy Ranch Rd.	2	15	1	5,000
14 <sup>th</sup> Street & Cloud Rd.	4	15	1	5,000
3 <sup>rd</sup> Ave. & Joy Ranch Rd.	4	25	1	5,000

The distribution system is divided into three pressure zones: Central, 7<sup>th</sup> Street Booster, and Cloud Road Booster. A pressure zone map is shown on Figure 1-3.

The well water supplies are all within the Central pressure zone. Wells #2 and #3 are pumped to the 250,000-gallon ground storage tank near the DHWC office near 10<sup>th</sup> Street and Carefree Highway. Water from this tank is pumped into the distribution system. Water from Well #4 is pumped to the 300,000-gallon ground storage tank near 3<sup>rd</sup> Avenue and Joy Ranch Road. A booster station at this site pumps water from the tank into the distribution system. An elevated tank on the south side of the system off of Central Avenue floats on this pressure zone.

A 103,000-gallon ground storage tank is located near 7<sup>th</sup> Street and Joy Ranch Road is filled from the Central Zone. Water from this tank is pumped into the distribution system from an onsite booster station to the 7<sup>th</sup> Street Booster Zone.

The 250,000-gallon ground storage tank near 14<sup>th</sup> Street and Cloud Road is also filled from the Central Zone. Water from this tank is pumped into the distribution system from an onsite booster station to the Cloud Road Booster Zone.



**TABLE 1-4**  
**Cave Creek Water Company Wells**  
*Town of Cave Creek Water Master Plan*

Well Name	ADWR ID No.	Drill Date	Casing Depth (feet)	Casing Diameter (inches)	Pump HP	Pump Yield (gpm)	Meter Size (inches)
Active Wells							
Faber	55-521032	1987	800	12	25	100	3
Neary	55-625095	1971	260	8	10	50	3
Vermeersch	55-518050	1988	700	10	40	300	3
Hazelton	55-518052	1988	1000	8	15	100	3
Pee Wee	55-625099	1980's	84	8	--	--	--
Wright I	55-625094	1970's	292	10	15	50	3
Wright II	55-516266	1980's	357	8	10	80	3
Inactive Wells							
Rockaway	55-625097	1970's	420	8	3	--	1
Carol Heights	55-625096	1970's	750	10	--	--	--
Triangle	55-636529	1970's	213	--	--	--	--
Linda Drive	--	1977	322	--	--	--	--
--	55-625798	1970's	210	10	7.5	80	3

**TABLE 1-5**  
**CCWC Storage Tanks**  
*Town of Cave Creek Water Master Plan*

Tank Location	Capacity (gallon) <sup>a</sup>
Neary	110,000
Linda	200,000
Wright 1	110,000
Wright 2	40,000
Carol Heights 1	110,000
Carol Heights 2	15,000
Rockway Hills 1	110,000
Rockway Hills 2	15,000
<b>Total</b>	<b>710,000</b>

<sup>a</sup>Capacities obtained from May 2006 Water Master Plan.

**TABLE 1-6**  
**CCWC Booster Stations**  
*Town of Cave Creek Water Master Plan*

Booster Station Location	Booster Pumps		Pneumatic Tanks	
	Quantity	Horsepower	Quantity	Capacity (gallon)
Neary	3	15	1	5,000
Sentinel	3	15, 15, 30	2	1,000 & 5,000
Wright I, II	2	30	1	5,000
Carol Heights	2	30,15	1	5,000
Rockaway	1	--	2	1,000 & 5,000
Carriage Drive	2	15,10	2	1,000
Ocotillo Ridgel	3	50,30,15	2	300 & 5,000
Hawksnest	4	5	1	1,000
Galloway	3	30,30,15	2	1,000 & 5,000
Linda Drive	6	50 (2), 30 (4)	1	5,000
Ocotillo Ridge II	3	30,15,15	--	--
School House Rd. South Booster Station	3	1, 1, 3	2	300 & 1,000 <sup>a</sup>

<sup>a</sup>School House Road South Booster Station is not included in the model.

Note:

Source: May 2006 CCWC Water Master Plan.

The CCWC system typically operates by supplying CAP water to its customers. The 16-inch raw water transmission line extends about 12.5 miles from the CAP canal to the WTP. A raw water intake pump station and three inline booster stations lift the water from the canal to the WTP (with an elevation change of about 600 feet from the canal to the WTP). There are no raw water storage facilities, but there are two finished water storage tanks at the WTP with a total capacity of about 150,000 gal.

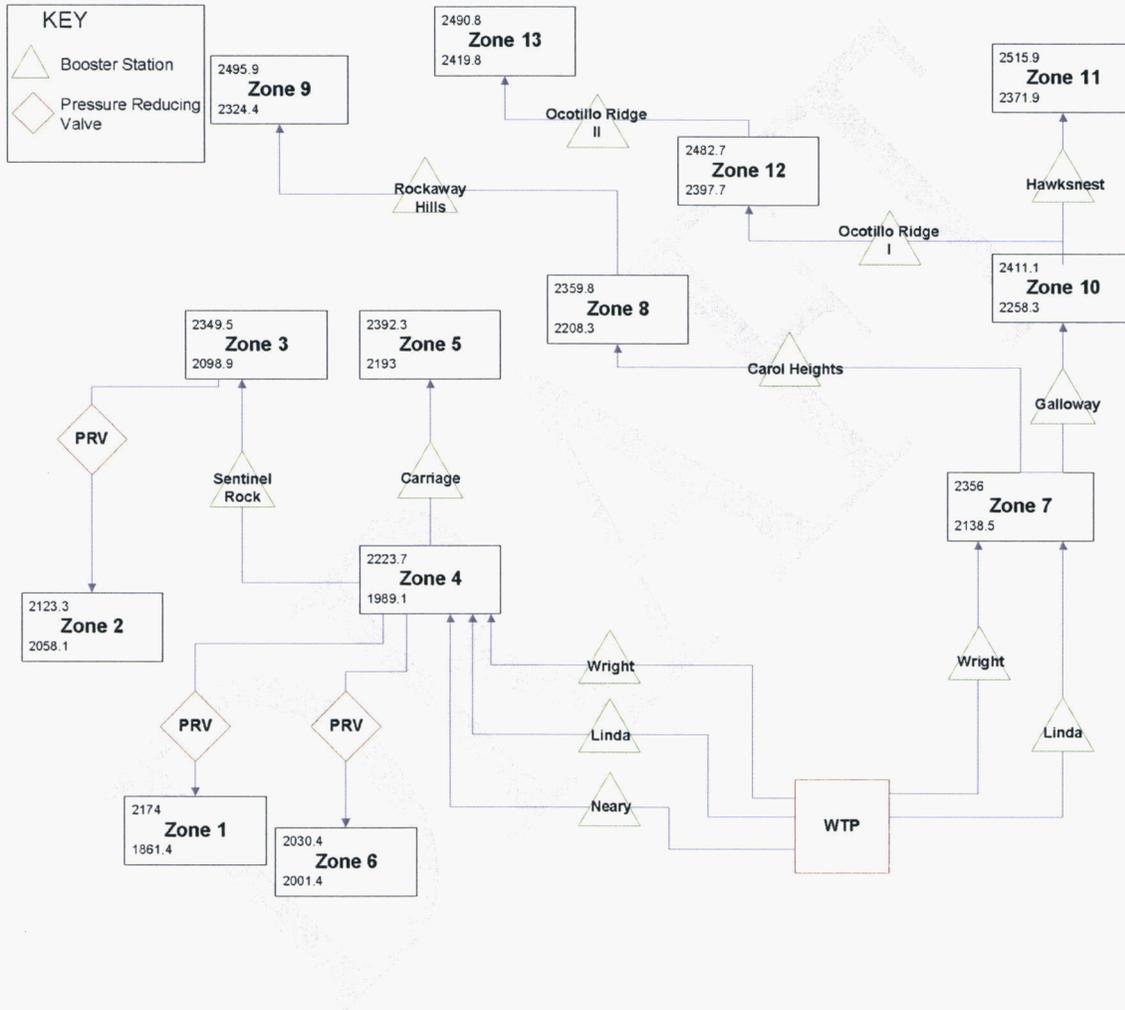
From the finished water tanks, water is transmitted to three booster stations: Wright, Neary, and Linda. A pressure zone schematic is shown on Figure 1-4 and a map of the system is shown on Figure 1-5 along with the Town boundary. About one quarter of Town of Carefree's residents are served by the CCWC.

The pressure zone schematic shows the interconnection of the water system and major facilities (booster stations and pressure reducing valves [PRVs]) that transmit water to customers. The elevation range (in feet) of the lowest to highest junction in the water model is shown for each pressure zone; the model does not depict every customer connection, so some customers may be higher or lower than the depicted range.

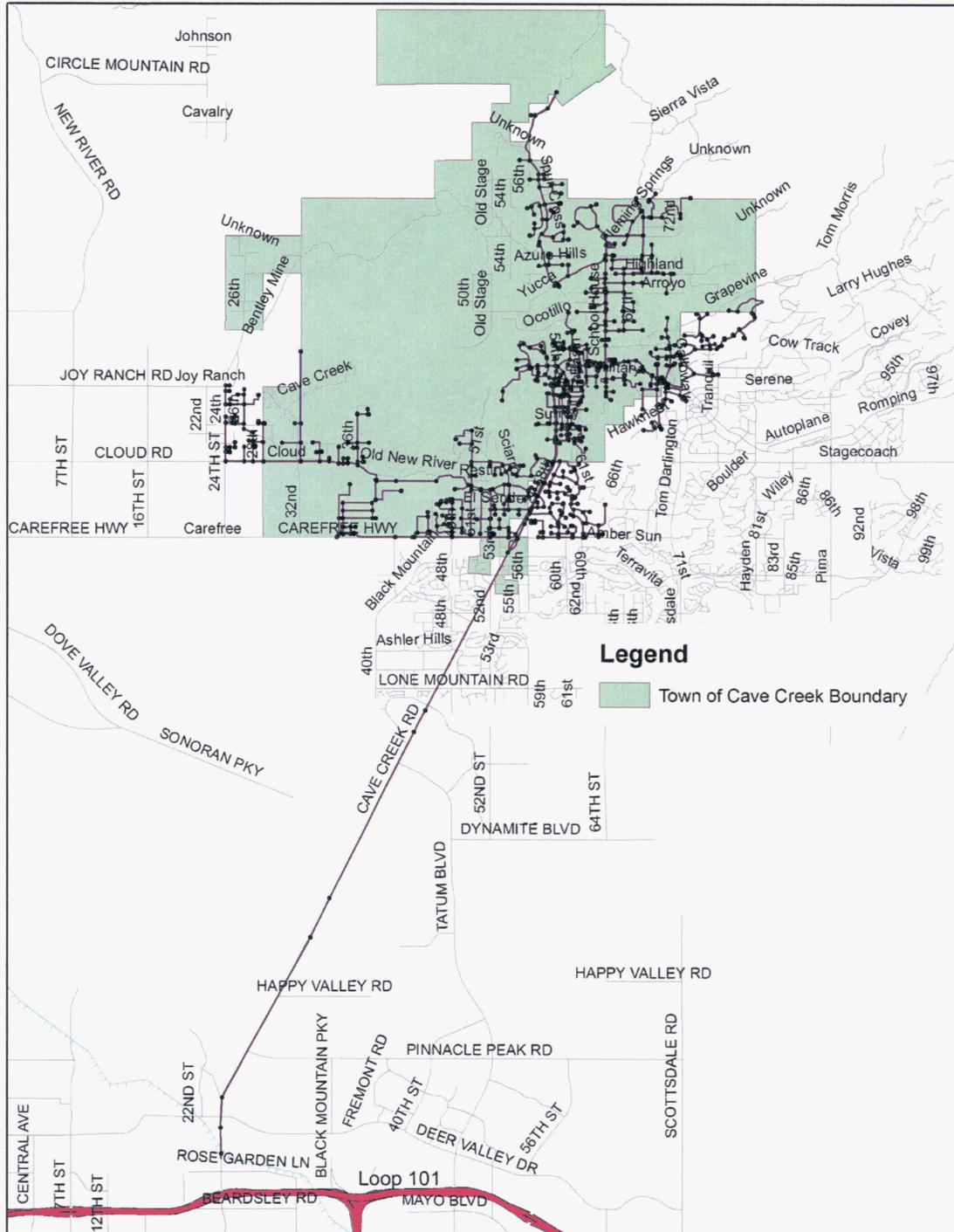
The Wright and Linda booster stations are both capable of pumping water to Zones 4 and 7; the Neary booster station pumps to Zone 4 only. Water is delivered to Zone 1 via PRVs from Zone 4, and water is pumped from Zone 4 to Zone 3. From Zone 3, water is delivered to Zone 2 via PRV. Water is pumped to Zone 5 via the Carriage booster station from Zone 4, and water from Zone 7 is pumped via the Galloway booster station to Zone 10. The Carol

Heights booster station serves Zone 8 with suction from Zone 7, and Zone 9 is supplied via booster from Zone 8. The Hawksnest booster station serves Zone 11 with suction from Zone 10. Zone 12 is supplied by a booster station with suction from Zone 10, and Zone 13 is supplied via booster from Zone 12.

**FIGURE 1-4**  
System Schematic  
*Town of Cave Creek Water Master Plan*



**FIGURE 1-5**  
CCWC System Map  
Town of Cave Creek Water Master Plan



## SECTION 2

# Water Supply Requirement Evaluation

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The objective of this task is to identify future water requirements of the Town, including the service areas of the CCWC and DHWC. CH2M HILL worked with Town staff to update the projected demands in both water systems. Future demands were developed for 2010 (short term) and for 2030 (long term). Future demands for the water system were based on land use and future development data provided by the Town. In addition, CH2M HILL evaluated future demand requirements for the Town of Carefree and Sabrosa Water Company.

## 2.1 Customer Projections by Service Area

### 2.1.1 Cave Creek Water Company

The customer projections for CCWC were estimated using the population projections calculated in the October 2006 Sanitary Sewer Master Plan. A graphical representation of the CCWC customer projections (housing units) is provided on Figure 2-1, which includes 2,639 and 4,365 customers in 2010 and 2030, respectively. Using the sewer master plan projections and a multiplication factor of 2.4 persons per dwelling unit provided by the Town (Larry Sahr, 2007) the estimated CCWC population is 6,334 and 10,476 in 2010 and 2030, respectively. The customer projections include those that reside within the Town of Carefree and are served by CCWC.

### 2.1.2 Desert Hills Water Company

The customer projections for DHWC were calculated based on 1,627 customers in 2005, as reported by the 2005 ACC Utility Divisions 2005 Annual Report. The sewer master plan projections were also used to project growth for DHWC. This resulted in 1,913 and 3,163 customers in 2010 and 2030, respectively (Figure 2-1).

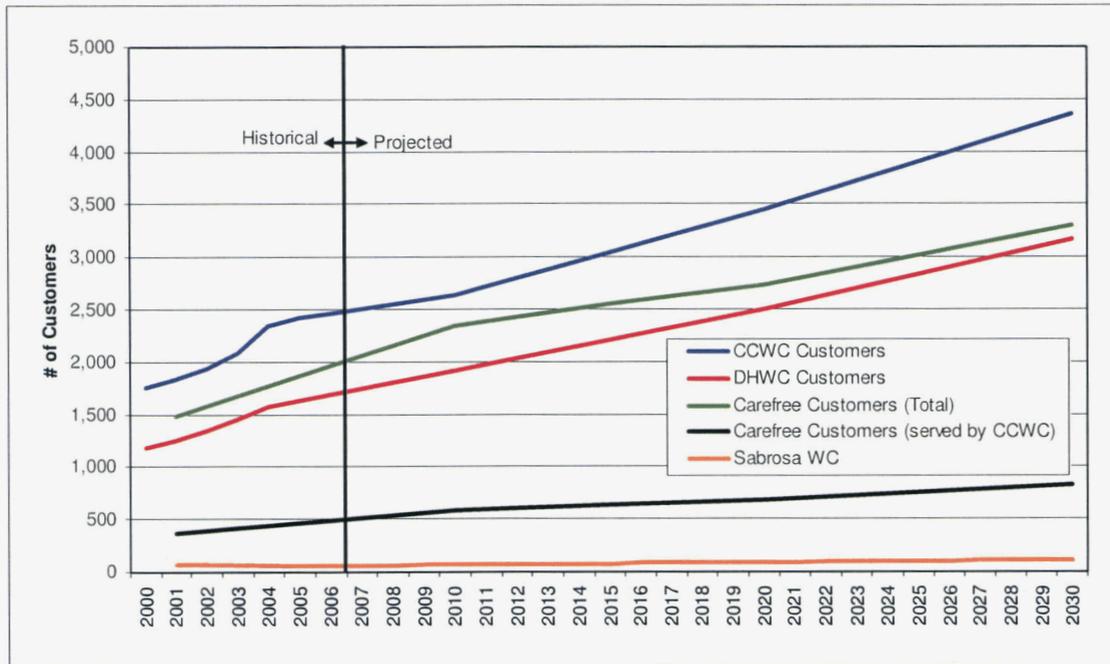
### 2.1.3 Town of Carefree

The customer projections for the Town of Carefree were calculated using the Town of Carefree General Plan 2020. According to the plan, population projections were estimated by the Arizona Department of Economic Security, and included populations of 4,611 and 5,384 (in 2010, and 2020). The report also stated a build-out population of 6,496, which was used for the 2030 population. The corresponding number of customers was then calculated using a ratio of 1.97 people per customer housing unit based on the General Plan. This resulted in 2,341 and 3,297 connections in 2010 and 2030, respectively, and includes customers served by both CCWC and Carefree Water Company. The number of Carefree customers served by CCWC was calculated by multiplying the total projected connections by 25 percent (Figure 2-1).

## 2.1.4 Sabrosa Water Company

The customer projections for Sabrosa Water Company were calculated using the 2005 ACC Utility Divisions Annual Report (55 customers), although Sabrosa had reported 70 customers in its 2002 ACC report. Using Sabrosa's CC&N boundary, the estimated maximum number of customers at buildout based on existing lot count was determined to be 113 (Figure 2-1).

**FIGURE 2-1**  
Customer Projections by Service Area  
*Town of Cave Creek Water Master Plan*



## 2.2 Water Demand Projections

Historical water demands were based on available public data acquired from the ACC's Annual Reports for the CCWC and DHWC. Demand projections for these two companies were assumed to parallel the projected population growth discussed previously. The historical and projected demands for the Carefree Water Company were obtained from the 2002 Town of Carefree General Plan 2020 Adoption Report.

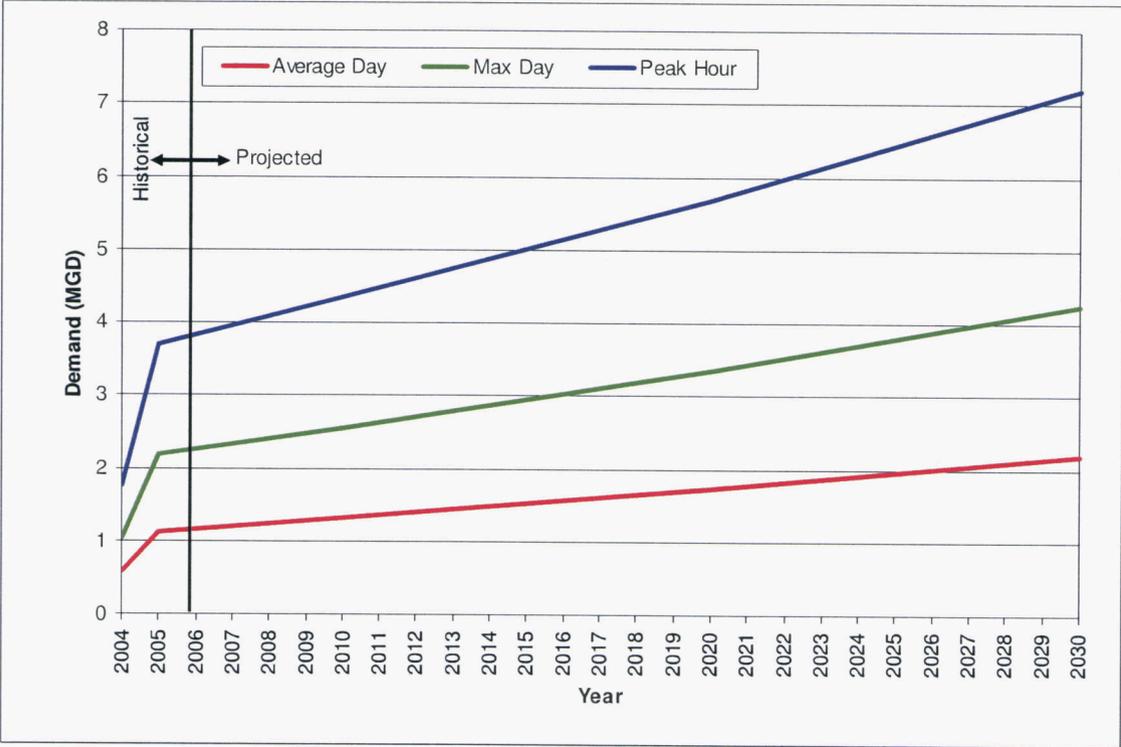
The following equations were used for demand calculations, as per the May 2006 CCWC Master Plan:

$$\text{Peak Hour} = \text{Max Day} * 1.7 \quad (1)$$

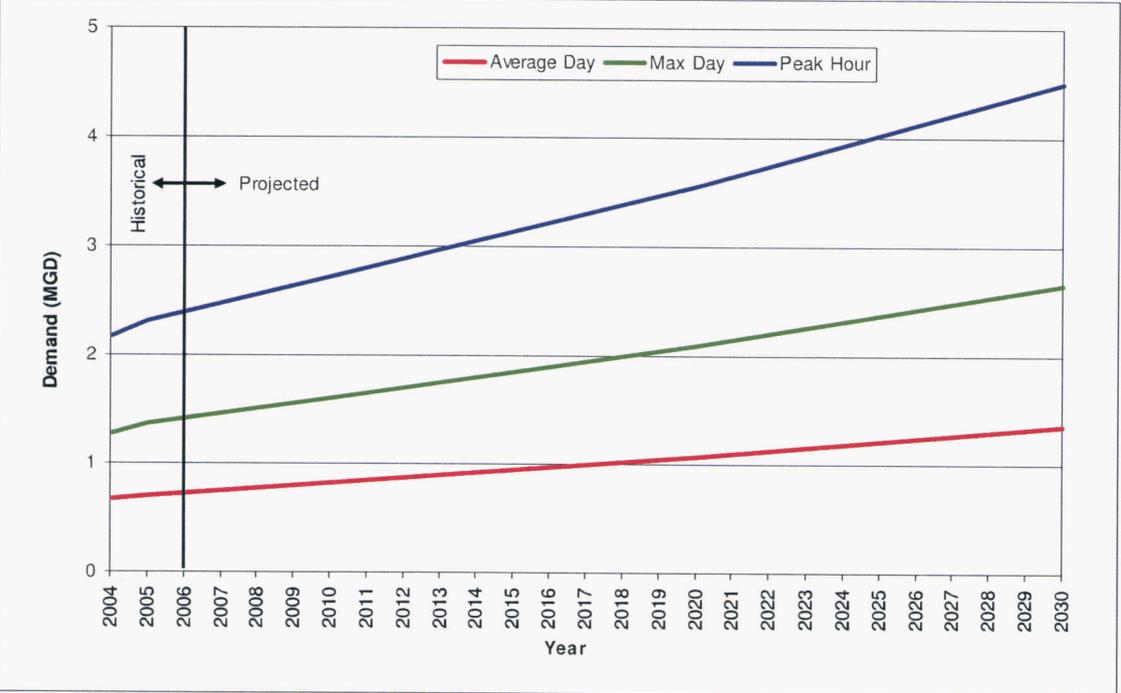
$$\text{Max Day} = (\text{Average Day} * 2.0) + \text{Lost} \quad (2)$$

The resulting demand calculations are included graphically for CCWC and DHWC on Figures 2-2 and 2-3, respectively.

**FIGURE 2-2**  
CCWC Demands  
Town of Cave Creek Water System Master Plan



**FIGURE 2-3**  
DHWC Demands  
Town of Cave Creek Water System Master Plan



SECTION 3

# Water Resource Evaluation

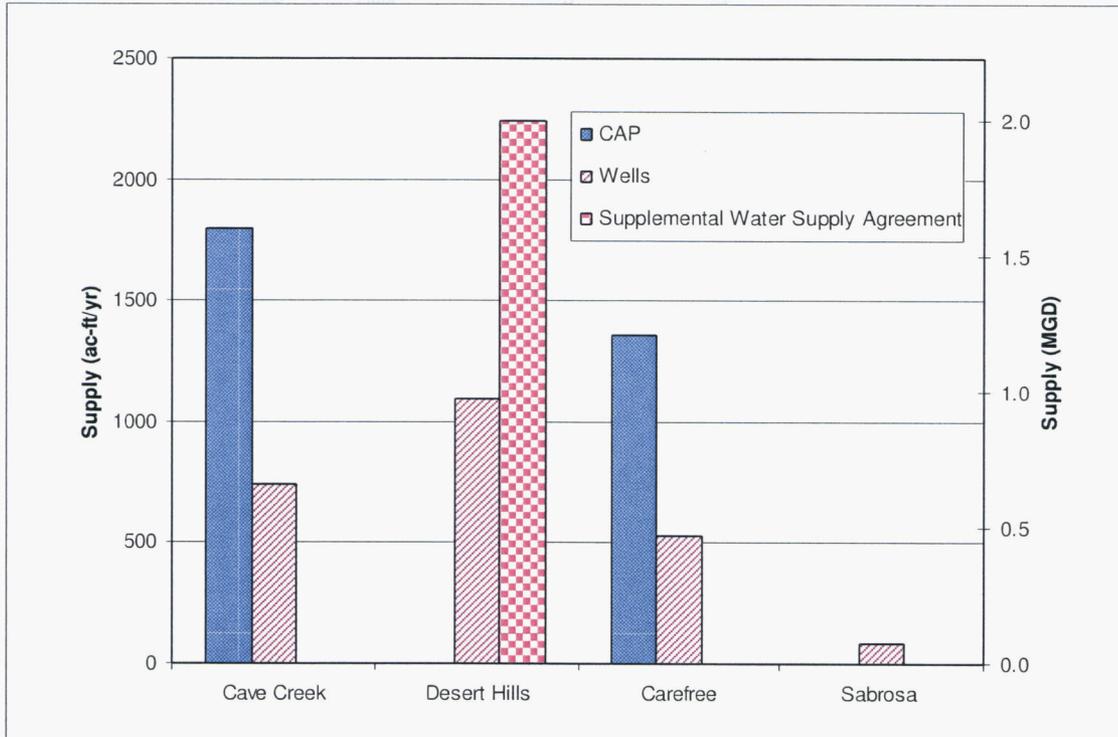
The objective of this task was to identify existing water supply sources and to identify additional water supply alternatives such as renewable water sources from both systems to meet future water needs.

## 3.1 Water Supply Evaluation

The objective of this task was to assess the existing water supplies available to each water system service area. CH2M HILL quantified the available volume of supply and assessed the water quality with respect to regulatory and aesthetic concerns.

The total system water supply (in ac-ft/yr and million gallons per day [mgd]) is provided per service area on Figure 3-1. The well supplies assume that wells are operating at full capacity at all times. DHWC also has an agreement in place with Arizona American to provide up to 2 mgd of water from the Anthem system through 2010.

**FIGURE 3-1**  
Total System Water Supply by Service Area and Source  
*Town of Cave Creek Water System Master Plan*



### 3.1.1 Water Quality

The CCWC and DHWC are required to meet required Federal and State drinking water regulations. The federal Safe Drinking Water Act sets the minimum standards for health and aesthetic water quality. These standards are known as maximum contaminant levels (MCL), which are a measurement of water quality. The Arizona Department of Environmental Quality (ADEQ) is responsible for administering the Arizona Environmental Quality Act for the state, which adopted the federal water quality requirements for the treatment, storage, and distribution of water.

In review of the Water Quality Reports submitted by CCWC to ADEQ, the CCWC is required to monitor and report surface water treatment compliance monthly, measure nitrate (as N) and nitrite (as N) quarterly, test for inorganic chemical compounds such as arsenic yearly, and test for trihalomethanes every three years. For 2003 and 2004, all samples tested came in below the MCLs for each component and thus, the system is in compliance.

CH2M HILL also requested a summary of the Water Quality Reports submitted by DHWC to ADEQ from 2002 to 2006. DHWC is required to monitor and report bacterial compliance monthly, measure nitrate (as N) annually and nitrite (as N) every nine years. They are also required to test for inorganic chemical compounds, volatile organic compounds, synthetic organic compounds and radiochemicals every three years. Trihalomethanes are currently tested annually until compliance is met and then testing will be done triannually. Upon review of data provided by ADEQ for 2002 through 2006, all samples tested were at or below the MCLs for each component with the exception of arsenic levels found in one point of entry to the system.

Of particular interest are the arsenic levels found in the potable water supply wells due to the recent regulatory changes in MCLs of arsenic in drinking water. In October 2001, the U.S. Environmental Protection Agency (USEPA) announced its decision to require public water systems to lower the allowable arsenic content in drinking water from 50 parts per billion (ppb) (0.050 milligram per liter [mg/L]) to 10 ppb (or 0.010 mg/L) by January 23, 2006. After this date, systems must begin monitoring and complete initial monitoring by December 31, 2007.

The levels of arsenic in each well reported to the ACC in 2004, and 2005 by CCWC are compiled in Table 3-1.

**TABLE 3-1**  
Average Arsenic Level of CCWC Wells  
*Town of Cave Creek Water Master Plan*

Well	2005 Arsenic Level		2004 Arsenic Level	
	mg/L	ppb	mg/L	ppb
Vermeersch	0.230	230	0.280	280
Hazelton	0.056	56	0.051	51
Faber	0.280	280	0.920	920
Neary	0.016	16	0.016	16
Pee Wee	<0.003	< 3	0.0076	7.6
Rockaway	0.015	15	0.015	15
Wright I	0.010	10	0.010	10
Wright II	0.012	12	0.012	12

According to the 2004 and 2005 Annual ACC Reports submitted by CCWC, the range of arsenic in the eight production wells used in 2005 was 0.01 mg/L to 0.280 mg/L, a significant improvement over the range in 2004 of 0.01 mg/L to 0.92 mg/L. Because these levels are much greater than the MCLs specified, the change in the arsenic regulation has had a significant impact on CCWC. CCWC has invested in arsenic treatment equipment at the WTP to use these wells for water production. Currently, the well supply may not be treated and delivered at the same time as the CAP supply, therefore, use of groundwater supplies is limited.

Arsenic levels detected at the point of entry to the system were also higher than the new 0.01 mg/L limit. In 2003, the level was 0.011 mg/L, and the level increased to 0.025 mg/L in 2004, which is an indicator that blending well and CAP water might not be a viable method to maintain new regulatory standards, and additional arsenic treatment at the point of entry may be required in the future.

The levels of arsenic in each well reported to the ACC in 2004 and 2005 by DHWC are compiled in Table 3-2.

**TABLE 3-3**  
Average Arsenic Level of DHWC Wells  
*Desert Hills Water Company*

Well	2005 Arsenic Level		2004 Arsenic Level	
	mg/L	ppb	mg/L	ppb
Well 2	0.008	8	0.008	8
Well 3	0.009	9	0.009	9
Well 4	0.012	12	0.012	12

According to the 2005 Annual ACC Report submitted by DHWC, Well #4 exceeded the MCL with a value of 12 ppb. However, Well #2 and Well #3 are both below the MCL. The change in the arsenic regulation might have an impact on DHWC and potentially require the development of a compliance strategy, which might require additional investment to maintain the use of the well for water production. Arizona American, the operator of the DHWC system under contract to the Town, is currently employing a strategy of blending Well #4 with the Anthem supply to mitigate the arsenic impact to deliver water to the system that is below the MCL.

## 3.2 Water Treatment Capacity Evaluation

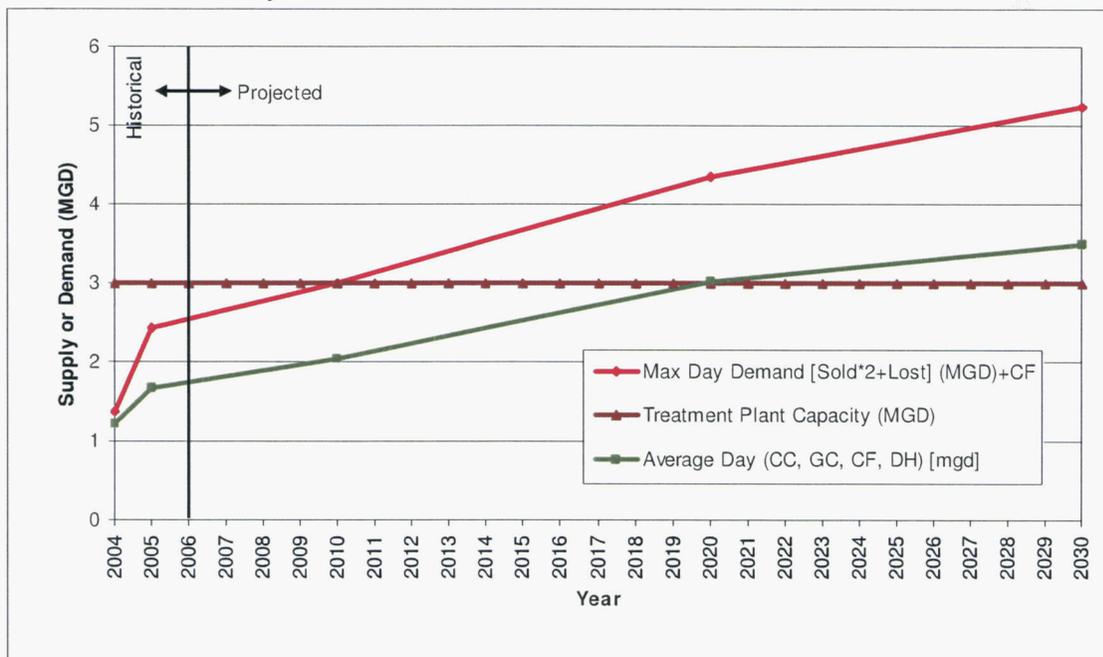
The objective of this task is to develop water treatment capacity requirements to ensure short- and long-term water demands are met.

A comparison of CCWC's demand versus the treatment plant capacity is shown on Figure 3-2. This figure depicts the maximum day demand for treatment capacity, which includes water sold and lost in Cave Creek, and the demand for Carefree, (which is 300 ac-ft/yr through 2010 and increases to 700 ac-ft/yr from 2011 through 2030). Water treated for Carefree is "wheeled" by CCWC and is included in Carefree's CAP allocation.

This figure shows that the maximum day demand exceeds the treatment plant capacity of 3 mgd by 2010, with projected demands extremely close to available capacity by 2008. This figure also depicts the average day demand for treatment capacity, which includes the demand for Cave Creek, Rancho Manana golf course, Carefree and Desert Hills (historical water delivered to DHWC only). The demand for Carefree under average day conditions is the same as described for maximum day conditions above, and it is part of Carefree's CAP allocation.

The Town should take immediate steps to increase capacity of the WTP to meet maximum day demands to at least 3.5 or 4 mgd in 2007. In the long term, the WTP capacity should be increased to just over 5 mgd to meet maximum day projected demands.

**FIGURE 3-2**  
CCWC Demand versus Treatment Plant Capacity  
*Town of Cave Creek Water System Master Plan*



### 3.3 Water Supply Alternatives

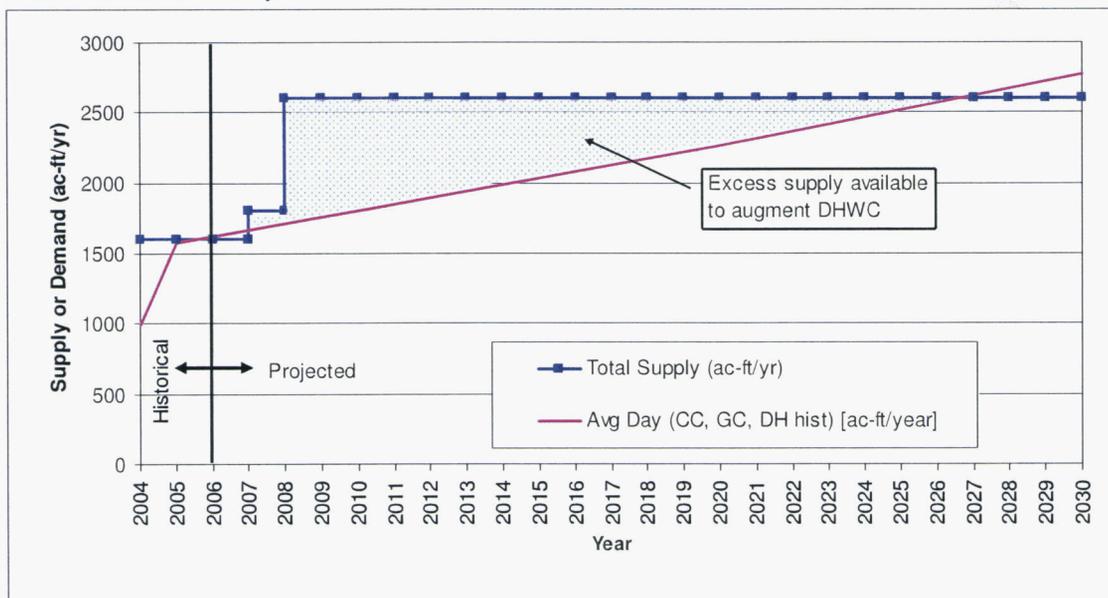
The objective of this task is to develop strategic water supply alternatives to ensure short- and long-term water needs are met. It includes the evaluation of using additional potential water supplies, which may result from the Town's efforts to obtain additional water rights if necessary.

A comparison of CCWC's system projected demand versus the current and projected CAP supply is shown on Figure 3-3. This figure depicts the average day demand, which includes Cave Creek customers, Rancho Manana golf course and Desert Hills. Deliveries to Desert Hills from CCWC are historical only in this graphic.

The average day demand exceeds the total supply after 2027. The Town should closely monitor its CAP allocation in 2007 and take steps to ensure that the Arizona Water Settlement Act supply is available by 2008. The addition of the CAP allocation from the Arizona Water Settlement Act provides CCWC with excess supply from 2008 through 2027. This excess may be used to augment supply to DHWC through the existing connection with CCWC. Both systems are being operated by Arizona American under contract to the Town, so no third-party coordination is required to deliver water from CCWC to DHWC.

After 2008, the Town may want to consider evaluating deliveries to Carefree and the Rancho Manana golf course. One option for the golf course supply would be diverting the untreated well water supply to the course. The Town should also consider purchasing additional CAP water from other sources by 2027 to meet its future demand requirements.

**FIGURE 3-3**  
CCWC Demand versus Total CAP Supply  
*Town of Cave Creek Water System Master Plan*

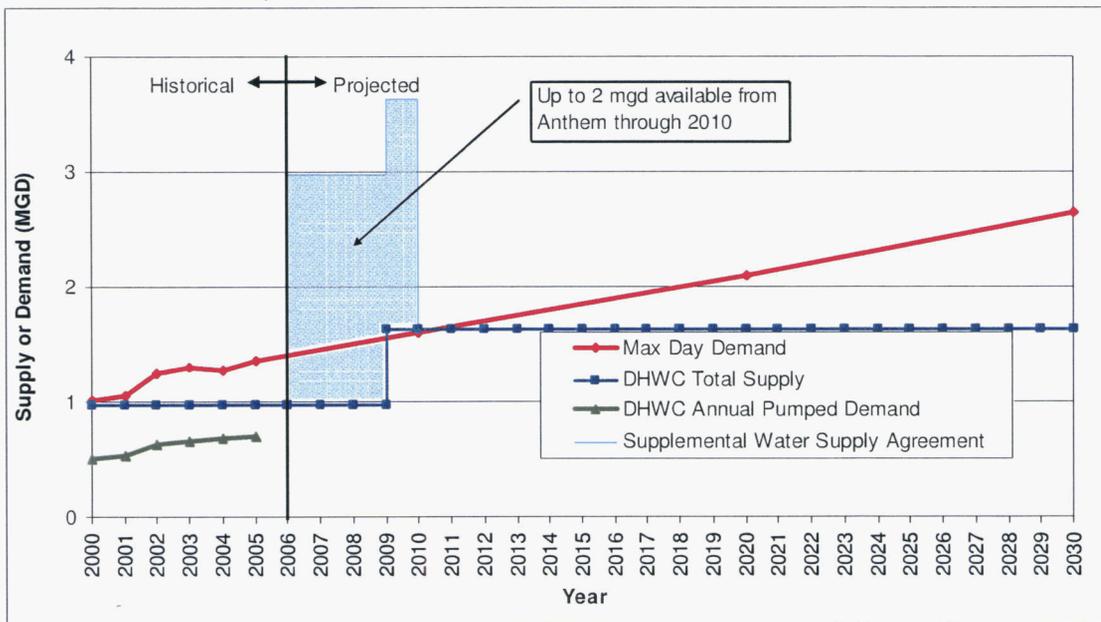


A comparison of DHWC's system demand versus DHWC's supply is shown on Figure 3-4. DHWC's total supply includes existing wells as well as the construction and successful development of a 450 gpm groundwater well from the planned Cielo Grande development (Technical Specifications for Construction, Development, Testing, and Equipping of One New Municipal Water Supply Well for Columbia Communities in the DHWC Service Area, Errol L. Montgomery & Associates, July 2006) by 2009. The supply assumes that groundwater wells are operating at full capacity at all times.

Figure 3-4 also depicts the quantity of water pumped annually by DHWC (as reported in the system's ACC annual utility reports). In past years, the deficit in supply has been provided through the purchases of additional water from Anthem or CCWC. Up to 2 mgd of treated water is available from Anthem via an agreement in place through 2010.

The DHWC system has several options available to further augment its future supply. One option is constructing a permanent connection to the Anthem community. As part of development agreements, another option is for the Town to impose developers to provide additional supplies by drilling new wells and constructing storage facilities, similar to the planned Cielo Grande development. As needed, another option is for the Town to augment supply to DHWC via the existing connection to the CCWC system. As noted in Figure 3-3, CCWC will have an excess of CAP water available to deliver to DHWC via the existing system connection. A longer term option to augment reliability and redundancy is to construct a connection to a neighboring municipality to “wheel” the Town’s CAP allocation for delivery to either DHWC or CCWC.

**FIGURE 3-4**  
Desert Hills Demand versus Desert Hills Supply  
Town of Cave Creek Water System Master Plan



## SECTION 4

# Water System Assessment

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The objective of this section is to identify a short- and long-term strategy to convey water to all customers in both water systems. CH2M HILL has also developed a recommendation for a Capital Improvement Program.

## 4.1 Hydraulic Model Development

CH2M HILL obtained a WaterCad (Bentley) water model for the CCWC system from Global Water Resources, the former owner of CCWC. This model was developed and calibrated by RBF Consulting. However, no water model had been developed for the DHWC system. CH2M HILL developed a water model and calibrated the model for the DHWC system using InfoWater software, an MWH Soft modeling software. The calibrated Desert Hills water model was combined with the Cave Creek water model and then the combined water model was upgraded to WaterGEMs (Bentley).

### 4.1.1 Desert Hills Water Model Development

Typically a water model consists of the following elements:

- **Junction** - Junctions are points placed at the intersection of two or more pipes (intersections or tees), at points of water consumption or inflow, at points where specific analysis values (e.g., pressure, concentration) are desired, and at points where pipe attributes (e.g., diameter, material) change.
- **Pipe** - A pipe conveys water from one junction node to another.
- **Pump** - A pump imparts energy to a fluid thereby raising its hydraulic head. A pump curve that describes the head imparted to a fluid as a function of its flow rate through the pump is needed for hydraulic analysis.
- **Valve** - A valve regulates either flow or pressure in a distribution system.
- **Tank** - Tanks are nodes with storage capacity, where the volume of stored water can vary with time during an extended period simulation.
- **Reservoir** - Reservoirs are nodes that represent an infinite external source or sink of water to the network. They are used to represent external water sources, such as treatment plants, wells and water import points.

The AutoCad drawings received from the DHWC were used to develop the model network in InfoWater, which is a GIS integrated water model software developed by MWH Soft. The model was checked for connectivity, crossing/intersecting pipes, parallel pipes, and nodes in close proximity. The coordinates of the model network were adjusted to "NAD\_1983\_StatePlane\_Arizona\_Central\_FIPS\_0202\_IntlFeet" using Spatial Adjustment in

ArcGIS. The junction node elevations were derived from the contour GIS shapefiles obtained from Maricopa Flood Control District using Elevation Extractor in InfoWater.

The Desert Hills Water Model consists of approximately 500 pipes, 430 junction nodes, 3 groundwater wells, 1 water import point (i.e., Anthem), 5 storage tanks, and 4 booster stations. Not all of the valves were modeled, but only those that split pressure zones. Thirteen valves were included in the model.

#### 4.1.2 Desert Hills Water Model Calibration

The Desert Hills Water Model was calibrated using the demand data and pressure recorder data obtained from Arizona American. October 26, 2006 was selected for model calibration because there were most pressure recorder data on this day. The water consumption on this day was 590 gpm.

The following assumptions were made for the model calibration:

- The Central Zone is the main pressure zone which has 3 groundwater wells (i.e., Well 2, Well 3, and Well 4), 1 water import point (i.e., Anthem) and three storage tanks (i.e., Well 4 Tank, Central Tank, and Carefree Highway Tank). This Zone feeds the 7<sup>th</sup> Street Booster Zone and Cloud Street Booster Zone by filling the tanks located at the same site as the boosters.
- Except at the Carefree Highway Booster Station where three pumps were on, only one pump was on at each of the following boosters: Well 4, 7<sup>th</sup> Street, and Cloud Street.
- The Cloud Street Tank was drawn down and being filled.

First, the meter reading data in July 2006 was joined to the attribute table of a GIS shapefile containing the spatial meter locations. The meter reading changes from the previous month were spatially allocated to the model junction nodes using Demand Allocator in InfoWater. Second, a global multiplier was applied to the demands obtained from the first step so that the total demand in the model matched the water consumption on the calibration day. Third, the model controls for the system facilities were adjusted to match the settings described above. Finally, the model was run and the pressure data from the model simulation was compared to the field pressure recorder data on the calibration day.

The model calibration results are presented in Table 4-1. Three out of four locations have pressure differences less than 10 pounds per square inch (psi) and one location has a pressure difference less than 15 psi. Based on limited available data, CH2M HILL felt the model adequately represented observed field conditions.

**TABLE 4-1**  
Model Calibration Results  
*Town of Cave Creek Water Master Plan*

Location	Field Average Pressure (psi)	Model Pressure (psi)	$ \Delta P $ (psi)
Anthem	60	51	9
7 <sup>th</sup> Street Booster	94	101	7
Central Avenue and Joy Ranch Road	45	58	13
Well 3	68	71	3

### 4.1.3 Model Combination and Upgrading to WaterGEMs

WaterGEMs is a GIS integrated water model software developed by Bentley, the same company that developed WaterCad. CH2M HILL opted to use WaterGEMs to develop the combined water model based on the following considerations:

- WaterGEMs and WaterCad have similar functions and modeling capabilities. Modelers who are familiar with WaterCad can easily learn how to use WaterGEMs. Because the Cave Creek Water Model was developed in WaterCad, it is logical choice to use WaterGEMs for the combined model.
- WaterGEMs has more new functions and modeling capabilities than WaterCad, especially its GIS integration feature which makes the model presentation very powerful.

The Cave Creek Water Model was upgraded to WaterGEMs first. Next, the Desert Hills Water Model was exported from InfoWater to EPANET, since WaterGEMs has the capability of importing EPANET files. Having the Cave Creek Water Model open in WaterGEMs, the Desert Hills Water Model was imported as a submodel as an EPANET input file. CH2M HILL combined the model elements such that the systems could be operated to serve water from CCWC to DHWC.

CH2M HILL also briefly validated the information in the CCWC WaterCad model provided by Global Water Resources once it was upgraded to WaterGEMs. As part of the validation, junction elevations were compared to Maricopa County's GIS elevation contours. A summary of modifications, mostly minor, made to junction elevations is available in Appendix A.

### 4.1.4 Model Scenarios

The water model contains several scenarios to evaluate the systems under varying demand conditions. The scenarios are grouped into three categories: near term (2008), year 2010 and year 2030. In each category, the model was run with average day, maximum day, maximum day plus fire flow and peak hour demands for a total of 12 scenarios.

## 4.2 Transmission Assessment

More info to be added regarding size and location of future facilities based modeling results...

## 4.3 Storage Assessment

Storage was assessed throughout the systems using the following equations:

$$\text{Storage for DHWC} = \text{PH-MD} + \text{Fireflow} \quad (3)$$

$$\text{Storage for CCWC} = \text{PH-MD} + \text{Fireflow} + \text{Emergency Storage} \quad (4)$$

Where:

Peak Hour = Max Day \*1.7

Max Day = Average Day (Sold) \*2.0 + Lost

Fireflow (10-hour duration) =  $(1.47(P)^{0.5} [1-0.01(P)^{0.5}])$ , where P is in 1,000s of people

Emergency Storage = Max Day\*10 percent

**TABLE 4-2**  
Projected Storage Requirements  
*Town of Cave Creek Water System Master Plan*

Storage Requirements	DHWC (million gallons)	DHWC (million gallons) [County Requirement]	CCWC (million gallons)	CCWC (million gallons) [County Requirement]
Existing		1.01		0.71
2010	2.4	1.2	3.5	1.8
2020	2.9	1.6	4.4	2.3
2030	3.5	2.0	5.3	3.0

This approach for calculating storage requirements is more conservative than Maricopa County's requirement (both with and without the Emergency storage volume) of adequate storage to meet the average day of the maximum month. The County's method would project a little more than half of the storage volume presented in Table 4-2 above and is included for reference. The County requirement was calculated by developing seasonal water use curves to determine the multiplier of average day usage to maximum month. The seasonal water use curves for DHWC and CCWC are included in Appendix B. DHWC currently meets the County's storage requirement, but will need to construct additional storage facilities to meet the requirement in the future.

CH2M HILL used a more conservative approach for the CCWC storage assessment due to the large elevation changes across the system (resulting in multiple pressure zones) and the infeasibility of being able to construct storage facilities in every pressure zone. On the contrary, the DHWC has fewer pressure zones with less elevation change across the system, allowing several storage facilities to be constructed in its major pressure zone.

Based on current storage capacities, both systems are well short of meeting the projected storage requirements. The Town has several sites planned for the construction of future storage facilities. These include additional storage near the WTP, a site in Carefree, Cahava Springs, and in the Spur Cross Ranch area. DHWC will need to develop additional storage facilities to meet its needs, and the Town may consider adding conditions for developers to participate in these facilities as part of development agreements.

More info to be added regarding capacity and location of future facilities based modeling results...

## 4.4 Capital Improvement Program

Need to fully flesh out CIPs and get cost information from estimators...

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material
<b>Desert Hills</b>						
<b>2008 Improvements</b>						
<i>Cielo Grande Pipes</i>						
3061	DHP-1413	654	3052: DHJ-905	3055: DHJ-906	8	Ductile Iron
3064	DHP-1415	1,020	3055: DHJ-906	3060: DHJ-911	8	Ductile Iron
3065	DHP-1416	838	3056: DHJ-907	3057: DHJ-908	8	Ductile Iron
3066	DHP-1417	886	3058: DHJ-909	3059: DHJ-910	8	Ductile Iron
3067	DHP-1418	1,545	3055: DHJ-906	3058: DHJ-909	8	Ductile Iron
3068	DHP-1419	747	3058: DHJ-909	3056: DHJ-907	8	Ductile Iron
3069	DHP-1420	423	3056: DHJ-907	2277: DHJ-548	8	Ductile Iron
3054	DHP-1412	844	3052: DHJ-905	1979: DHJ-400	6	Ductile Iron
3072	DHP-1422	1,335	3070: DHJ-913	3052: DHJ-905	6	Ductile Iron
<i>Permanent Anthem Connection</i>						
2902	DHP-1232	2,266	2430: DHANTHEM	2326: DHJ-1219	8	Ductile Iron
3071	DHP-1421	1,973	2326: DHJ-1219	3070: DHJ-913	8	Ductile Iron
3074	DHP-1423	4,721	3070: DHJ-913	3073: DHJ-914	8	Ductile Iron
3075	DHP-1424	1,116	3073: DHJ-914	2437: DHT-5	8	Ductile Iron
<b>2010 Improvements</b>						
<i>Incorporate customers NE of Desert Hills Dr/Central into 7th St Booster Zone</i>						
DHP-1237	close pipe					
	New pipe					
3153	DHP-1461	700	3150: DHJ-932	1955: DHJ-130	8	Ductile Iron
<i>Las Campanas Dev</i>						
3100	DHP-1435	443	2327: DHJ-461	3099: DHJ-921	8	Ductile Iron
3101	DHP-1436	838	3099: DHJ-921	2343: DHJ-555	8	Ductile Iron
3102	DHP-1437	611	2037: DHJ-581	3098: DHJ-920	8	Ductile Iron
3103	DHP-1438	727	3098: DHJ-920	3099: DHJ-921	8	Ductile Iron
<i>Desert Hills Ranch Dev</i>						
3090	DHP-1427	1,222	2284: DHJ-610	3085: DHJ-915	8	Ductile Iron
3091	DHP-1428	1,312	3085: DHJ-915	3086: DHJ-916	8	Ductile Iron

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material
3092	DHP-1429	1,154	3086: DHJ-916	3088: DHJ-918	8	Ductile Iron
3093	DHP-1430	1,494	3088: DHJ-918	3089: DHJ-919	8	Ductile Iron
3094	DHP-1431	1,218	3089: DHJ-919	2027: DHJ-566	8	Ductile Iron
3095	DHP-1432	1,161	3085: DHJ-915	2005: DHJ-570	8	Ductile Iron
3096	DHP-1433	685	2005: DHJ-570	3087: DHJ-917	8	Ductile Iron
3097	DHP-1434	620	3087: DHJ-917	3088: DHJ-918	8	Ductile Iron
<b>Apache Peak III Dev</b>						
3110	DHP-1441	487	2245: DHJ-551	3105: DHJ-923	8	Ductile Iron
3111	DHP-1442	705	3105: DHJ-923	3104: DHJ-922	8	Ductile Iron
3112	DHP-1443	559	3105: DHJ-923	3106: DHJ-924	8	Ductile Iron
3113	DHP-1444	720	3106: DHJ-924	3107: DHJ-925	8	Ductile Iron
<b>Cloud Rd Booster Zone Piping</b>						
3134	DHP-1453	1,303	1957: DHJ-132	3133: DHJ-929	8	Ductile Iron
3135	DHP-1454	786	3133: DHJ-929	2093: DHJ-334	8	Ductile Iron
3137	DHP-1455	1,930	2086: DHJ-333	3136: DHJ-930	8	Ductile Iron
3139	DHP-1456	1,295	3136: DHJ-930	3138: DHJ-931	8	Ductile Iron
3140	DHP-1457	472	3138: DHJ-931	2406: DHJ-411	8	Ductile Iron
<b>Looping W/O Central Ave</b>						
3123	DHP-1445	1,682	2014: DHJ-594	3122: DHJ-926	8	Ductile Iron
3125	DHP-1446	941	3122: DHJ-926	3124: DHJ-927	8	Ductile Iron
3126	DHP-1447	1,199	3124: DHJ-927	2028: DHJ-567	8	Ductile Iron
<b>Looping S/O Carefree Hwy</b>						
3132	DHP-1452	776	2319: DHJ-343	2015: DHJ-593	8	Ductile Iron

**2030 Improvements**

*Add 1 elevated storage tank (750k) and associated piping to connect to 10th St Office tank*

*New tank and boosters for new pressure zone*

*Distribution piping*

*New well, storage, booster on west side of Central Zone*

Well 10" casing, 1000 ft deep, 450 gpm

**Cave Creek****2008 Improvements**

***New 8 inch to replace old pipe on Carefree Hwy***

1900	P-1407	1,182	744: J-745	742: J-743	8	Ductile Iron
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ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material
<b>Create new Pressure Zone</b>						
PRV-14	75 psi	on old new river e/o 36th St				
PRV-17	75 psi	on Carefree Hwy				
<b>new pipe to replace old pipe on Cave Creek rd</b>						
1849	P-1345	444	857: J-829	858: J-832	8	Ductile Iron
1850	P-1346	1,452	833: J-865	886: J-892	8	Ductile Iron
<b>increase WTP capacity from 3 mgd to 4 mgd (Trident treatment unit)</b>						
no model data for this line item						
<b>2010 Improvements</b>						
PRV-15	on Cloud Rd w/o 32 St to reduce pressure in that area					
PRV-16	on Spur Cross/Yucca for redundant connection betw Zones 4 & 7					
piping on Cahava Ranch/Morning Star						
piping in Zone 8						
Spur Cross tank(s)						
38th St booster						
32nd St booster						
<b>2030 Improvements</b>						
Cahava Springs Tank, piping, booster						
new PZ on north side w/booster						
Add'l piping s/o Cahava Springs Tank						
New raw water transmission, boosters						

SECTION 5

# Conclusion

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Summary comments will be included herein when final modeling results with concurrence from the Town and cost information is available...



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**Appendix A**

**TABLE A-1**  
**Elevation Revisions in CCWC Model**

<b>Junction</b>	<b>Initial Elevation</b>	<b>Revised Elevation GIS Contour</b>
J-872	2099.41	2105.41
J-731	2098.62	2100.62
J-134	2099.41	2101.41
J-762	2118.77	2125.77
J-139	2119.42	2125.42
J-313	2129.72	2149.72
J-312	2137.17	2141.17
J-630	2139.73	2142.73
J-626	2179.76	2180.76
J-604	2179.46	2180.46
J-93	2206.17	2196.17
J-889	2178.84	2180.84
J-129	2178.84	2180.84
J-868	2149.84	2160.84
J-844	2158.79	2165.79
J-825	2181.36	2179.36
J-165	2158.63	2161.63
J-172	2165.32	2155.32
J-806	2164.11	2154.11
J-690	2179.23	2185.23
J-276	2179.13	2181.13
J-605	2219.36	2226.36
J-830	2194.95	2204.95
J-867	2178.74	2188.74
J-316	2158.89	2163.89
J-867	2188.74	2208.74
J-870	2198.23	2218.23
J-270	2199.9	2209.9
J291	2179	2183
J-24	2218.96	2221.96
J-27	2219.16	2221.16
J-78	2258.79	2261.79
J-881	2238.85	2240.85
J-92	2260.79	2259.79
J-91	2238.85	2240.85
J-838	2238.85	2240.85
J-854	2296.92	2279.92
J-854	2296.92	2279.92
J-649	2279.17	2281.17
J-618	2279.3	2291.3

**TABLE A-1**  
**Elevation Revisions in CCWC Model**

<b>Junction</b>	<b>Initial Elevation</b>	<b>Revised Elevation GIS Contour</b>
J-81	2279.23	2291.23
J-88	2299.41	2310.41
J-617	2299.28	2301.28
J-20	2299.54	2301.54
J-8	2366.31	2356.31
J-8	2366.31	2356.31
J-749	24418	2419.8
J-4	2423	2419.23
J-322	1937.99	1953
J-771	1918.73	1920.73
J-338	1919.49	1921.49
J-770	1919.88	1921.88
J-775	1918.5	1923.5
J-349	1939.96	1940.96
J-346	1939.96	1940.96
J-340	1939.34	1940.34
J-768	1939.73	
J-335	1939.57	1940.57
J-334	1939.96	
J-331	1939.44	1940.44
J-328	1959.38	1960.38
J-418	2020.7	2000.7
J-420	2048.39	2038.39
J-419	2043.96	2033.96
J-557	1999.7	2000.7
J-859	2038.81	2040.81
J-458	2019.98	2035.98
J-457	2024.51	2019.51
J-461	2038.85	2040.85
J-794	2099.8	2103.8
J-576	2099.8	2103.8
J-583	2119.98	2128.98
J-795	2139.76	2140.76
J-700	2118.34	2128.34
J-150	2118.34	2128.34
J-820	2118.34	2128.34
J-151	2118.57	2123.57
J-597	2142.03	2132.03
J-593	2079.3	2081.3
J-588	2099.31	2100.31

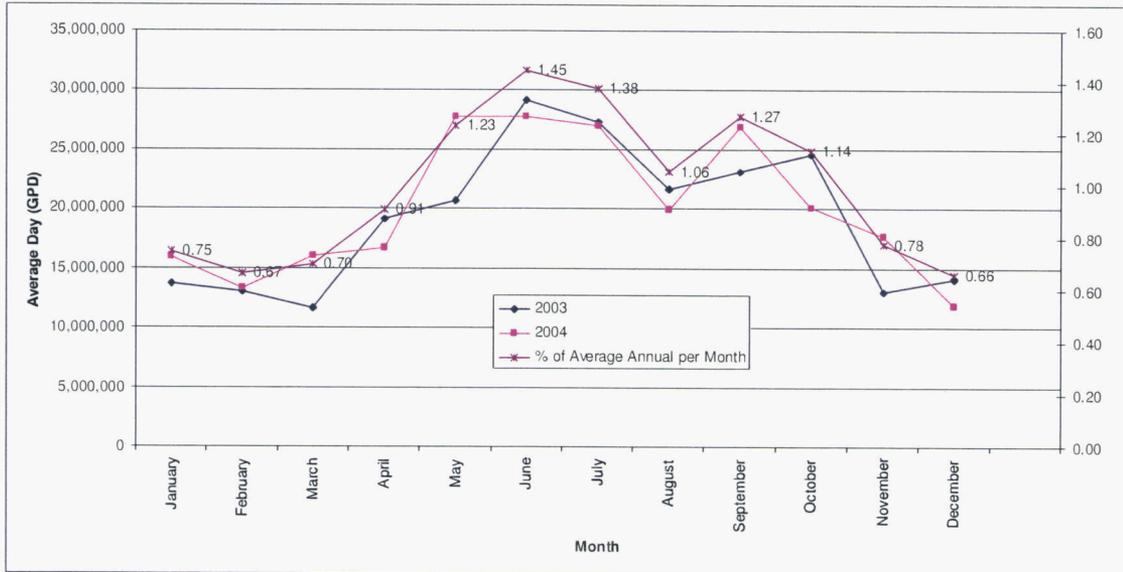
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**Appendix B**

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**FIGURE B-1**  
**DHWC Seasonal Water Use Curve**  
*Town of Cave Creek Water System Master Plan*



**FIGURE B-2**  
**CCWC Seasonal Water Use Curve**  
*Town of Cave Creek Water System Master Plan*

