Quartz Hill Water District
Quartz Hill, California
June, 2002

2002 URBAN
WATER MANAGEMENT PLAN
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Quartz Hill Water District
2002 Urban Water Management Plan
Update
Contact Sheet

Date plan submitted to the Department of Water Resources: 6/15/02
Name of person preparing this plan: Claud Seal, PE, Boyle Engineering Corp.
Phone: (661) 948-0896
Fax: (661) 948-0897
E-mail address: cseal@boyleengineering.com
The Water supplier is a: Special District
Utility services provided by the water supplier include: Water
Is This Agency a Bureau of Reclamation Contractor? No
Is This Agency a State Water Project Contractor? No
Public Participation

Law

10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published ... After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

Public Participation

The Quartz Hill Water District has actively encouraged community participation in its urban water management planning efforts since the District was formed in 1955. Advertised public meetings have been held annually to present the District's previous year's expenditures as well as the next annual proposed budget. Each budget cycle has become more inclusive of conservation efforts and emergency measures to provide water in the event of an area electrical power failure, interruption of the surface water supply, or mechanical breakdown causing water supply loss.

For this initial Urban Water Management Plan, public meetings were held that included (1) a general concept District Board of Directors discussion session, (2) "open house" discussions on water conservation opportunities for specific customer sectors (for example, an ultra-low flush toilet replacement for tourist-serving businesses), and (3) meetings on water reduction methods (to gain public support, determine potential problems, and design conservation approaches). Formal public sessions were held for review and comment on the draft plan before the District Board of Directors' approval. Public interest groups that were given the opportunity to participate in the development of the plan are listed in Appendix A.

A special effort was made to include grassroots community and public interest organizations (such as neighborhood associations, church and service groups), the Chamber of Commerce, local environmental groups, and landscape and growers' associations. Notices of public meetings were included as inserts in District water bills and were posted on the District's homepage on the Internet. Legal public notices for each meeting were published in the local newspapers, posted at District facilities and high usage commercial establishments such as grocery stores. Copies of the draft plan were available at District offices, schools and libraries.

Plan Adoption

The Quartz Hill Water District prepared this initial version of its Urban Water Management Plan during the winter of 2001-2002. The UWMP plan was adopted by District's Board of Directors in June, 2002 and submitted to the California Department of Water Resources within 30 days of Board of Directors' approval. Attached to the cover letter addressed to the Department of Water Resources and as Appendix B are copies of the signed Resolution of Plan Adoption. This plan includes all information necessary to meet the requirements of California Water Code Division 6, Part 2.6 (Urban Water Management Planning).
Agency Coordination

Law

10620 (d) (2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

Coordination Within the District

District water department staff met and coordinated the development of this plan with the District Board of Directors, District Engineer, fire, and building and safety offices.

On May 1 each year, the District's staff compiles and correlates data, notifies the Board of Directors (BOD) about the outlook on the water supplies for the District for the next 12 months. In 1991, the BOD adopted guidelines, which require that adequate water supply be available before new development can be approved. In the event of a declared water shortage, the District has adopted a policy to establish a moratorium on new water service permits. See Appendix C.

Interagency Coordination

All water sources for the Quartz Hill Water District are used exclusively for urban and agricultural interests in the area of the District. The District therefore invites recommendations for the development of this plan from the following agencies:

- Other local public agencies, including County health, planning, fire, and building departments; Office of Emergency Services; and the various Lancaster and Antelope Valley School Districts.
- Other Wholesale and Retail Water area water suppliers including the Antelope Valley-East Kern Water Agency (AVEK), Palm Ranch Irrigation District, and the Palmdale Water District.
- Los Angeles County Regional Sanitation District (LACRSD).

Supplier Service Area

Law

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631. (a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.
Climate

QHWD has an inland Mediterranean climate. Summers are hot and dry, and winters are cool and usually dry unless a storm system is in the area. Annual maximum mean temperatures range from 50°F in the winter to 97°F in the summer. Annual average rainfall is about 6 inches with the rainy season typically occurring between November and April. Snowfall within District limits is uncommon but not rare. Prevailing winds are typically from the southwest at velocities of up to 50 miles per hour.

Other Demographic Factors

The Quartz Hill Water District is located in the southwest end of the Antelope Valley at the north end of Los Angeles County. It is 65 miles northwest of Los Angeles on the Antelope Valley 14 and west of both Palmdale and Lancaster. The District lies in the foothills of the San Gabriel Mountains that divide the Antelope Valley from the Los Angeles proper basin. The Pacific Ocean is about 160 miles to the west. QHWD occupies an area of about 4.5 square miles (2880 acres) in one of the most appealing residential areas in the valley. Incorporation of the District occurred in 1955 and water service is provided to all residential, commercial, industrial, and agricultural customers, and for environmental and fire protection uses. The agricultural water users of years past have been taken over by home developers. Although there are older homes with their own wells still in operation, buyers of these homes typically discontinue operation of their deep wells and connect to the District’s water system.

First ranchers, and then farmers began using the rich land in the QHWD area in the early 1800’s. The drought conditions and dust bowls of the Midwest motivated many of the farmers to eventually relocate in the QHWD region in the late 1920’s and early 30’s of the Depression Era. The relatively shallow water from wells and temperate climate provided longer growing seasons for a variety of crops, especially nuts and pitted fruit. Vineyards were added later. Quartz Hill never became a major economic center of the region although its rural setting and lifestyle have been a continuous attraction to old and new Antelope Valley residents. Since there are no year-round springs, creeks, or rivers, groundwater was and remains the only water supply. Enough naturally occurring recharge meant the groundwater supply has been sufficient to meet the needs of the area.

Beginning in the 1970s, QHWD (along with most of California) experienced an economic boom, and large increases in the residential population (both single family and multi-family) resulted. The foothill terrain and moderate urban setting has become attractive to many local Lancaster and Palmdale residents as well as commuters to the Los Angeles basin job markets.

Due to its proximity to growing business centers in Palmdale and Lancaster and major population centers to the south (Los Angeles) little industrial development has taken place in the QHWD District Limits. The District’s Commercial customers generally fall in the range of small to medium sized vendors, personal services, or real estate agents.

As the population increased in the District and region, the demand for water also increased. Groundwater levels have dropped. The District delivers potable water through its network of pressurized distribution lines. The system is supplied by active wells with one additional reserve well. The District has 4 potable water reservoirs. Additional wells are currently under construction.
Between 1920 and 1970, population increases for QHWD were small but steady. However, the District began to experience rapid growth during the 1970’s and 1980s when the population nearly tripled. Agricultural processing facilities began moving out of QHWD area due to encroaching residential units. The annual crop harvesting season requirements for increased short-term labor gave way to year-round permanent residents.

Table 2 shows the population total for the District from 2000, with projections to 2020.

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<tbody>
<tr>
<td></td>
<td>4,384</td>
<td>5,082</td>
<td>5892</td>
<td>6,830</td>
<td>7920</td>
</tr>
</tbody>
</table>

**Past Drought, Water Demand, and Conservation Information**

The local region experienced a prolonged drought from 1987 through 1992. The District met its customers' needs through careful management of groundwater and local reservoir supplies. Community involvement made it possible to have voluntary rationing during 1987-89. The decreased supply of water from Northern California did not adversely affect QHWD since the District was able to supplement surface water shortages by increased well pumping. Due to the decreased surface water available to other area users, those users increased usage of well water and the water tables began dropping. A slight voluntary decrease in usage allowed the District to continue providing water supplies through its deep well system.

Prior to 1995, new water demand maintained a growth rate of about 1-2% per year (Table 5), due in part to a general slow-down in the region’s economy and more affordable housing tracts in adjacent Palmdale and Lancaster. From 1996 to 2001, the area population increased by 13% raising Quartz Hill’s population to about 9,626 full year residents. New water demand has kept pace with the growth. The District continues to have a modest but growing commercial sector.
Water Sources (Supply)

Law

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments [to 20 years or as far as data is available.]

Water Supply Sources

The Quartz Hill Water District has two sources of water: groundwater and surface water from the California Aqueduct. The imported California Aqueduct water is distributed by the Antelope Valley-East Kern Water Agency (AVEK) to retailers like Quartz Hill Water District. AVEK water has been available to QHWD since 1978. The District has potential for additional area wells.

<table>
<thead>
<tr>
<th>Table 2. Current and Projected Water Supplies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase(d) from AVEK (wholesaler- Imported Water from DWR)</td>
</tr>
<tr>
<td>District produced groundwater ¹</td>
</tr>
<tr>
<td>District produced surface water</td>
</tr>
<tr>
<td>Transfers</td>
</tr>
<tr>
<td>Exchanges</td>
</tr>
<tr>
<td>Recycled Water ²</td>
</tr>
<tr>
<td>Recycled Water used for groundwater (gw) recharge (adds to gw supply)</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Total (AF)</td>
</tr>
</tbody>
</table>

¹ Units of Measure: Acre Feet/Year
² Projections (Italics).

Groundwater

Through 2000, the District has obtained about 1,450 acre-feet per year (AFY) from six wells, from an average depth of 250 to 350-feet. In 2001 the well production increased to 3,050 acre-feet due to the reduction of available California Aqueduct State Water Project surface water via AVEK. The Antelope Valley Groundwater Basin is not adjudicated. QHWD wells are cased to about 300-feet. Water quality is within standards set for acceptable drinking water by the federal government and the California Department of Health Services as of the date of publication of this report. QHWD does not own or have access to an
open basin reservoir or a lake. As new wells are brought on line, older wells are relegated to standby status or are redrilled for increased production.

**Recycled Water**

The Quartz Hill Water District does not control the area wastewater collection systems and processing facilities. That service is provided by Los Angeles County. The County’s two area processing facilities and treatment ponds are about ten miles east of the District and nearly 25 miles northeast of the District. The cost to treat the wastewater to tertiary level and transport via as yet unbuilt pipelines far exceeds the cost to enlarge existing wells and drilling new wells. QHWD does not plan to invest in recycled water in the foreseeable future.

The District is planning to recharge local aquifers when excess surface water is available. New wells are being equipped with recharge piping.
Reliability Planning

Law

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable.

10631 (c) For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to replace that source with alternative sources or water demand management measures, to the extent practicable.

10631 (c) Provide data for each of the following:
(1) An average water year, (2) A single dry water year, (3) Multiple dry water years.

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (b) An estimate of the minimum water supply available during each of the next three-water years based on the driest three-year historic sequence for the agency's water supply.

Reliability

The costs of demand management or supply augmentation options to reduce the frequency and severity of shortages are now high enough that District planners must look more carefully at the costs of unreliability to make the best possible estimate of the net benefit of taking specific actions, hence the term "reliability planning." Reliability is a measure of a water service system's expected success in managing water shortages.

To plan for long-term water supply reliability, planners examine an increasingly wide array of supply augmentation and demand reduction options to determine the best courses of action for meeting water service needs. Such options are generally evaluated using the water service reliability planning approach.

In addition to climate, other factors that can cause water supply shortages are earthquakes, chemical spills, and energy outages at treatment and pumping facilities. District Planners include the probability of catastrophic outages when using the reliability planning approach.

Reliability planning requires information about: (1) the expected frequency and severity of shortages; (2) how additional water management measures are likely to affect the frequency and severity of shortages; (3) how available contingency measures can reduce the impact of shortages when they occur.

The Quartz Hill Water District will consider adopting a system-wide annualized demand reduction target of no more than 25 percent. It is believed that anything over a 25% reduction would cause an economic
hardship within the District. The 25 percent criterion is an overall use reduction target, which will result in an estimated 25% reduction to residential users and commercial users.

The District used the Department of Water Resources' Bulletin 160-98, the California Water Plan Update, chapters 7, 8 and 9, Options for Meeting Future Water Needs, in the development of the reliability comparison section.

**Frequency and Magnitude of Supply Deficiencies**

The District experienced a severe drought during 1976-77 but well water supplies were adequate to provide water to its customers. During the 1987-92 drought, although the community had grown, well water supplies coupled with the reduced surface water supply were still adequate to provide water to the District's customers. Future droughts could, and probably will negatively impact the District since more wells, not all of them owned by the District, will be pumping water from the area aquifers. The area population has increased by over 30% in Lancaster and over 65% in Palmdale during the last five years. The District will be better prepared to handle drought impacts due to: (1) the adoption by the District Board of Directors of a "No-Waste" Ordinance (see Appendix C); (2) successful voluntary rationing on the part of the community; and (3) concentrated water conservation programs and an educational water conservation program with the local schools, and residential water audits; and (4) the recharge of aquifers with periodic excess surface water.

The current and future supply projections through 2022 are shown in Table 3. The future supply projections assume average annual recharge to the Antelope Valley Basin and continued availability of surface water.

**Plans to Assure a Reliable Water Supply**

The future supply projections assume average annual recharge to the Antelope Valley Aquifers and continued surface water availability, although reduced in quantity. The District also has the option of acquiring additional water via adjacent interagency water sources such as the Los Angeles County Waterworks Department. With the area water table dropping up to 1 to 2-feet per year, additional expenses will be incurred by the District to drill more wells and provide more storage reservoirs.

**Reliability Comparison**

Table 4 details estimated water supply projections associated with several water supply reliability scenarios. For further information on the data, see Three-year Minimum Supply and Water Shortage Contingency Plan sections.

<table>
<thead>
<tr>
<th>Table 3. Supply Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multiple Dry Water Years</strong></td>
</tr>
<tr>
<td><strong>Average Normal Water Year 2002 (Volume)</strong></td>
</tr>
<tr>
<td>4,967</td>
</tr>
</tbody>
</table>

Unit of Measure: Acre-feet/Year

6/6/02
Three Year Minimum Water Supply

Based on experiences during the recent drought, the community recognizes that it is better to enter into a water shortage alert early, at a minimal level, to establish necessary rationing programs and policies, to gain public support and participation, and to reduce the likelihood of more severe shortage levels later. As the community continues to become more water efficient, it may become more difficult for customers to reduce their water use during water shortages (this is called “demand hardening”). Staff does not believe that District customers are yet approaching demand hardening, because there are still large potential water efficiency improvements in residential plumbing fixtures, appliances, and landscapes, and in the commercial, industrial, and institutional sectors. However, improved water use efficiency does mean that water supply reserves must be larger and that water shortage responses must be made early to prevent severe economic and environmental impacts.

Beginning in Fiscal Year 2002-03 and continuing each year thereafter, the District will forecast in April of each year, the 3-year minimum water supply availability for its sources of water, and projects its total water supply for the current and three subsequent years. Based on the water shortage stages and triggers, a water shortage condition may be declared. The driest three-year historic sequence for the District’s water supplies was from 1990 to 1992. Because shortages can have serious economic and environmental impacts, the District will make every effort to limit water shortages to no more than 25%. Refer to Appendix D table G5 for costs associated with reduced water supply.

Transfer or Exchange Opportunities

Law

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

Water Transfers

The District has standby piping connections with one of the adjacent water suppliers, the Los Angeles County Waterworks. The L.A. County Waterworks, until early 2002, supplied a small isolated area of the District that was located in the surrounding foothills. The Waterworks had better head pressure in that area. The servicing and billing logistics were handled through the District. Although a new QHWD pipeline eliminated that supply need, the connection to LA water is still available to the District’s system. Former farmlands that utilized their own wells are slowly being replaced with residential units. The agricultural wells are being replaced with connections to the QHWD. The cyclical water demands on single or small local proximity well groupings are being replaced with the managed and controlled supply of District water.

There is no contractually agreed upon annual allotment of treated surface water between the Antelope Valley-East Kern Water Agency (AVEK) and QHWD. Since AVEK’s Quartz Hill Water Treatment Facilities have been in operation, QHWD has purchased an average of 1700 acre-feet per year of DWR water beginning in 1978. In the last five years there has been an increase of water purchases of annual quantities of up to 2781 acre-feet per year. For purposes of this study, the predicted quantities of water available to QHWD from AVEK have been conservatively estimated for planning purposes at a declining 2% per year.
Water Use Provisions

Law

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:

(A) Single-family residential; (B) Multifamily; (C) Commercial; (D) Industrial; (E) Institutional and governmental; (F) Landscape; (G) Sales to other agencies; (H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof; and (I) Agricultural.

(2) The water use projections shall be in the same 5-year increments to 20 years or as far as data is available.

Past, Current and Projected Water Use

Since 1994, new customer connections are being added at a rate about 19% per year, while water demand has increased at a rate of about 18.5% per year. Unaccounted water losses are unknown at this point. Table 5 illustrates Past, Current, and Projected Water Use 1991 - 2022 in acre-feet per year, and Table 6 illustrates Past, Current, and Projected Water Use 1991 - 2022 in number of customers per year. Figure 1 provides a graphical presentation of the of past usage and projected requirements based on three mathematical models.

Figure 1
Past District Water Usage and Future Projected Use B Linear and Polynomial Trend Lines

QHWD WATER USE 1955 TO 2000
Projected to 2022

\[ y = 2.0615x^2 + 1.5786x + 321.27 \]

\[ y = 98.469x - 433.85 \]
## Table 4.
### Annual Past, Current and Projected Water Demand (AF/yr)(3)

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<td>Single family residential</td>
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<td>Institutional and governmental</td>
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<tr>
<td>Saline barriers</td>
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<tr>
<td>Groundwater recharge (recycled water)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
</tr>
<tr>
<td>Conjunctive use</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
</tr>
<tr>
<td>Agriculture (4)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
</tr>
<tr>
<td>Unaccounted-for system losses</td>
<td>Unkn</td>
<td>Unkn</td>
<td>Unkn</td>
<td>Unkn</td>
<td>Unkn</td>
<td>Unkn</td>
<td>Unkn</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3.012</td>
<td>4.521</td>
<td>5.251</td>
<td>6.076</td>
<td>7.044</td>
<td>8.165</td>
<td>9.466</td>
</tr>
</tbody>
</table>

Unit of Measure: Acre-feet/Year

(1) All residential, commercial, Industrial, government customer water users are grouped into one classification.
(2) Italicized numbers are future projections.
(3) Using 3% Annual Growth

## Table 5.
### Number of Connections by Customer Type (ea)(1)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Single family residential</td>
<td>3,675</td>
<td>4,140</td>
<td>4,468</td>
<td>5,180</td>
<td>6,005</td>
<td>6,961</td>
<td>8,070</td>
</tr>
<tr>
<td>Multi-family residential</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
</tr>
<tr>
<td>Commercial</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
</tr>
<tr>
<td>Industrial</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
</tr>
<tr>
<td>Institutional and governmental</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
</tr>
<tr>
<td>Landscape/recreation</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
</tr>
<tr>
<td>Agriculture</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other (Recycle water)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3,675</td>
<td>4,140</td>
<td>4,468</td>
<td>5,180</td>
<td>6,005</td>
<td>6,961</td>
<td>8,070</td>
</tr>
</tbody>
</table>

(1) Using 3% Annual Growth
(2) All commercial and residential water users are grouped into one classification.
(3) Italicized numbers are projections.
(4) During the period of 1993 to 2000, the annual usage rate was approximately 1.0 AF per connection.

Under rationing conditions, it is apparent that the District needs to improve information about its customers. Previously, the District identified and billed customers on the basis of street address, and the meter size. Realizing that each type of customer would have different needs and different appropriate rationing
allocations, the District plans to redesign its water billing system so all accounts can be classified by usage and each customer can be identified by sector and usage category. The District is developing a 5-year plan to differentiate customer billing types in all service connections.

Residential Sector
QHWD uses the figure if 3.5 persons per household for each connection. Since Multi-family residential customers are not separately metered, the real per capita usage is not known. Total system per capita water use (excluding agricultural water use) averages 1.0 AF/year per connection, or 1.0 AF/3.5 persons. This yields 0.28 AF/person or 255 gallons per capita per day. Water efficiency improvements appear to be a way of reducing per capita water use, which will help prevent a return to pre-drought levels.

A Capacity Charge program was established in 1992, where new development pays additional fees to help offset their water demand by increasing the water use efficiencies of existing customers. This program has provided funding to support water use surveys for residential and public facilities, and to study implementing an ultra-low flush toilet replacement programs. Single and multi-family residential connections are projected to increase at about 3% per year over the next 20 years, but the efficiency improvements will significantly help offset the water demand of new customers.

Commercial Sector
The District has a small but growing mix of commercial customers, ranging from markets, restaurants, antique stores, insurance offices, beauty shops, and gas stations and other facilities serving the local and visitor population. The sector is growing at about 3% per year, driven particularly by the need for services by the increasing permanent population. This trend is expected to continue through 2022.

Industrial Sector
The District has no industrial sector since agricultural efforts have all but ceased within the District's boundaries.

Institutional/Governmental Sector
The District has a small but active "town Board of Directors" type governmental sector, composed of a local town Board of Directors, Westside School District elementary and middle schools, visitor serving public facilities, and a public park. The town of Quartz Hill is located in a five acre unincorporated portion of Los Angeles County. It is surrounded by Palmdale to the south and east, Lancaster to the north and east and Los Angeles County to the west.

Landscape/Recreational Sector
The small landscape and recreational customer demand is expected to increase approximately 2% per year for the next 20 years, due to continued growth in recreational and visitor-serving facilities. Increased efficiency and landscape conversions from farmland to residential usage should help offset new demand resulting from projected increases in this sector.

Agricultural Sector
Agricultural water demand within and outside the District services is negligible. Impact on the District's water resources has been included in the Commercial demand calculations.
Supply and Demand Comparison Provisions

Law
10635 (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from the state, regional, or local agency population projections within the service area of the urban water supplier.

Supply and Demand Comparison

System Demands
Figure 2 below graphically displays the water usage by month, for the year of 2000. The wide variation of water demands can be seen between the winter and the summer months. While the long-term average (the linear line through the varying usage line) demand has been the previously used in predicting future requirements, considering only the average ignores the wider varying demands of the hot weather, summer periods.

![Graph Showing Monthly Water Usage Variations](image)

**Figure 2**
Graph Showing Monthly Water Usage Variations

**QHWD Water Use By Month**
For the Year 2000

- **Wells**
- **AVEK**
- **Total**
- **Linear (Total)**

Time (Month)
To further refine customer peak demands for predictive purposes, a typical day’s 24-hour duration of winter, early spring, and summer usage was plotted from data that were gathered from a Mojave Desert area community based on hourly metered seasonal flows into the wastewater treatment plant. The graphical shape, slopes, and points of influence agree with the typical daily potable water use as noted in the book, PLANNING AND MANAGING RELIABLE URBAN WASTE SYSTEMS, by Robert J. Harsberg, published by the American Water Works Association. Had there been similar data available for QHWD’s demands, the local data would have been used.

![Graph of Daily Water Demands By Season](image)

Figure 3 shows two typical August peak demand periods: morning from about 7 to 9 a.m., and late afternoon to early evening from 4 until 6 p.m. Winter and spring usage is very nearly coincidental with wastewater inflows to the treatment plant. Using the above summer demand model and applying it to the July, 2000 QHWD water average daily demand of 23.4 AF/day, Figure 4 provides a view of a worst demand case situation. That worst case situation could be worse if there is a need for the 2000 gpm fire flow periodic demand in addition to the cyclical water use.

![Hourly Water Demand For 23.4 AF/day (July, 2000) Water](image)
While the numerical values may not exactly coincide with local QHWD daily summer usage, the trend and time frames of occurrence are very close to actual demands that have been seen repeating annually by QHWD water system Operations personnel. This graph points out that the peak hourly demand of the peak summer demand (Typically July or August) will be about 1.82 AF/ Hour or 593,000 gallons per hour. If that level of demand were to be required for every hour of the year, QHWD would have to supply 5,194.7 million gallons (5.195 billion gallons) per year. QHWD is currently supplying about 1.6 billion gallons (or 4,773.64 AF) per year.

The above two graphs show that the District must be able to supply the long-term average water needs as well as the seasonal peak needs. The District’s water system should have the capabilities for the District to handle surge requirements such as multiple location fire fighting flow demands at 5 p.m. on August 15th of a typical year, without denying water to any of its customers in other parts of the District. Not only does the quantity of water need to be available during peak demands, but the system’s pressure should be maintained at or above the 60 to 65 psi minimum requirement at all times. Fortunately we are examining QHWD’s water supply system, not just the wells or storage reservoirs alone.

Supply System

Below is a table displaying the District’s supply wells and pertinent data. A summary examination of the average and peak water supply capabilities of the larger producing wells has been included below the table.

<table>
<thead>
<tr>
<th>Well No.</th>
<th>Location</th>
<th>Motor Size (HP)</th>
<th>Standing Water Level (depth-ft)</th>
<th>Pumping Water Level (depth-ft)</th>
<th>Total Head (ft.)</th>
<th>Cap. (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>40th &amp; K-4</td>
<td>60</td>
<td>269</td>
<td>312</td>
<td>43</td>
<td>321</td>
</tr>
<tr>
<td>6A</td>
<td>35th &amp; L</td>
<td>100</td>
<td>345</td>
<td>386</td>
<td>41</td>
<td>620</td>
</tr>
<tr>
<td>7A</td>
<td></td>
<td>200</td>
<td>334</td>
<td>366</td>
<td>32</td>
<td>779</td>
</tr>
<tr>
<td>8*</td>
<td>32nd &amp; K-8</td>
<td>200</td>
<td>276</td>
<td>290</td>
<td>14</td>
<td>917</td>
</tr>
<tr>
<td>9</td>
<td>40th &amp; K-6</td>
<td>225</td>
<td>291</td>
<td>302</td>
<td>11</td>
<td>847</td>
</tr>
<tr>
<td>11</td>
<td>51st &amp; J-10</td>
<td>60</td>
<td>not used</td>
<td>not used</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>50th &amp; K-4</td>
<td>150</td>
<td>315</td>
<td>415</td>
<td>100</td>
<td>486</td>
</tr>
</tbody>
</table>

| Total GPM |                             | 3970          |
| Total Average GPM |                 | 5,716,800     |

* Data from 2001

Currently, the well system is capable of supplying 3,970 gal/min or 5,716,800 gal/day. Using the capacities from the newer wells 6A and 7A, and assuming a minimum of four of the six new wells that are being drilled now will produce at least 500 gal/min, all wells can collectively average pumping 5,970 gal/min total or 8,596,800 gal/day or over 26.4 AF/day. This yields 9,636 AF/yr, which nearly equals the projected requirement of 9,466 AF/yr for the year 2021.
Table 9 compares current, and projected water supply and demand based on annual average values. This projection incorporates decreasing availability of AVEK water at a rate of about 2% per year. It indicates that in average precipitation years, the Quartz Hill Water District has sufficient water to meet its customers’ needs, through 2022. This is based on continued commitment to conservation programs, additional recycled water as the user population increases, and additional conjunctive use of groundwater basin.

<table>
<thead>
<tr>
<th>Table 7</th>
<th>Projected Annual Average Supply and Demand Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Supplies</td>
<td>6,405</td>
</tr>
<tr>
<td>AVEK Water Supplies</td>
<td>3,249</td>
</tr>
<tr>
<td>Supply totals</td>
<td>9,654</td>
</tr>
<tr>
<td>Demand totals</td>
<td>5,251</td>
</tr>
<tr>
<td>Difference</td>
<td>4,403</td>
</tr>
<tr>
<td>Units in AF/yr</td>
<td></td>
</tr>
</tbody>
</table>

The projected supply data presented in Table 7 above must be tempered with: 1.) the loss and retirement of older wells due to mechanical problems that are uneconomical to repair or replace, and 2.) the loss of the aquifer water quantities due to surrounding area overdrafting by other well owners, and 3) the total loss of AVEK water in any given year. In the latter case, the margin of safety decreases nearly to zero by 2022. To make up for the AVEK supply water loss and maintain the same safety margin of 2200 AF/yr, at least 4 to 5 new wells averaging 500 gpm will need to be put into operation by 2022.

In any one dry year, the District will need to carefully manage its water supply. In the second consecutive dry year, the District will probably need to enter into a Stage I water shortage response. In the third consecutive dry year, or in the event of a major system failure, the District may continue a Stage I water shortage response or move into a Stage II water shortage response. See the Water Shortage Contingency Plan and Three-year Minimum Water Supply sections and Table 10 for more detailed information.

Table 8 presents a supply and demand comparison where demand does not fluctuate in conjunction with a change in supply. This analysis demonstrates that based on current demand and up to a 23% reduction of supply, there will still be an adequate water supply shortage that meets demands.

Table 8 A and 8 B will detail how supply options and demand options can alter the outcome of a water reduction or shortage.

<table>
<thead>
<tr>
<th>Table 8</th>
<th>Single Dry Year and Multiple Dry Water Years (AF/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Supply Sources</td>
<td>Current Supply 2002 (Volume)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply totals</td>
<td>9,654</td>
</tr>
<tr>
<td>Percent Supply Reduction</td>
<td>0%</td>
</tr>
<tr>
<td>Demand totals</td>
<td>4,968</td>
</tr>
<tr>
<td>Difference</td>
<td>4,686</td>
</tr>
</tbody>
</table>

Table 10A modifies the comparison by increasing the supply available for use with the inclusion of 2,200 AF/yr of additional well water.
Table 8A
Reliability and Comparison with Supply Options (AF/yr)

<table>
<thead>
<tr>
<th>Water Supply Sources</th>
<th>Average / Normal Water Year</th>
<th>Single Dry Water Year</th>
<th>Multiple Dry Water Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Year 1</td>
</tr>
<tr>
<td>Supply totals</td>
<td>11,854</td>
<td>9,128</td>
<td>10,669</td>
</tr>
<tr>
<td>Percent Supply Reduction</td>
<td>0%</td>
<td>23%</td>
<td>10%</td>
</tr>
<tr>
<td>Demand totals</td>
<td>4,968</td>
<td>4,968</td>
<td>4,968</td>
</tr>
<tr>
<td>Difference</td>
<td>6,886</td>
<td>4,160</td>
<td>5,701</td>
</tr>
</tbody>
</table>

Table 8B modifies the comparison by implementing demand management measures and other consumption reductions methods. This comparison holds supply at the same level as Table 10 without the increased 2,200 AF/yr of well water. This analysis demonstrates that the use of conservation measures will still allow a well water production surplus. Reasons for water user reduction rates will have to be developed from other credible sources such as increased fees, higher rates on larger meters and services, or some other economic motivator.

Table 8B
Reliability and Comparison with Demand Options (AF/yr)

<table>
<thead>
<tr>
<th>Water Supply Sources</th>
<th>Average / Normal Water Year</th>
<th>Single Dry Water Year</th>
<th>Multiple Dry Water Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Year 1</td>
</tr>
<tr>
<td>Supply totals</td>
<td>5,654</td>
<td>5,654</td>
<td>5,654</td>
</tr>
<tr>
<td>Percent Demand Reduction</td>
<td>0.0%</td>
<td>23%</td>
<td>10%</td>
</tr>
<tr>
<td>Demand totals</td>
<td>4,968</td>
<td>3,825</td>
<td>4,471</td>
</tr>
<tr>
<td>Difference</td>
<td>686</td>
<td>1,829</td>
<td>1,183</td>
</tr>
</tbody>
</table>

Active water efficiency improvements and additional water supply may not be necessary to meet the District’s projected water demand. However, there are long term hazards in ignoring conservation methods and increased groundwater pumping.

1. The area groundwater table levels are decreasing 1 to 2-feet per year. Other municipalities and agricultural interests are also drafting from the same aquifer at increased rates. Without conducting an area hydrological study, it is difficult to predict when the existing well bowls will have to be lowered to maintain their current production levels. However any lowering of the bowls will increase the required pump motor power and will result in added usage and maintenance expenses being incurred by the District.

2. Arsenic is prevalent in the area soils of the lower basin levels. As wells are deepened, the levels of free arsenic will be increasing. The Federal EPA has mandated a maximum level of 10 ppb in public drinking water and this new standard will take effect in 2007. With increased numbers of wells, increased arsenic treatment facilities will have to be purchased and operated at each new well site as well as the existing wells. The captured arsenic and other undesirable chemicals and minerals will have to be disposed of at area hazardous disposal sites at the District’s expense.

3. The District will continue to examine supply enhancement options, possible water recycling, groundwater recharge, and importation of more surface water supplies.

Water Demand Management Measures

6/6/02
10631 (f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:
(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:..................

The Quartz Hill Water District is committed to implementing water conservation and water recycling programs. This Section discusses water conservation.

As mentioned in the cover letter to this Plan, the Quartz Hill Water District is not signatory to the Memorandum of Understanding regarding Urban Water Conservation in California (MOU) and is therefore not a member of the California Urban Water Conservation Board of Directors (CUWCC). For the purpose of responding to the Urban Water Management Planning Act the District will address the 16 Demand Management Measures. Descriptions of the District's water conservation programs are below. The District has, in good faith, tried to address and comply with all of the BMP targets listed in the CUWCC MOU where applicable.

IMPLEMENTATION DESCRIPTION: Since 1996, the District has offered free residential water use surveys to single-family and multi-family customers (refer to table 6). The District has not specifically focused on any particular group of water users but plans to concentrate on the top 20% users within the next two years. The District will continue to offer surveys to any customer who so requests or to customers displaying disregard or ignorance of established District water policies and rules. It is the District's goal to complete surveys for 15% of the single family and 15% of the multi-family connections over the next ten years. One of the problems the District faces is that all the District water connections are not separated into type categories. Although the majority of the District's customers are single-family residential users, there is a growing group of commercial customers as well. Should reduction of water supplies to be required, identifying the more critical from the less critical users by user types will assist in determining priorities. Being able to identify the type of user for consideration of water usage records will also be of assistance to the District.

The District's billing department is developing an inquiry program to sort billing records by water use within sectors, so that letters offering the free surveys can be mailed to the highest water users. If a customer does not participate and remains on the highest water use list the subsequent year, the customer receives up to three additional letters offering a water use survey, with hose shut-off nozzles offered as a further incentive to participate.

The District plans to recruit local or area master gardeners and farmers, who will help to develop a program on landscaping and farming efficiency improvements and are knowledgeable about the plants that are commonly grown in the area.

Single-family surveys take about two hours and are conducted by two-member teams. During the interior portion of the survey, the team: measures flow rates of existing plumbing fixtures and tests for toilet leakage with dye tablets; offers techniques on installing water efficient showerheads and faucet aerators (if necessary); provides informational materials on the ultra-low flush toilet replacement programs (rebates may be offered, or toilets may be made available -- see DMM 16); assists in strapping the hot water tank (if necessary) for earthquake safety and disaster water supply, assists in adjusting the hot water temperature and installation of an insulation blanket for energy efficiency; provides information on other energy efficiency materials (such as energy saving fluorescent lights); and checks smoke detectors.
The team then conducts the landscape survey. The team shows the customer the location of the water meter and how to read it; measures the landscaped areas, tests the sprinkler system for irrigation efficiency, and distribution uniformity; teaches the customer how to set the irrigation controller; develops a three-season irrigation schedule (based on soil type, evapotranspiration, and irrigation system), recommends sprinkler system repairs or improvements and provides brochures on water efficient landscaping, design, and plants. Multi-family surveys are similar, but require coordination with owners/managers, tenants, and landscaping services.

Institutional and governmental customers will also be offered water use surveys. All District-owned facilities including District Hall, the District’s corporation yard facilities, Hospitals, County libraries, fire stations, and public restrooms will be surveyed and recommendations offered for retrofitting. Due to lack of in-house expertise, and legal concerns about potential liability, the District plans to hire a consultant to perform the hospital and large institutional customer audits. (See DMM 9.)

**IMPLEMENTATION SCHEDULE and CONSERVATION SAVINGS:**

<table>
<thead>
<tr>
<th>Year</th>
<th>Surveys completed Single Family¹</th>
<th>Surveys completed Multi-Family²</th>
<th>Annual Water Savings (AF)</th>
<th>Cumulative Water Savings (AF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2002</td>
<td>30e</td>
<td>0</td>
<td>3.3</td>
<td>3.3</td>
</tr>
<tr>
<td>2003</td>
<td>67e</td>
<td>0</td>
<td>7.4</td>
<td>10.7</td>
</tr>
<tr>
<td>2004</td>
<td>67e</td>
<td>0</td>
<td>7.4</td>
<td>18.1</td>
</tr>
<tr>
<td>2005</td>
<td>67e</td>
<td>0</td>
<td>7.4</td>
<td>25.5</td>
</tr>
<tr>
<td>2006</td>
<td>67e</td>
<td>0</td>
<td>7.4</td>
<td>32.9</td>
</tr>
<tr>
<td>2007</td>
<td>67e</td>
<td>0</td>
<td>7.4</td>
<td>40.3</td>
</tr>
<tr>
<td>2008</td>
<td>67e</td>
<td>0</td>
<td>7.4</td>
<td>47.7</td>
</tr>
<tr>
<td>2009</td>
<td>67e</td>
<td>0</td>
<td>7.4</td>
<td>55.1</td>
</tr>
<tr>
<td>2010</td>
<td>67e</td>
<td>0</td>
<td>7.4</td>
<td>62.5</td>
</tr>
<tr>
<td>2011</td>
<td>67e</td>
<td>0</td>
<td>7.4</td>
<td>69.9</td>
</tr>
</tbody>
</table>

¹ = estimate
² = 15% of (4468 single and multi-family connections/10 years) = 67
3 = Included with the Single Family grouping
4 = Annual potential 5% savings: 67 connections x 2.2 AF/conn. x 0.05 = 7.4 AF/yr

**METHODS TO EVALUATE EFFECTIVENESS:** For each dwelling unit the survey team completes a customer data form (including number of people per household, number of bathrooms, age of appliances, and lot and landscaped area square footage). These data are used to analyze the customer’s water use, and to refine the program.

Beginning in fall of 2002, District staffs will review the surveyed customers’ water use records, and compare historic with current use for one year after the survey. If the reduction in water use is not in line with DMM water savings estimates, staff will flag the customer’s account and offer a follow up survey.

**BUDGET:** Proposed annual budget: $85,000, includes Job Training Program staff, brochures, and tools. The purchase of showerheads, aerators, dye tablets, and other miscellaneous materials will be handled through community vendors’ discounts or other funding or grant programs. (This budget item does not reflect the costs associated with ultra-low flush toilets - see DMM 16.)
DMM 2 -- Plumbing Retrofit

IMPLEMENTATION DESCRIPTION: The District plans to participate in the distribution of information and examples of applications of low flow showerheads, aerators, and toilet tank leak detection tablets via flyers included with monthly billings, local radio and TV advertising, during local spring and fall festivals, and during Water Awareness Month. At these events the District also emphasizes water use surveys and ultra-low flush toilet replacement programs (refer to DMM 1 and 16). The District has targeted 10% of the pre-1992 single-family homes and multi-family homes every two years for water use surveys. In order to reach the targeted 10% every two years the District will need to distribute additional devices to people outside the targeted group.

IMPLEMENTATION SCHEDULE: The District will continue to implement this DMM at a targeted rate of 10% of pre-1992 single and multi-family customers every two years. However, actions required by this DMM are included as part of DMM 1 and DMM 16, which District staffs believe is a more efficient approach than implementing in DMM 2. The table below will be used to list all the water savings devices installed in compliance with both DMM 1 and 16.

<table>
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<tr>
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CONSERVATION SAVINGS:

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<tr>
<td>2013</td>
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</table>

*e = estimate*

METHODS TO EVALUATE EFFECTIVENESS: Refer to DMM 1 and 16.

BUDGET: Proposed annual budget: See DMM 1.

DMM 3 -- Distribution System Water Audits, Leak Detection and Repair

IMPLEMENTATION DESCRIPTION: The District has conducted water audits and leak detection and repair checks on an "as-needed" basis since the beginning of District water services. QHWD plans to begin preventative audits and leak detections in 2002 on a managed and prearranged basis. District staffs will be trained at AWWA-DWR co-sponsored training programs.

Since the District is located in an earthquake zone, it has permanently incorporated the system water audit and leak detection, and meter calibration (production and customer meters) programs into its utility operations. On average, District water department crews spend about 20 days surveying approximately 40 miles of main and laterals per year. The District also participates in an annual valve exercise program to ensure that all connections operate as required. Broken or poorly operating valves are scheduled for repair or replacement.

In coordination with the County fire department, the water department complied with recent amendments to California Code of Regulations Title 19, Division 1, Chapter 9, pertaining to standardization of fire hydrants and associated fire protection equipment. As a result of several recent major fire-fighting/water shortage disasters in California communities, the District has acquired standby pumps and generators to assist in water distribution in a disaster. The District meets or exceeds minimum fire flow requirements, in accordance with California Water Works Standards.

IMPLEMENTATION SCHEDULE: The District will permanently incorporate this DMM into its operations and maintenance procedures, and establish a three-year rotation schedule. District crews will survey at least 40 miles of main and laterals per year on an on-going basis.
METHODS TO EVALUATE EFFECTIVENESS: The accounting staff will annually review the data records to confirm that the unaccounted for water losses stay under 6% once all customers are metered and categorized.

CONSERVATION SAVINGS: Savings are initially estimated to be about 200 AFY. Unaccounted water losses will be isolated and then reduced in stages to about 5% per year.

BUDGET: Proposed annual budget: $75,000 (from operations and maintenance budget).

DMM 4 -- Metering with Commodity Rates

IMPLEMENTATION DESCRIPTION: The District is fully metered for all customer sectors, including separate meters for single-family residential, commercial, and all institutional/governmental facilities. Since 1990 District policy has been to separately meter each dwelling unit in multi-family complexes.

The City has an inclining multi-block rate structure, with a lifeline allotment of 24 billing units per person per year for residential customers (and other customers with permanent residential populations, such as retirement homes). A billing unit is one hundred cubic feet (748 gallons), commonly abbreviated HCF or CCF. For rate information, see DMM 11 or Appendix D.

New Commercial/industrial/institutional customers are required by L. A. County to have fire sprinkler systems. Separate meters for the sprinkler systems are not required by the District.

IMPLEMENTATION SCHEDULE: The City will continue to install and read meters on all new services, and will continue to conduct its meter calibration and replacement program.

METHODS TO EVALUATE EFFECTIVENESS: Periodic review of customer water use, comparing current water use per capita with historic data.

CONSERVATION SAVINGS: Metered accounts may result in a 10% reduction in demand compared to non-metered accounts.

BUDGET: Meter installation costs are part of new service connection fees.

DMM 5 -- Large Landscape Water Audits and Incentives

IMPLEMENTATION DESCRIPTION: Irrigation surveys will be conducted for all of the District's large landscape customers (currently defined as three acres or greater) by the end of 2002. The NACWA-sponsored Mobile Lab team conducts the surveys. During the survey, the team calculates a water budget for the site -- the amount of water necessary for that site based on the size of the landscape and the climate. The water budget is then used as the water allotment for that site, and any water use which exceeds the water budget is billed at a higher rate. District staff review landscape customers' water use monthly. If the water budget is exceeded for three consecutive months, the customer is offered technical assistance. On-site follow-up evaluations are recommended for customers whose annual water use exceeds their water budget.

Daily climatological data (temperatures, relative humidity, wind velocity, and precipitation) are recorded by District staff personnel and are available via telephone inquiries to the District Office. By monitoring daily weather data, District maintenance crews can adjust their watering and irrigation schedules.

The District will offer Spanish/English language irrigator training classes. The District is considering a financial incentive program to encourage high water users to convert to more water efficient landscapes. Financial incentives may include: irrigation system conversions, automatic controllers, soil moisture
sensors, automated CIMIS scheduling, and plants and other landscape materials. The water department continually works with the parks department and the school district to improve water use efficiency at public landscapes and greenbelts. This sometime includes the redesigning of a landscape.

IMPLEMENTATION SCHEDULE and METHODS TO EVALUATE EFFECTIVENESS: The District plans to complete the few remaining large landscape customers' water use surveys over the next five years. The District will continue to implement this DMM by annual review of customers' water use, and by offering on-site follow-up evaluations to customers whose total water use exceeds their total annual water budget.

CONSERVATION SAVINGS: Landscapes that are upgraded based on survey recommendations could result in a 10% reduction in water demand.

BUDGET: Proposed annual budget: $65,000, for contractual support of the Mobile Lab program, and materials.

DMM 6 -- Landscape Water Conservation Requirements

IMPLEMENTATION DESCRIPTION: In 1992, motivated by the drought, the District established a landscape ordinance. Later, it was amended to include firescaping guidelines and to conform to California Water Code Section 65590 et seq. (AB325), which covers new and existing commercial, industrial, institutional/governmental, and multi-family customers, and includes new single-family homes.

The District continues to work in partnership with the County fire department, local nurseries, landscape designers, contractors and the local floriculture growers to help educate landowners in regards to water efficient landscapes (WEL). An information pamphlet will be developed to explain evapotranspiration and procedures involved in developing irrigation schedules.

IMPLEMENTATION SCHEDULE: The District will permanently incorporated this DMM into its ordinances.

METHODS TO EVALUATE EFFECTIVENESS: The District will monitor the cost savings on all District properties, the attendance to the Water Efficient Landscape (WEL) demonstration garden and the number of WEL materials distributed. The RCD will report annually on the landscape water savings associated with this DMM to the District. CONSERVATION SAVINGS: The landscape ordinance may lead to a similar 15% reduction due to landscape surveys and water budget irrigation scheduling.

BUDGET: Proposed annual budget: $85,000, for materials and contract money with the RCD.

DMM 7 -- Public Information

IMPLEMENTATION DESCRIPTION: The District promotes water conservation and other resource efficiencies in coordination with other energy utilities. The District distributes public information through bill inserts, brochures, community speakers, paid advertising, and many special events every year.

The District is forming a Citizens' Advisory Committee, to assist in developing new ways to communicate with the public and the media about water conservation and other resource issues. Due to high numbers of visitors into the region, it also has become a priority to develop conservation materials focused on the visitors themselves through working with restaurants, hotels, and local newsmedia. The District plans to establish a World Wide Web Home Page in mid-2002, which will include information on water conservation, recycling, and other resource issues.

IMPLEMENTATION SCHEDULE: The District will continue to provide public information services and materials to remind the public about water and other resource issues.
METHODS TO EVALUATE EFFECTIVENESS: The District will track the commentary regarding the information provided.

CONSERVATION SAVINGS: The District has no method to quantify the savings of this DMM but believes that this program is in the public's interest.

BUDGET: Proposed annual budget: $75,000, (from public affairs office budget) for staff and materials.

DMM 8 -- School Education

IMPLEMENTATION DESCRIPTION: The District continues to work with the school districts to promote water conservation and other resource efficiencies at school facilities and to educate students about these issues. As part of the commercial/industrial/institutional water conservation programs, all new public school toilets, urinals, showerheads, and faucet aerators will utilize ultra-low flow models. A study is underway to determine cost-sharing retrofit of school kitchens with water and energy efficient icemakers and dishwashers. The District is working with the school districts to complete retrofits of school and facilities and playground irrigation systems.

The District consults with several school officials and teachers to implement DMM 8. The District provides educational materials for several grade levels, State and County water system maps, posters, workbooks, interactive computer software, videos, tours (for example, the surrounding watershed, water treatment facility), and sponsors teachers' Project Water Education for Teachers (WET) training, science fairs, and water conservation contests.

For Water Awareness Month during May 2001, school water conservation activities consisted of classroom games for all elementary grade classes in the District.

IMPLEMENTATION SCHEDULE: The District will continue to implement this DMM at the levels described.

METHODS TO EVALUATE EFFECTIVENESS: The District will continue to survey the institutions and educators on the number of programs, materials and attendance at water conservation activities.

CONSERVATION SAVINGS: The District has no method to quantify the savings of this DMM but believes that this program is in the public's interest.

BUDGET: Proposed annual budget: $60,000, for consultant and materials (ULF toilets are separately budgeted - see DMM 16).

DMM 9 -- Commercial and Industrial Water Conservation

IMPLEMENTATION DESCRIPTION: For the last several years, the District has provided water use audits to any commercial/industrial/institutional (CII) customer who so requested. The District plans to complete a computerized analysis of all CII customers by monthly and annual water usage, to identify the top 10% of the commercial customers and the top 20% of the industrial and institutional customers. The District will contact these customers by letter, and follows up with telephone calls, to offer audits.

In 2003, the District will develop a billing insert which will include water survey information and will periodically distribute the October 1994 DWR publication Water Efficiency Guide for Business Managers and Facility Engineers. Staff also, will complete a program to identify CII customers by Standard Industrial classification (SIC) codes.
IMPLEMENTATION SCHEDULE and CONSERVATION SAVINGS: The District will continue to implement this DMM at the annual target rate for at least the next five years. Savings evaluations will be provided to the District and the customer by the consulting engineer.

<table>
<thead>
<tr>
<th>Year</th>
<th>Surveys completed CII</th>
<th>Annual Water Savings</th>
<th>Cumulative Water Savings</th>
</tr>
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<tr>
<td>2012</td>
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<td>1.1e</td>
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e = estimate
Survey Water Savings: 10 conn x 2.2 AF/yr x 0.05 = 1.1 AF/yr

METHODS TO EVALUATE EFFECTIVENESS: The District will continue to implement this DMM by annual review of customers’ water use, and by offering on-site follow-up evaluations to customers whose total water use exceeds their total annual water budget.

BUDGET: Proposed annual budget: $45,000, for consultant and interns.

DMM 10 – New Commercial and Industrial Water Use Review

IMPLEMENTATION DESCRIPTION: The District building department coordinates the implementation of this DMM. Project designers must demonstrate the use of water saving devices in their designs. A staff member reviews the building plans to determine the water use efficiency before a permit is issued to the new customer.

IMPLEMENTATION SCHEDULE: The District will continue to implement this DMM.

METHODS TO EVALUATE EFFECTIVENESS: The consultant reports on all plan improvements and compares it with historical data to determine the increase in water use efficiency.

CONSERVATION SAVINGS: Commercial water reduction achieved from DMMs excluding Ultra Low Flush Toilet Replacement is estimated at 12% to 15% in gallons per employee per day.

BUDGET: Proposed annual budget: $50,000 for consultant (building department staff costs are separately budgeted).
DMM 11 -- Conservation Pricing, Water Service and Sewer Service

IMPLEMENTATION DESCRIPTION: The Quartz Hill Water District has an inclining block rate structure for all customer sectors. Large landscape and agricultural customers have individualized water budgets, billed at the first block rate. Usage above the water budget is billed at a higher block rate.

A rate stabilization fund to provide a buffer in future shortages is being discussed by the District now. New rates were adopted in 1998, with a 3% annual increase scheduled for three years. The District will conduct its next rate study later in 2002.

METHODS TO EVALUATE EFFECTIVENESS: Monitor the number of violators who use water in excess of their established allotment.

CONSERVATION SAVINGS: The incentive of this DMM is to decrease the customers water costs and water use through price incentives as described above. The expected annual water savings is 90 AFY.

BUDGET: Proposed annual budget: $45,000 for consultant (building department staff costs are separately budgeted).

DMM 12 -- Landscape Water Conservation for New and Existing Single Family Homes

IMPLEMENTATION DESCRIPTION: As discussed under DMM 6, the District has a landscape ordinance which pertains to new and existing single family homes, and an active landscape conservation program. The District promotes efficient landscaping practices. The District is also considering a financial rebate program to help homeowners convert to more water efficient landscapes (which may include landscape materials, irrigation conversions, automatic controllers, soil moisture sensors, gray water, etc.).

IMPLEMENTATION SCHEDULE: The District has permanently incorporated this DMM into its ordinances, and will continue to distribute brochures to all new service connections.

METHODS TO EVALUATE EFFECTIVENESS: Refer to DMM 1 and 6.

CONSERVATION SAVINGS: Refer to DMM 1 and 6.

BUDGET: Proposed annual budget: $45,000, for materials.

DMM 13 -- Water Waste Prohibition

IMPLEMENTATION DESCRIPTION: The District established a “No-Waste” ordinance in 1993. In times of water shortages, enforcement includes the “gutter flooder” patrol, to educate customers, and if necessary, issue warnings and citations for violations.

IMPLEMENTATION SCHEDULE: The District has permanently incorporated this DMM into its ordinances.

METHODS TO EVALUATE EFFECTIVENESS: All citations and violations are reported annually.

CONSERVATION SAVINGS: The District has no method to quantify the savings of this DMM but believes that this program is in the public’s interest.

BUDGET: Enforcement costs are a part of the water department’s overhead.
Resolution To Adopt The Urban Water Management Plan

QUARTZ HILL WATER DISTRICT
LOS ANGELES COUNTY, CALIFORNIA
June 6, 2002

The Board of Directors of the Quartz Hill Water District does hereby resolve as follows:

WHEREAS the California Legislature enacted Assembly Bill 797 (Water Code Section 10610 et seq., known as the Urban Water Management Planning Act) during the 1983-1984 Regular Session, and as amended subsequently, which mandates that every supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually, prepare an Urban Water Management Plan, the primary objective of which is to plan for the conservation and efficient use of water; and

WHEREAS the District is an urban supplier of water providing water to a population over 4,500, and

WHEREAS the Plan shall be periodically reviewed at least once every five years, and that the District shall make any amendments or changes to its plan which are indicated by the review; and

WHEREAS the original Plan was submitted and adopted before must be adopted before December 31, 2000, and the plan revision has been adopted after public review and hearing, and filed with the California Department of Water Resources within thirty days of adoption; and

WHEREAS the District has therefore, prepared and circulated for public review a draft Urban Water Management Plan, and a properly noticed public hearing regarding said Plan was held by the District Board of Directors on April 18th, 2002, and

WHEREAS the Quartz Hill Water District did prepare and shall file said Plan with the California Department of Water Resources within 30 days from this plan’s adoption;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Quartz Hill Water District as follows:

1. The 2002 Urban Water Management Plan is hereby adopted and ordered filed with the District Clerk;
The General Manager is hereby authorized and directed to file the 2002 Urban Water Management Plan with the California Department of Water Resources within 30 days after this date;

The General Manager is hereby authorized and directed to implement the Water Conservation Programs as set forth in the 2002 Urban Water Management Plan, which includes water shortage contingency analysis and recommendations to the Board of Directors regarding necessary procedures, rules, and regulations to carry out effective and equitable water conservation and water recycling programs;

In a water shortage, the General Manager is hereby authorized to declare a Water Shortage Emergency according to the Water Shortage Stages and Triggers indicated in the Plan, and implement necessary elements of the Plan;

The General Manager shall recommend to the Board of Directors additional regulations to carry out effective and equitable allocation of water resources.
ADOPTED this 6th day of June, 2002, by the following vote:

AYES: Board of Directors (insert members’ names)
NOES: None

ABSENT: None
ABSTAIN: None

ATTEST: ________________________________________________
        District Clerk, (name)

Board of Directors Members (indicate names)
General Manager
Chief, Water Department

6/6/02
APPENDIX C

QHWD’s WATER SHORTAGE INFORMATION

No-Waste Policy
Resolution to Declare a Water Shortage Emergency
Moratorium on New Connections During a Declared Water Shortage
Water Shortage Rationing Allocation Method (TO BE ADDED)
No Waste Policy

QUARTZ HILL WATER DISTRICT
LOS COUNTY, CALIFORNIA
Date

The Board of Directors of the Quartz Hill Water District has adopted the following Policy No. xxxx, Waste to be prevented:

XXXXXX Waste to be prevented. Consumers shall prevent all waste of water and for the purpose of this chapter the word "waste" shall be defined as:

A. Where water is unable to be absorbed within the limits of the cultivated area upon which it is being used;
B. Where water is allowed to gather, from any cause whatsoever, into a pool where it serves no useful purpose; but may act as a harbor or breeding place for mosquitoes;
C. Where water is allowed to run into a gutter or upon land which has no need for it at the time.

(Ord. 1046 para.1 (Exh. A(part)), 2000.)
Resolution To Declare A Water Shortage Emergency

QUARTZ HILL WATER DISTRICT
LOS ANGELES COUNTY, CALIFORNIA
Date

The District Board of Directors of the Quartz Hill Water District does hereby resolve as follows:

PURSUANT to California Water Code Section 350 et seq., the Board of Directors has conducted duly noticed public hearings to establish the criteria under which a water shortage emergency may be declared.

WHEREAS, the Board of Directors finds, determines and declares as follows:
(a) The District is the water purveyor for the property owners and inhabitants of QHWD;
(b) The demand for water service is not expected to lessen.
(c) When the combined total amount of water supply available to the District from all sources falls at or below the Stage II triggering levels described in the 2002 Urban Water Management Plan, the Board of Directors will declare a water shortage emergency. The water supply would not be adequate to meet the ordinary demands and requirements of water consumers without depleting the District’s water supply to the extent that there may be insufficient water for human consumption, sanitation, fire protection, and environmental requirements. This condition is likely to exist until precipitation and inflow dramatically increases or until water system damage resulting from a disaster are repaired and normal water service is restored.

NOW, THEREFORE, BE IT RESOLVED that the Board of Directors of the Quartz Hill Water District hereby directs the General Manager to find, determine, declare and conclude that a water shortage emergency condition exists that threatens the adequacy of water supply, until the District’s water supply is deemed adequate. After the declaration of a water shortage emergency, the General Manager is directed to determine the appropriate Rationing Stage and implement the District’s Water Shortage Emergency Response.

FURTHERMORE, the Board of Directors shall periodically conduct proceedings to determine additional restrictions and regulations which may be necessary to safeguard the adequacy of the water supply for domestic, sanitation, fire protection, and environmental requirements.

6/6/02
Moratorium On New Connections During A Water Supply Reduction

QUARTZ HILL WATER DISTRICT
LOS ANGELES COUNTY, CALIFORNIA
Date

The Board of Directors of the Quartz Hill Water District does hereby resolve as follows:
The Municipal Code of the Quartz Hill Water District is hereby amended to read as follows:

XX-1 MORATORIUM ON SERVICE COMMITMENTS AND CONNECTIONS

1. When the District declares a water shortage emergency, the following regulations shall become effective immediately and shall continue in full force and effect to prohibit the following while it remains in full force and effect:
   a. The District shall not issue oral or written commitments to provide new or expanded water service, including will-serve letters.
   b. The District shall not sell meters for water service connections, despite the prior issuance of will-serve letters or other oral or written service commitments, unless building permits have been issued.
   c. The District shall not provide new or expanded water service connections, despite the prior issuance of will-serve letters or other oral or written service commitments and meters, unless building permits have been issued.
   d. The District shall not provide water for use on any new plantings installed after the declaration of a Water Shortage Emergency.
   e. The District shall not annex territory located outside the District’s service boundary.

2. The following uses are exempt from the moratorium and upon application to the District shall receive necessary water service commitments and connections to receive water from the District:
   a. Uses, including but not limited to, commercial, industrial, single and multifamily residential, for which a building permit has been issued by the District on or before the declaration of a Water Shortage Emergency.
   b. Uses, including but not limited to, commercial, industrial, single and multifamily residential, for which a retail meter had been purchased from the District before the declaration of a Water Shortage Emergency, as evidenced by a written receipt and for which a building permit has been issued and remains in full force and effect.
   c. Publicly owned and operated facilities, including but not limited to schools, fire stations, police stations, and hospitals and other facilities as necessary to protect the public health, safety and welfare.
Water Shortage Rationing Allocation Method

(TO BE ADDED TO SAMPLE PLAN AT A LATER TIME)
APPENDIX D

Rate Stabilization Fund Discussion
Establishment of a Rate Stabilization Fund

In order to mitigate the financial impacts of a water shortage, the District is establishing an Emergency Fund. The goal is to maintain the fund at 75% of normal water district revenue. This fund will be used to stabilize rates during periods of water shortage or disasters affecting the water supply. The District will not have to increase rates as much or as often during a prolonged or severe shortage.

However, even with the emergency fund, rate increases will be necessary during a prolonged water shortage. As described in this Plan, a Stage II shortage will be accompanied by a 15 – 25% reduction in water deliveries while a Stage III will be accompanied by a 25 - 35% reduction. The experiences of California water purveyors during the 1990-91 drought demonstrated that actual water use reductions by customers are usually considerably larger than those requested by the supplier. During the 1990-91 drought shortage it was also politically difficult for many agencies to adopt the rate increases necessitated by a 20% to 50% reduction in sales. When a Water Shortage Emergency is declared, the supply shortage will trigger the appropriate Rationing Stage and rate increase.

Water rates increase by the following percentages when the indicated Stages are implemented:

- **Stage I**: no rate increase
- **Stage II**: 25% increase over pre-shortage rates
- **Stage III**: 50% increase over pre-shortage rates
- **Stage IV**: 100% increase over pre-shortage rates

End of the Water Shortage Emergency
15% increase over pre-shortage rates (This rate increase should be re-evaluated every two years)

Most California water agencies, which experienced water shortages, have found that customer gpcd has not nor is it expected to return to pre-shortage levels. After a shortage, water department expenses are expected to drop below pre-shortage levels but water sales are not expected to rebound. In anticipation of reduced sales, after a declared shortage ends, the District's rates will be set for one year at 115% of the pre-shortage rates. Any excess revenues collected as a result of this rate adjustment will be used to re-establish the Rate Stabilization Fund.
APPENDIX E

WATER RECYCLING INFORMATION

This appendix was not needed in this report.
DMM 14 -- Water Conservation Coordinator

IMPLEMENTATION DESCRIPTION: The District plans to designate a full-time water conservation coordinator in 2002. The District currently has one staff person (who works 30% on water conservation), and part time staff who coordinates the landscape programs. The District also employs student interns from area schools. And, the District contracts with consultants to implement a number of DMMs.

IMPLEMENTATION SCHEDULE: The District will continue to implement this DMM.

METHODS TO EVALUATE EFFECTIVENESS: The District will continue to survey the institutions and educators on the number of programs, materials and attendance at water conservation activities.

CONSERVATION SAVINGS: The District has no method to quantify the savings of this DMM but believes that this program is in the public’s interest.

BUDGET: QHWD takes pride in setting new standards for the Water Conservation Coordinator. Proposed annual budget: $70,000 for water conservation staff costs.

DMM 15 -- Financial Incentives

IMPLEMENTATION DESCRIPTION: The District and other local government agencies cost-share commercial and industrial audit costs, and may establish a rebate program through area vendors so that commercial/industrial/institutional customers more fully implement audit recommendations (see DMM 9). The District is also considering establishing incentive programs to encourage customers to convert to more water efficient landscapes (see DMMs 5 and 12).

IMPLEMENTATION SCHEDULE: The District anticipates establishing financial incentive programs for this DMM (and water recycling) during 2002 -2003.

METHODS TO EVALUATE EFFECTIVENESS: Actual water use will be monitored and compared with the estimated water savings proposed in the project loan/grant applications.

CONSERVATION SAVINGS: Water conservation savings will need to be quantified on a project-by-project basis. This DMM will not be implemented until 2002. The District projects water savings in excess of 20AFY based on the success of the District’s other implemented DMMs.

BUDGET: Proposed annual budget: $40,000, for materials. An auxiliary budget request will be submitted if the District Board of Directors approves the financial incentives program.

DMM 16 -- Ultra-low Flush Toilet Replacement

IMPLEMENTATION DESCRIPTION: The District established the need for a high visibility ultra-low flush toilet replacement program in 2001. Initially, District Board of Directors members’ homes and District Hall will be converted to ultra-low flush models, followed by student and faculty toilets (and later urinals) at QHWD High School. Initially, rebates up to $25 per toilet will be offered. All public facilities in the District will have ULF toilets, urinals, showerheads, and self-closing faucets. Funding for replacement programs will come in part from the Demand Offset Program, where new development provides funds to improve the water use efficiency of existing customers.

The District will offer rebates to customers, will establish a direct installation program, and will provide rebates for toilets and urinals for installation at public facilities including schools, libraries, and fire department facilities. DMM 16 will be implemented in coordination with DMM 1, DMM 2, and DMM 8.
IMPLEMENTATION SCHEDULE: The District will continue to implement this DMM until the District’s goal is met: at least 80% of all non-conserving and low-flush model toilets in the District will be replaced with ultra-low flush models.

<table>
<thead>
<tr>
<th>Year</th>
<th># of ULFT Retrofits</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>0</td>
</tr>
<tr>
<td>2003</td>
<td>10e</td>
</tr>
<tr>
<td>2004</td>
<td>20e</td>
</tr>
<tr>
<td>2005</td>
<td>20e</td>
</tr>
<tr>
<td>2006</td>
<td>20e</td>
</tr>
<tr>
<td>2007</td>
<td>20e</td>
</tr>
<tr>
<td>2008</td>
<td>20e</td>
</tr>
<tr>
<td>2009</td>
<td>20e</td>
</tr>
<tr>
<td>2010</td>
<td>20e</td>
</tr>
<tr>
<td>2011</td>
<td>20e</td>
</tr>
<tr>
<td>2012</td>
<td>20e</td>
</tr>
</tbody>
</table>

e = estimate

METHODS TO EVALUATE EFFECTIVENESS: The District will calculate annual ULFT replacement program water savings to confirm the savings are within 10% of calculated retrofit-on-resale water savings, using the CUWCC MOU Exhibit 6 methodology and water savings estimates. Exhibit 6 has become an industry standard for evaluation of ULFT replacement programs.

CONSERVATION SAVINGS: Projected total annual water savings from toilet retrofits at full implementation are 0.5 AFY per year.

BUDGET: Proposed annual budget: $130,000, for materials, rebates, and administrative costs.

Agricultural Water Conservation Programs

The District has no agricultural water accounts, although it interacts with area agricultural business for information exchange.

The District may consider becoming a signatory to the Memorandum of Understanding Regarding Efficient Water Management Practices by Agricultural Water Suppliers in California in 2 to 3 years.

Water Shortage Contingency Plan

Preparation for Catastrophic Water Supply Interruption

Law
10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

**Water Shortage Emergency Response**

In 2001, in accordance with the requirements of Assembly Bill 11X, the District water, fire, and emergency services departments developed a comprehensive water shortage contingency plan, which was incorporated into the District’s Emergency Response Plan in early 2002. The District’s plan is consistent with provisions in the County’s Emergency Response Plan. Both plans contain procedures for the distribution of potable water in a disaster; these procedures are consistent with guidelines prepared by the California State Office of Emergency Services.

The District plan recommended the following: (1) the purchase of water purification equipment; (2) purchase of standby generators and auxiliary pumps; and (3) development of emergency water conveyance and supply storage facilities. Steps (1) and (2) have been or are currently being implemented. Step (3) is in the study and design phases.

In addition, specific water-critical customers (such as hospitals, nursing facilities, schools, and a few individual customers with medical conditions dependent on continuous water availability) have been identified. Likely potable water distribution sites have been identified.

Be assured that the District recognizes the importance of the DMMs in reducing water demand and would continue to implement the programs. Also, the District would increase media attention to the water supply situation during a shortage and would step up public water education programs, encourage property owners to apply for a landscape and interior water use survey and continue to advertise the importance of customers to install ULF plumbing fixtures.

During declared shortages, or when a shortage declaration appears imminent, the District General Manager, who serves as the temporary chair, activates a District water shortage response team. The Chairman of the Board of Directors assumes the responsible director’s role when he/she has arrived at the operational control center. The team includes: Board of Directors, General Manager, Operations Foreman, Clerical Staff Director. During a declared water shortage, the District will accept applications for new building permits but will not issue permits until the shortage declaration is rescinded. An appeal process has been established.

**Supplemental Water Supplies**

To offset future potential water shortages due to drought or disaster, the District is considering the following supplemental water supplies.

**Water Transfers**

See the Transfer or Exchange Opportunities section.

**Long Term Additional Water Supply Options**

To meet future long-term water demand beyond 2020, the District has purchased land for additional wells.
The following table summarizes the actions the water district will take during a water supply catastrophe.

<table>
<thead>
<tr>
<th>Examples of Actions</th>
<th>Check if Discussed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine what constitutes a proclamation of a water shortage.</td>
<td>✓</td>
</tr>
<tr>
<td>Stretch existing water storage.</td>
<td>✓</td>
</tr>
<tr>
<td>Obtain additional water supplies.</td>
<td>✓</td>
</tr>
<tr>
<td>Develop alternative water supplies.</td>
<td>✓</td>
</tr>
<tr>
<td>Determine where the funding will come from.</td>
<td>✓</td>
</tr>
<tr>
<td>Contact and coordinate with other agencies.</td>
<td>✓</td>
</tr>
<tr>
<td>Create an Emergency Response Team/Coordinator.</td>
<td>✓</td>
</tr>
<tr>
<td>Create a catastrophe preparedness plan.</td>
<td>✓</td>
</tr>
<tr>
<td>Put employees/contractors on-call.</td>
<td>✓</td>
</tr>
<tr>
<td>Develop methods to communicate with the public.</td>
<td>✓</td>
</tr>
<tr>
<td>Develop methods to prepare for water quality interruptions.</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Water Shortage Contingency Ordinance/Resolution**

**Law**

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (h) A draft water shortage contingency resolution or ordinance.

**Quartz Hill Water District Water Shortage Response**

As mentioned earlier, the District adopted a “No-Waste” Ordinance in 1997, and based on rationing experience, the District has developed a Resolution to Declare a Water Shortage Emergency. The District adopted a policy in 1998 to implement a Moratorium on New Connections during declared water shortages see Appendix C.

**Stages of Action**

**Law**

10632. The plan shall provide an urban water shortage contingency analysis, which includes each of the following elements which are within the authority of the urban water supplier:

10632 (a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply and an outline of specific water supply conditions which are applicable to each stage.
Rationing Stages and Reduction Goals

The District has developed a four stage rationing plan (see Table 15) to invoke during declared water shortages. The rationing plan includes voluntary and mandatory rationing, depending on the causes, severity, and anticipated duration of the water supply shortage.

<table>
<thead>
<tr>
<th>Shortage Condition</th>
<th>Stage</th>
<th>Customer Reduction Goal</th>
<th>Type of Rationing Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 15%</td>
<td>I</td>
<td>15%</td>
<td>Voluntary</td>
</tr>
<tr>
<td>15 – 25%</td>
<td>II</td>
<td>25%</td>
<td>Mandatory</td>
</tr>
<tr>
<td>25 – 35%</td>
<td>III</td>
<td>35%</td>
<td>Mandatory</td>
</tr>
<tr>
<td>35 - 50%</td>
<td>IV</td>
<td>50% or &gt;</td>
<td>Mandatory</td>
</tr>
</tbody>
</table>

Priority by Use

Priorities for use of available potable water during shortages were based on input from the District Emergency Response Team, citizen groups, and legal requirements set forth in the California Water Code, Sections 350-358. Water allocations are established for all customers according to the following ranking system:

- Minimum health and safety allocations for interior residential needs (includes single family, multifamily, hospitals and convalescent facilities, retirement and mobile home communities, and student housing, and fire fighting and public safety)
- Commercial, industrial, institutional/governmental operations (where water is used for manufacturing and for minimum health and safety allocations for employees and visitors), to maintain jobs and economic base of the community (not for landscape uses)
- Permanent agriculture (orchards, vineyards, and other commercial agriculture which would require at least five years to return to production).
- Annual agriculture (floriculture, strawberries, other truck crops)
- Existing landscaping
- New customers, proposed projects without permits when shortage declared.

Health and Safety Requirements

Based on commonly accepted estimates of interior residential water use in the United States, Table 18 indicates per capita health and safety water requirements. In Stage I shortages, customers may adjust either interior or outdoor water use (or both), in order to meet the voluntary water reduction goal.

However, under Stage II, Stage III and Stage IV mandatory rationing programs, the District has established a health and safety allotment of 68 gpcd (which translates to 33 HCF per person per year), because that amount of water is sufficient for essential interior water with no habit or plumbing fixture changes. If customers wish to change water use habits or plumbing fixtures, 68 gpcd is sufficient to provide for limited non-essential (i.e. outdoor) uses.

Stage IV mandatory rationing, which is likely to be declared only as the result of a prolonged water shortage or as a result of a disaster, would require that customers make changes in their interior water use habits (for instance, not flushing toilets unless “necessary” or taking less frequent showers).
Table 16
Per Capita Health and Safety Water Quantity Calculations

<table>
<thead>
<tr>
<th></th>
<th>Non-Conserving Fixtures</th>
<th>Habit Changes 1</th>
<th>Conserving Fixtures 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toilets</td>
<td>5 flushes x 5.5 gpf</td>
<td>27.5</td>
<td>3 flushes x 5.5 gpf</td>
</tr>
<tr>
<td>Shower</td>
<td>5 min x 4.0 gpm</td>
<td>20.0</td>
<td>4 min x 3.0 gpm</td>
</tr>
<tr>
<td>Washer</td>
<td>12.5 gpcd</td>
<td>12.5</td>
<td>11.5 gpcd</td>
</tr>
<tr>
<td>Kitchen</td>
<td>4 gpcd</td>
<td>4.0</td>
<td>4 gpcd</td>
</tr>
<tr>
<td>other</td>
<td>4 gpcd</td>
<td>4.0</td>
<td>4 gpcd</td>
</tr>
<tr>
<td>Total (gpcd)</td>
<td></td>
<td>68.0</td>
<td>48.0</td>
</tr>
<tr>
<td>HCF per capita per year</td>
<td></td>
<td>33.0</td>
<td>23.0</td>
</tr>
</tbody>
</table>

1 Reduced shower use results from shorter and reduced flow. Reduced washer use results from fuller loads.
2 Fixtures include ULF 1.6 gpf toilets, 2.0 gpm showerheads and efficient clothes washers.

Water Shortage Stages and Triggering Mechanisms

As the water purveyor, the Quartz Hill Water District must provide the minimum health and safety water needs of the community at all times. The water shortage response is designed to provide a minimum of 50% of normal supply during a severe or extended water shortage. The rationing program triggering levels shown below were established to ensure that this goal is met.

Rationing stages may be triggered by a shortage in one water source or a combination of sources. Although an actual shortage may occur at any time during the year, a shortage (if one occurs) is usually forecasted by the Water Department on or about April 1 each year. If it appears that it may be a dry year, the District contacts its agricultural customers in March, so that they can minimize potential financial impacts.

The District’s potable water sources are groundwater and imported surface. Rationing stages may be triggered by a supply shortage or by contamination in one source or a combination of sources. Because shortages overlap Stages, triggers automatically implement the more restrictive Stage. Specific criteria for triggering the District’s rationing stages are shown in Table 19.
<table>
<thead>
<tr>
<th>Percent Reduction of Supply</th>
<th>Stage I Up to 15%</th>
<th>Stage II 15 - 25%</th>
<th>Stage III 25 - 35%</th>
<th>Stage IV 35 - 50%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Supply</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total supply is 85 – 90% of “normal.” And Below “normal” year is declared.</td>
<td>Total supply is 75 – 85% of “normal.” Or Below “normal” year is declared</td>
<td>Total supply is 65 – 75% of “normal.” Or Fourth consecutive below “normal” year is declared. Or</td>
<td>Total supply is less than 65% of “normal.” Or Fifth consecutive below “normal” year is declared. Or</td>
<td></td>
</tr>
<tr>
<td><strong>Future Supply</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Projected supply insufficient to provide 80% of “normal” deliveries for the next two years. Or</td>
<td>Projected supply insufficient to provide 75% of “normal” deliveries for the next two years. Or</td>
<td>Projected supply insufficient to provide 65% of “normal” deliveries for the next two years. Or</td>
<td>Projected supply insufficient to provide 50% of “normal” deliveries for the next two years. Or</td>
<td></td>
</tr>
<tr>
<td><strong>Groundwater</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No excess groundwater pumping undertaken.</td>
<td>First year of excess groundwater pumping taken, must be “replaced” within four years. Or</td>
<td>Second year of excess groundwater pumping taken, must be “replaced” within four years. Or</td>
<td>No excess groundwater pumping available. Or Reduced groundwater pumping due to replenishment of previously pumped groundwater. Or</td>
<td></td>
</tr>
<tr>
<td><strong>Water Quality</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contamination of 10% of water supply (exceeds primary drinking water standards)</td>
<td>Contamination of 20% of water supply (exceeds primary drinking water standards)</td>
<td>Contamination of 30% of water supply (exceeds primary drinking water standards)</td>
<td>Or</td>
<td></td>
</tr>
<tr>
<td><strong>Disaster Loss</strong></td>
<td></td>
<td></td>
<td></td>
<td>Disaster Loss</td>
</tr>
</tbody>
</table>
Water Allotment Methods

The District has established the following allocation method for each customer type. See Appendix C for sample water shortage rationing allocation method.

<table>
<thead>
<tr>
<th>Customer Type</th>
<th>Allocation Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Family</td>
<td>Hybrid of Per-capita and Percentage Reduction</td>
</tr>
<tr>
<td>Multifamily</td>
<td>Hybrid of Per-capita and Percentage Reduction</td>
</tr>
<tr>
<td>Commercial</td>
<td>Percentage Reduction</td>
</tr>
<tr>
<td>Industrial</td>
<td>Percentage Reduction</td>
</tr>
<tr>
<td>Gov't/institutional</td>
<td>Percentage Reduction</td>
</tr>
<tr>
<td>Agricultural-Permanent</td>
<td>Percentage Reduction - vary by efficiency</td>
</tr>
<tr>
<td>Agricultural-Annual</td>
<td>Percentage Reduction - vary by efficiency</td>
</tr>
<tr>
<td>Recreational</td>
<td>Percentage Reduction - vary by efficiency</td>
</tr>
<tr>
<td>New Customers</td>
<td>Per-capita (no allocation for new landscaping during a declared water shortage.)</td>
</tr>
</tbody>
</table>

Based on current and projected customer demand, Appendix C indicates the water allocated to each customer type by priority and rationing stage during a declared water shortage.

Individual customer allotments are based on a five-year period. This gives the District a more accurate view of the usual water needs of each customer and provides additional flexibility in determining allotments and reviewing appeals. However, no allotment may be greater than the amount used in the most recent year of the five-year base period.

The Water Department Manager shall classify each customer and calculate each customer's allotment according to the Sample Water Rationing Allocation Method. The allotment shall reflect seasonal patterns. Each customer shall be notified of their classification and allotment by mail before the effective date of the Water Shortage Emergency. New customers will be notified at the time the application for service is made. In a disaster, prior notice of allotment may not be possible; notice will be provided by other means. Any customer may appeal the Water Department Manager's classification on the basis of use or the allotment on the basis of incorrect calculation.

Prohibitions, Consumption Reduction Methods and Penalties

Law

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.
10632 (e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.
10632 (f) Penalties or charges for excessive use, where applicable.

Mandatory Prohibitions on Water Wasting

The QHWD "No Waste" Ordinance (see Appendix C) includes prohibitions on various wasteful water uses such as lawn watering during mid-day hours, washing sidewalks and driveways with potable water, and allowing plumbing leaks to go uncorrected more than 24 hours after customer notification.
Table 18
Consumption Reduction Methods

<table>
<thead>
<tr>
<th>Examples of Consumption Reduction Methods</th>
<th>Stage When Method Takes Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand reduction program</td>
<td>All stages</td>
</tr>
<tr>
<td>Reduce pressure in water lines</td>
<td></td>
</tr>
<tr>
<td>Flow restriction</td>
<td>IV</td>
</tr>
<tr>
<td>Restrict building permits</td>
<td>II, III, IV</td>
</tr>
<tr>
<td>Restrict for only priority uses</td>
<td></td>
</tr>
<tr>
<td>Use prohibitions</td>
<td>All stages</td>
</tr>
<tr>
<td>Water shortage pricing</td>
<td>All stages</td>
</tr>
<tr>
<td>Per capita allotment by customer type</td>
<td>IV</td>
</tr>
<tr>
<td>Plumbing fixture replacement</td>
<td></td>
</tr>
<tr>
<td>Voluntary rationing</td>
<td>I</td>
</tr>
<tr>
<td>Mandatory rationing</td>
<td>II, III, IV</td>
</tr>
<tr>
<td>Incentives to reduce water consumption</td>
<td></td>
</tr>
<tr>
<td>Education Program</td>
<td>All Stages</td>
</tr>
<tr>
<td>Percentage reduction by customer type</td>
<td>II, III, IV</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

See Appendix C, the "No Waste" Ordinance and Moratorium on New Connections - which details the reduction methods - regarding Table 18.

Excessive Use Penalties

Any customer violating the regulations and restrictions on water use set forth in the "No Waste" Ordinance shall receive a written warning for the first such violation. Upon a second violation, the customer shall receive a written warning and the district may cause a flow-restructor to be installed in the service. If a flow-restrictor is placed, the violator shall pay the cost of the installation and removal. Any willful violation occurring subsequent to the issuance of the second written warning shall constitute a misdemeanor and may be referred to the Los Angeles County District Attorney's office for prosecution pursuant. If water service is disconnected, it shall be restored only upon payment of the turn-on charge fixed by the Board of Directors.

Revenue and Expenditure Impacts and Measures to Overcome Impacts

Law

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier...

10632 (g) [An analysis of the impacts of each of the] proposed measures to overcome those [revenue and expenditure] impacts, such as the development of reserves and rate adjustments.
All surplus revenues that the District collects are currently used to fund the Rate Stabilization Fund, conservation, recycling, and other capital improvements. The District estimated projected ranges of water sales by shortage stage to best understand the impact each level of shortage will have on projected revenues and expenditures by each shortage stage.

This analysis is undertaken first with no additional water purchases and no rate increases and then with a 25% rate increase at Stage II; 50% at Stage III, and a 100% increase at Stage IV. To cover increased expenses and decreased sales, rate increases would need to be "severe".

See Appendix D for the District's efforts to establish an Emergency Fund and a Rate Stabilization Fund.

**Reduction Measuring Mechanism**

**Law**

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

**Mechanism to Determine Reductions in Water Use**

Under normal water supply conditions, potable water production figures are recorded daily. Totals are reported weekly to the General Manager. Totals are reported monthly to the Board of Directors and incorporated into the water supply report.

During a Stage I or Stage II water shortage, daily production figures are reported to the Operations Supervisor. The Operations Supervisor compares the weekly production to the target weekly production to verify that the reduction goal is being met. Weekly reports are forwarded to the General Manager and the Water Shortage Response Team. Monthly reports are sent to the Board of Directors. If reduction goals are not met, the Manager will notify the Board of Directors so that corrective action can be taken.

During a Stage III or Stage IV water shortage, the procedure listed above will be followed, with the addition of a daily production report to the General Manager.

During emergency shortages, production figures are reported to the Operations Supervisor hourly and to the General Manager and the Water Shortage Response Team daily. Daily reports will also be provided to the Board of Directors.
Water Recycling

Wastewater System Description

Law

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:

10633 (a) A description of the wastewater collection and treatment systems in the supplier's service area...

Participation in a Regional Recycled Water Planning

The District does not participate in any area recycled water use program. All wastewater from District customers is collected and treated by Los Angeles County. The County's two area processing facilities and treatment ponds are about ten miles east of the District and nearly 25 miles northeast of the District. The cost to treat the wastewater to tertiary level and transport via as yet built pipelines far exceeds the cost to enlarge existing wells and drilling new wells. QHWD does not plan to invest in recycled water in the foreseeable future.

Wastewater Generation, Collection & Treatment

Law

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:

10633 (a) A [...] quantification of the amount of wastewater collected and treated...

Regional Sanitary Treatment Plant (RTP)

As noted above, QHWD does not have access to treated wastewater. Discussions have been held with Los Angeles County but there are no definite plans as of this date to treat and transport tertiary water to the District's area.
Wastewater Disposal and Recycled Water Uses

Law

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:

10633 (a) A description of the [...] methods of wastewater disposal.

10633 (b) A description of the recycled water currently being used in the supplier's service area, including but not limited to, the type, place and quantity of use.

10633 (c) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

10633 (d) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years.

Recycled Water Not Currently Being Used

As noted above, QHWD does not have access to treated wastewater. Discussions have been held with Los Angeles County but there are no definite plans as of this date to treat and transport tertiary water to the District's area.

Encouraging Recycled Water Use

Law

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:

10633 (e) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

As noted above, QHWD does not have access to treated wastewater. Discussions have been held with Los Angeles County but there are no definite plans as of this date to treat and transport tertiary water to the District's area.
Recycled Water Optimization Plan

Law

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:

10633 (f) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems and to promote recirculating uses.

Plan for Optimizing the Use of Recycled Water

As noted above, QHWD does not have access to treated wastewater. Discussions have been held with Los Angeles County but there are no definite plans as of this date to treat and transport tertiary water to the District's area.
APPENDIX A

List Of Groups Who Participated In The Development Of This Plan

Agency governing Board of Directors/board members and staff
District Manager/General Manager and staff
Person(s) responsible for developing and implementing this Plan
Consultants
Members of the public, advisory groups and so on.