City of Glendale Water & Power

Your Trusted Community Utility

2010

City of Glendale *Water & Power* Urban Water Management Plan

Volume I
The Plan

The Urban Water Management Plan

for the

City of Glendale

The City of Glendale is a dynamic community. We are committed to the well being of all people who live in, work in, or visit our City.

We are proud of Glendale's history of accomplishment. Through visionary leadership, we build on this tradition of success by enacting fair legislation and providing quality services to ensure a community environment that is safe, healthy and enriching.

We are a team dedicated to a well governed, professionally managed, responsive, and fiscally sound City that creates opportunities for all to enjoy life, grow, and prosper.

June 2011

City of Glendale Water & Power
Your Trusted Community Utility

ENGINEERING

June 27, 2011

Department of Water Resources
Attn: **David Todd**, Chief, Financial and Technical Assistance Branch
Division of Water Use Efficiency and Transfers
P.O. Box 942836
Sacramento, CA 94236-0001

Subject: **2010 URBAN WATER MANAGEMENT PLAN**

Dear Mr. Todd:

Pursuant to the Urban Water Management Planning Act, Article 3, Section 10640, we have submitted three copies of our Urban Water Management Plan for the year 2010. The council of the City of Glendale has adopted the said plan on June 21, 2011.

Very truly yours,

P. Kavounas

Peter Kavounas, P.E.
Assistant General Manager – Water Services

PK:rt/rl

CITY OF GLENDALE *WATER & POWER*
141 North Glendale Ave., Level 4 • Glendale, CA 91206-4496
Tel: 818•548•4876 Fax: 818•240•4754

CITY OF GLENDALE

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Glenn Steiger, General Manager of Glendale *Water & Power*

REPORT PREPARED BY

Raja Takidin, Senior Civil Engineer
Leighton Fong, Civil Engineer II
Rosanna Lau, Civil Engineer I
Joy Gaines, Resource Efficiency Advisor

June 2011

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2010 Urban Water Management Plan Checklist

Checklist Organized According to Water Code

Page # In Plan	Section of Law	Item # in Completeness Form	Items to address
71-74	10608.20	11	Per Capita Water Use and Water Use Targets
3	10620 (d) (1) (2)	1	Coordinate the preparation of its plan with other appropriate agencies, including direct and indirect suppliers, wastewater, groundwater, and planning agencies
27	10620 (f)	2	Describe resource maximization / Import Minimization Plan
2	10621 (a)	3	Plan Updated in Years Ending in Five and Zero
3	10621 (b)	4	City and County Notification and Participation
6	10631 (a)	5	Provide current and projected population in 5-year increments to 20 years
4-6		5	Describe the climate and other demographic factors
28	10631 (b)	6	Identify and quantify the existing and planned sources of water available in 5-year increments to 20 years
28		6	Provide current water supply quantities
20-22	10631 (b) (1)	7	Description of groundwater basins
20-22	10631 (b) (2)	7	Groundwater basin water right and judgment
38	10631 (c)	8	Describe the reliability of the water supply and vulnerability to seasonal and climatic shortage
41	10631 (d)	9	Describe opportunities for exchanges or transfers of water on short-term or long-term basis
28	10631 (e) (1)	10	Quantify current and past water use in 5-year increments to 20 years
9	10631 (e) (2)	10	Identify projected water uses among water use sectors in 5-year increments to 20 years
66-70	10631 (f) (g)	13	Review of DMMs for Completeness
33-38	10631 (h)	14	Planned Water Supply Projects and Programs
41	10631 (i)	15	Opportunities for development of desalinated water
67	10631 (j)	16	District is a CUWCC signatory
28	10631 (k)	17	Agency demand projections provided to wholesale suppliers
Appendix J		17	Wholesaler identified & quantified the existing and planned sources of water
27-29		17	Wholesale Supply Reliability
11-12	10631.1(a)	12	Low Income Housing
Appendix B	10632 (a)	18	Provide Stages of Action for Water Shortage Contingency Plan
40-41	10632 (b)	19	Provide minimum water supply estimates based on driest three-year historic sequence

Page # In Plan	Section of Law	Item # in Completeness Form	Items to address
Appendix I	10632 (c)	20	Provide catastrophic supply interruption plan
40	10632 (e)	21	List the Consumption Reduction Methods
Appendix B	10632 (f)	21	Excessive use penalties or charges during mandatory conservation
61-64	10632 (g)	22	Describe how actions and conditions impact revenues and expenditures
61-64		22	Describe measures to overcome revenue and expenditure impacts.
Appendix B	10632 (h)	23	Provide copy of water shortage contingency ordinance
39	10632 (i)	24	Provide a mechanism for determining actual reductions in water use.
51-52	10633 (a)	25	Describe the wastewater collection and treatment systems in the supplier's service area.
53		25	Quantify the -volume of wastewater collected and treated
52		25	Describe the methods of wastewater disposal in the supplier's service area.
56-57	10633 (b)	26	Describe the type, place, and quantity of recycled water currently used in the supplier's service area.
28, Appendix B	10633 (c)	26	Describe and quantify potential uses of recycled water in 5-year increments to 20 years.
56	10633 (d)	26	Describe the technical and economic feasibility of serving the potential users of recycled water.
28	10633 (e)	27	Provide the projected acre-feet results of recycled water used per year.
59-60	10633 (f)	28	Describe the actions that may be taken to encourage recycled water use.
Appendix G		28	Provide a plan for optimizing the use of recycled water in the supplier's service area.
51	10635	29	Wastewater and Recycled Water – Recycled Plan Agency Coodination
42-50	10634	30	Water Quality Impacts on Availability of Supply
29-33	10635 (a)	31	Provide an assessment of the reliability of the water supplier's water service to its customers during normal, single dry, and multiple dry water years.
29		31	Compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in 5-year increments **(refer to 10631 (c)).**
30-33		31	Compare normal, single dry, and multiple dry water year projected water supply sources available to the water supplier with the normal, single dry, multiple dry water year projected water uses **(refer to 10631 (c)).**
Appendix E	10642		Provide proof of public participation and plan adoption

INTRODUCTION - I

1. Overview

Water has been a major resource towards improving the quality of life in the city of Glendale. As a utility since 1909, Glendale Water & Power (GWP) has grown to over 32,500 water and 88,000 electric customers becoming the third most populous city in Los Angeles County following Los Angeles & Long Beach. GWP progresses from pumping all our water from local private wells to miles of interconnecting water pipelines and the purchase of water from as far away as 500 miles. Our mission is to be a trusted community utility and provide high quality and reliable water supplies to our customers.

As southern California continues to grow, the City must be able to provide sufficient water supply. Glendale has outgrown its local supply of water decades ago, and due to recent drought conditions, demands for additional water supplies have increased. GWP is faced with the challenge to provide sufficient water supply to a growing city. Water supplies that we have relied on are being challenged by environmental and water quality issues. The importance of this Urban Water Management plan, a long range plan, is to insure a reliable water supply for our customers. The plan will show how GWP will be able to meet such needs by continuing water conservation efforts, maintaining the water distribution system and providing high quality water that meets or exceeds drinking water quality standards.

2. Purpose

The purpose of this document is to comply with the Urban Water Management Planning Act (UWMPA) contained in the California Water Code, Division 6, Part 2.6 Sections 10610 through 10656. It was added by Statue in 1983, Chapter 1009, and became effective on January 1, 1984. The Act, known as Assembly Bill 797 while pending before the Legislature, has been amended five times since it was adopted.

2.1. UWMP Act

The Act requires that “every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually prepare and adopt an ‘urban water management plan’ for submittal to the State Department of Water Resources (SDWR)”.

The act also requires that the plan be periodically reviewed for changes and that an update is submitted to SDWR every five years. The plan shall describe and evaluate the practical and efficient uses of water and the degree of usage of reclamation and conservation activities**.** The Urban Water Management Plan requires a detailed evaluation of water supply and demand at least twenty years into the future. Suppliers must provide analyses of the following:

- Service area and projected population.
- Existing and planned sources of water, including groundwater.
- The water supply's reliability during average, single-dry and multiple-dry water years.
- Past, current, and projected water use.
- Exchanges and transfers.
- A supply and demand assessment over five year increments to twenty years for average, single-dry, and multiple-dry water years.
- Current and planned water demand management measures.
- Current and planned water supply projects.
- An urban water shortage contingency plan.
- Recycled water as a potential water source.
- Quality of existing water sources.
- Desalination as a potential water source.

City of Glendale prepared its initial Urban Water Management Plan in 1985 and has updated it every five years. The Glendale 2010 Urban Water Management Plan is prepared by the City of Glendale Water Department. This document is a revision of the 2005 report, outlining the numerous changes that have occurred in the City for the last five years. The City has been actively developing local water resources, advocating the greater use of recycled water and has also implemented many of the Best Management Conservation Practices.

Over the years, the UWMP Act has undergone several amendments. The most recent amendment was adopted in 2009 which added the following additional requirements:

- Assessing current and future demands to achieve a base per capita water use reduction of twenty (20) percent by 2020
- Including indirect potable reuse to the list of recycled water users
- Projecting water use for low-income single and multi-family residential housing. A copy of the UWMP Act requirements and checklist is provided in Appendix A.

In addition to the UWMP Act, Senate Bills 610 and 221 in 2001, requires the availability of water supplies for new large developments verified by water utilities in a written letter or report. The Urban Water Management Plan was identified as a verification source. GWP currently provides water supply assessments for new large developments.

2.2. Plan Preparation

Notifications were sent out in March 2011 to nearby and related agencies notifying them of the City's intent to update the Urban Water Management Plan. A 60 day notification was also published in the Glendale News-Press and posted on the City's website (www.glendalewaterandpower.com) between April 2011 through May 2011. The notice stated the City's intent to update UWMP and that a draft will be available for viewing. See appendix E.

A 30 day notification was published in the Glendale News-Press and posted on the City website between May 3 through June 3, 2011 stating the time and location of a public hearing and that a draft is available for viewing at the Glendale Central Library and offices of Glendale *Water & Power*. A draft was also provided on the website for downloading. See appendix E.

The Glendale *Water & Power* (GWP) Commission on June 6, 2011, conducted a public hearing on the Urban Water Management Plan (UWMP) after notice of the hearing was conducted. Copies of the draft Urban Water Management Plan were sent to the City Council Members, *Water & Power* Commissioners and nearby and related agencies on April 21, 2011 for their review and comments. The Glendale City Council adopted the 2010 UWMP on June 21, 2011.

The adopted plan will be submitted to the California Department of Water Resources after its adoption as required by Water Code §10652.

2.3. Agency Coordination

Per Water Code §10620(d)(1)(2), this UWMP was prepared in coordination with the Urban Water Management Plan (UWMP) prepared by the Metropolitan Water District of Southern California (MWD) and the UWMP prepared by Cities of Burbank, Pasadena and Los Angeles. The City of Glendale is a member agency of MWD and therefore a beneficiary of their water management plans. Some information presented in this report was obtained from MWD's UWMP and the UWMP of Burbank, Pasadena and Los Angeles. Also, there is data in this report that was obtained from the City of Glendale's Planning and Public Works Departments.

3. Service Area

3.1. Land Use

Glendale spans over 31.58 square miles and is home to nearly 200,000 people. Glendale is primarily dominated by retail and service industries and has one of the highest percentages of multi-family units in Southern California. There has been a substantial growth in new development in the City consisting of mixed-use buildings and new multi-family housing, such as apartments and condominiums. There are only a small number of new single-family development projects occurring in the City consisting primarily of infilling and small subdivisions. The redevelopment primarily consists of the destruction of old single-family homes in the downtown area of the City and the construction of multi-family housing.

Figure 1.1
City of Glendale Land Uses

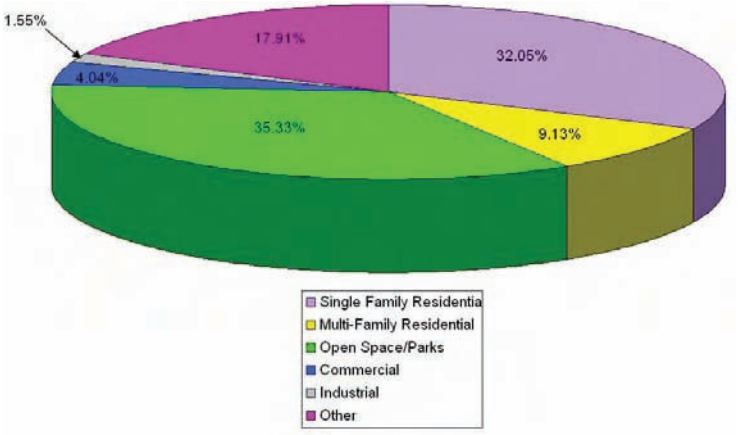


Table 1-1 City of Glendale Land Uses			
Land Uses	Acre	Mile	%
Single Family Residential	6,477.67	10.12	32.05%
Multi-Family Residential	1,845.51	2.88	9.13%
Open Space/Parks	7,140.62	11.16	35.33%
Commercial	815.81	1.27	4.04%
Industrial	312.46	0.49	1.55%
Other	3,619.54	5.66	17.91%
Total	20,211.62	31.58	100.00%

In Table 1-1, Glendale's largest land use category is open space area which includes hills, parks, and cemeteries with approximately 7,140 acres or 35.33%. With single family residential being the second largest total land use with approximately 6,477 acres or 32.05%. Following others, multi-family residential, commercial and industrial with approximately 3,619 acres, 1,845 acres, 815 acres and 312 acres, respectively or 17.91%, 9.13%, 4.04% and 1.55% respectively. Figure 1.1 shows a breakdown of the land uses within the City of Glendale. The "Other" category includes streets, freeways, water channels, and etc.

3.2. Demographics

The City of Glendale is the third largest city in Los Angeles County, following Los Angeles and Long Beach. Based on the 2009 E-4 Population Estimates for Cities, Counties and the State, 2001-2010, with 2000 Benchmark report published by the Department of Finance – Demographic Research Unit (DOF), Glendale's serving population of 201,893 resident's accounts for approximately 2.00 percent of County's total population. The population is expected to continue to grow at a relatively constant rate.

Historic and projected population and housing for the City of Glendale are shown in Table 1-2. Based on historical data an estimated increase of 0.04% and 1.28% per year for single and multi-family households respectively was assumed.

Table 1-2
Demographic Information for the Glendale Area

	2005	2010	2015	2020	2025	2030	2035
Population	205,651	210,293	216,797	224,285	231,864	238,406	244,357
Households							
Single-Family	29,932	29,945	29,958	29,971	29,984	29,997	30,010
Multi-Family	44,394	44,967	45,547	46,135	46,731	47,334	47,945
Total Households*	74,326	74,912	75,505	76,106	76,715	77,331	77,955

**Does not include mobile homes*

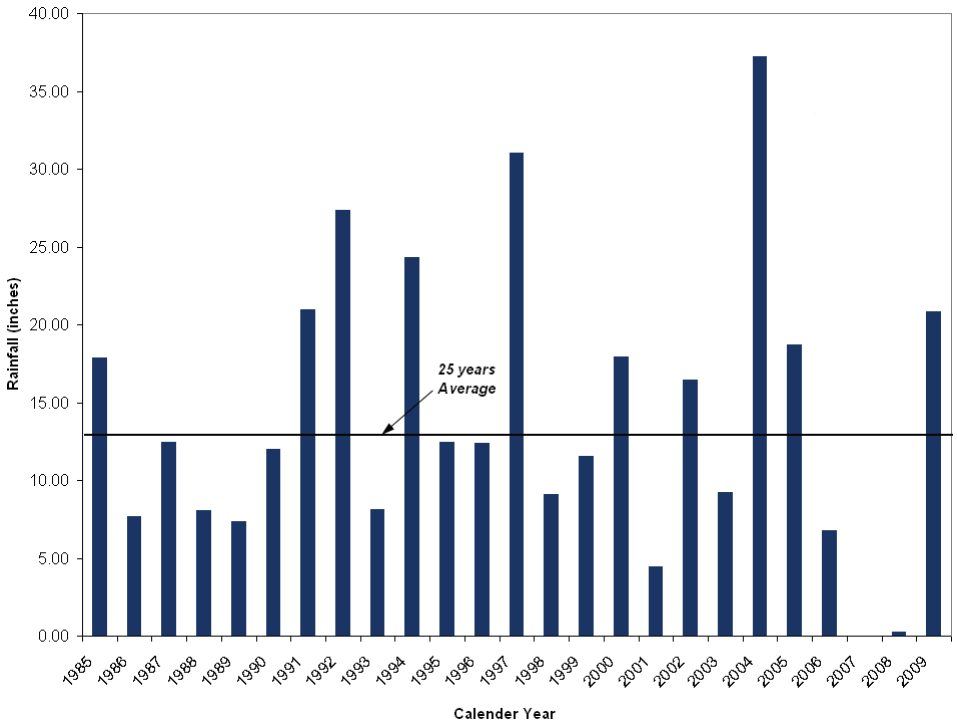
SOURCE: DOF, E-5 Population & Housing Estimates for Cities, Counties & the State, 2001-2010, with 2000 Benchmarks.

SOURCE: DOF, Race/Ethnic Population with Age and Sec Detail, 2000-2050,

3.3. Climate

The City's climate is mild, with an average temperature of 75ºF. Summer temperatures are commonly above 85ºF and may exceed 100ºF for several consecutive days. In the winter, temperature could go as low as the 30's ºF. Annual average rainfall for the last ten years was approximately 13 inches. Figure 1.2 summarizes the historical average rainfall in the service area in the last 25 years. As you can see after a very wet year in 2004, we entered a long period of drought dropping to 0 inches of rain 2007 and 0.26 inches of rain in 2008.

Figure 1.2
Annual Rainfall at Los Angeles Civic Center (1985-2009)

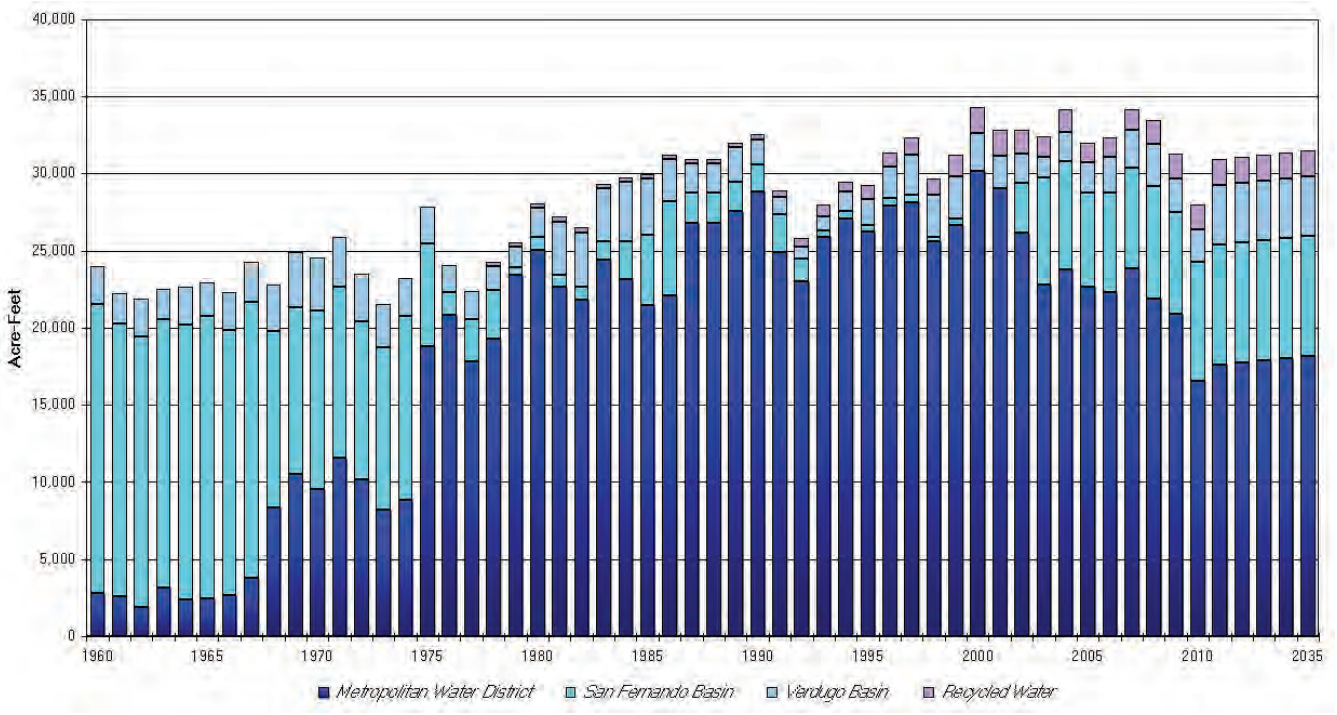


3.4. Overview - Water Demand and Supply

GWP currently receives water from local groundwater, imported water and recycled water. Local groundwater comes from the wells in the San Fernando and Verdugo Basin. Imported water is purchased from Metropolitan Water District (MWD). Recycled water is received from Los Angeles Glendale Reclamation Plant that is jointly owned by Glendale and Los Angeles. Water supplies are being jeopardized by droughts, environmental concerns and water contamination Conservation efforts, and expanding the use of recycled water will help the city offset these impacts on water supplies.

Water supply is foundational to a reliable water system. Decrease availability on one resource will increase the demand on another resource. The availability of each resource is projected using various historical trend related models in order to have sufficient supply for projected demand. Figure 1.3 shows historical water supplies from 1960 to 2010. Due to supply shortage due to the drought, demands decreased by over 2,100 AFY in 2009-10 as compared to 2008-2009.

Figure 1.3
Historical Sources of Water Supply



WATER DEMAND - II

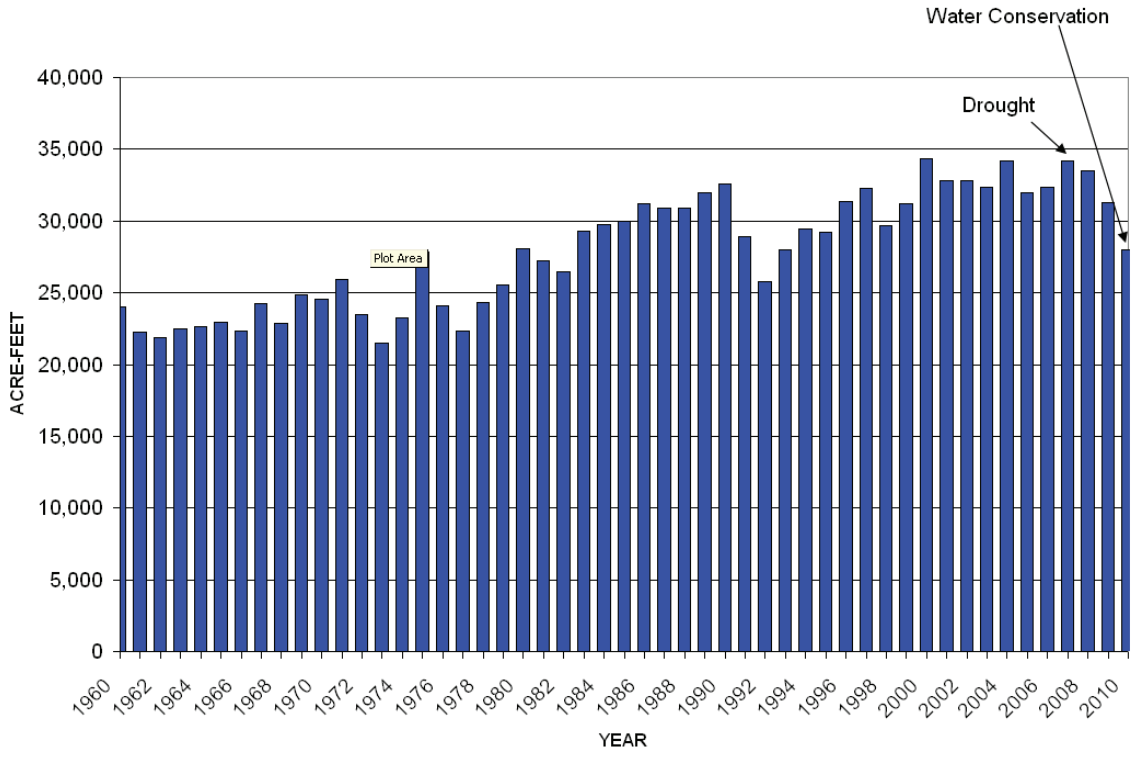
1. Overview

Growth of Southern California is tied to the growth of water supplies. As a city grows, water demand grows in order to accommodate the increase population. However, many challenges limit the amount of water supplies available such as environmental, water quality and climate changes. In this section, it will discuss the historical and projected demand for the City of Glendale.

2. Historical Water Use

Figure 2.1 below represents Glendale's historical water demand from 1960 up to present 2010. As shown in Figure 2.1, water demand fluctuates from year to year and can be effected by many reasons such as climate, water conservation, amount of rainfall, population growth and the economy. In 2009, a 3 year drought in combination with a recession forces GWP to require mandatory conservation. As the drought and recession continued into 2010, water usage decreased 11% compared to 2009. In 2004, it was a wet yet in which we had significant rainfall as shown in Figure 1.2 and thus in Figure 2.1 it reflects a 6% drop in water usage the following year.

Figure 2.1
Historical Water Supply



2.1. Water Demand Forecast by Category

Water demand in the current GWP billing system is separated into the following major categories: single-family, multi-family, commercial, industrial, irrigation and other. Water Demand by category for the next 25 years is projected per the same percentage increase used in the supply calculations. This percentage is calculated by finding the average increase and/or decrease in production within a 10 year interval between 2000 and 2009. See Table 2-1 below.

Table 2-1

PROJECTED WATER DEMAND BY CATEGORY (AF)

	2010	2015	2020	2025	2030	2035
Single Family Residential	10,165	10,703	10,752	10,802	10,852	10,903
Multi-Family Residential	9,620	10,130	10,177	10,224	10,271	10,319
Commercial/Institutional	3,698	3,894	3,912	3,930	3,948	3,967
Industrial*	468	493	495	497	499	502
Irrigation*	982	1,034	1,039	1,044	1,049	1,053
Other	1,515	2,613	2,572	2,573	2,578	2,580
TOTAL:	**26,448**	**28,866**	**28,946**	**29,070**	**29,198**	**29,323**

From the same billing system, the total number of connections corresponding for each category was also obtained for fiscal year 2005 and 2010. Using a similar method, the average difference between the 2 years were calculated and the percentage differences were used to project the total number of connections for the next 25 years as seen in Table 2-2 below.

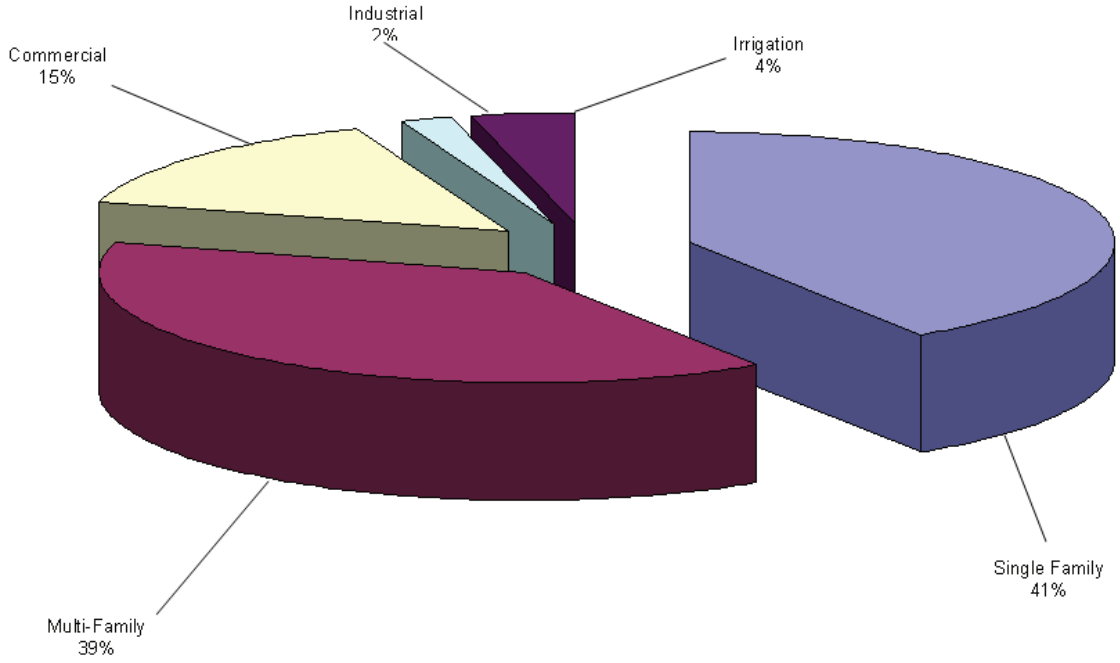
Table 2-2

PROJECTED NUMBER OF CONNECTIONS PER CUSTOMER TYPE

	2005	2010	2015	2020	2025	2030	2035
Single Family Residential	22,484	22,411	22,187	21,965	21,745	21,528	21,313
Multi-Family Residential	6,321	6,882	7,226	7,587	7,967	8,365	8,783
Commercial/Institutional	3,080	2,941	2,794	2,654	2,522	2,395	2,276
Industrial*	131	135	139	143	148	152	157
Irrigation*	88	241	253	266	279	293	308
Other	273	273	273	273	273	273	273
TOTAL:	**32,377**	**32,883**	**32,872**	**32,889**	**32,933**	**33,006**	**33,109**

In fiscal year 2009-2010, a total of 41% of water consumption was made of single-family homes, 39% of multi-family, 15% of commercial, 4% for irrigation and 2% of industrial, shown in Figure 2.2 below.

Figure 2.2
Water Consumption FY 2010 (AF)

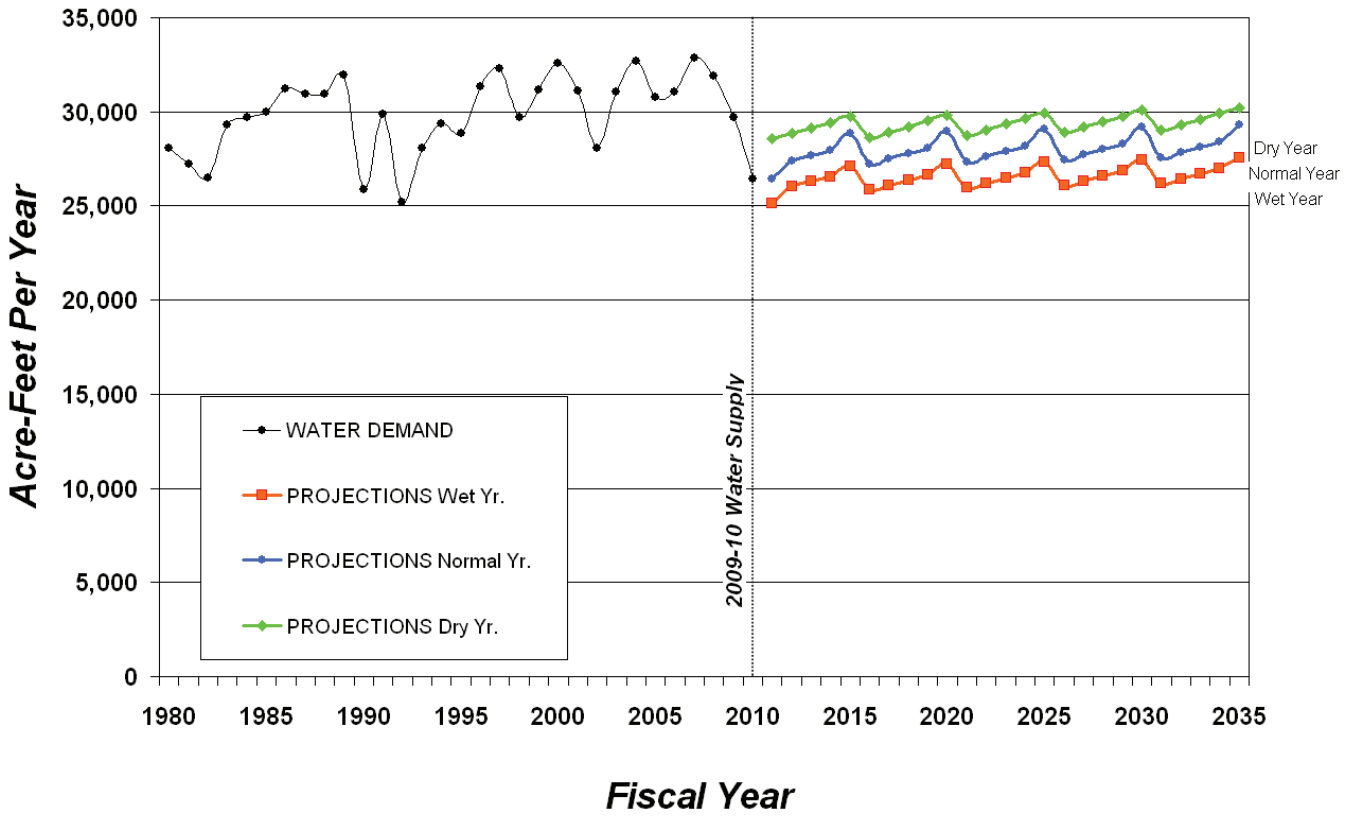


GWP is a retail agency and thus does not sell water to any other agencies. All projections to follow are based on water usage for customers in the City of Glendale.

2.2. Water Demand Forecast by Weather

Annual weather adjustment factors can be determined by projecting water demands and assuming long-term normal weather, and then comparing to actual demands. Adjusting for economic and drought conditions, projected water demands can vary by approximately ±3 percent in any year due to average historical weather variability. This means water demands under dry weather conditions can be as much as 3 percent higher than normal demands on average. On the other hand, water demands under wet weather conditions can be as much as 3 percent lower than normal demands on average. Figure 2.3 shows historical and projected total water demands.

Figure 2.3
Historical and Projected Water Demand in Glendale



2.3. Low-Income Water Demand Projections

Per the 2010 UWMP Guidelines (requirements), GWP is required to project water demands for low income customers. Because this is a new requirement, GWP has not tracked low-income water demand separately. For the purpose of projections, low-income customers were categorized by the following: low-income owners – Single Family; and low-income renters – Multi Family. According to the City of Glendale's Planning department, approximately 3.5% of households were low-income owners and thus single-family. Approximately 21.5% of households were low-income renters and thus multi-family. The total number of households per Table 1-2 in the previous section was used. In Table 2-3 below, the total number of households were multiplied by the corresponding percentages and multiplied by the average household demand of 19 HCF/month and converted to acre-feet/year for the total low-income water demands. From here water demand was projected for the next 25 years.

TABLE 2-3 Water Demand (AFY)							
	2005	2010	2015	2020	2025	2030	2035
Single-Family	548	549	549	549	549	550	550
Multi-Family	4,996	5,060	5,126	5,192	5,259	5,327	5,395

2.4. Unaccounted-for-Water

The City of Glendale annually calculates the unaccounted-for water use in the water system. Unaccounted-for water use is one way used to describe the "tightness" of the water distribution system. Generally, unaccounted-for water use is defined as the differences between the amount of water produced and water served. A significant amount or percentage of unaccounted-for water would represent an operating cost or revenue loss to the City. Unaccounted-for water can be the result of system leaks, flushing for water quality purposes, reservoir drainage for repairs, street cleaning, sidewalk trees watering, sewer cleaning, meter inaccuracies, meter-reading errors, water theft, accounting errors, main breaks etc.

There are two basic types of unaccounted-for water:

- Metered or evident uses: These are water used by City departments during daily operations or special incidents and will not be charged for the usage. For example: tank drainage, water quality flushing, street sweeping, hydrant flows, plant watering, etc.

- Unknown or unmetered water uses: These are potential uses the agency is speculating occur but does not have the ability to accurately confirm. These potential uses include fire fighting, unidentified leakage in the system, meter inaccuracies, theft, underestimated accounts, meter inaccuracies, main breaks and meter reading errors or accounting errors.

For the City of Glendale, the total of unaccounted water use has fluctuated between 1.3 percent and 6.2 percent over the past few years, as indicated in Table 2-4 below. The reason for the change from year to year could relate to the demand conditions and billing cycle issues at the beginning and end of the fiscal year. Factors that also have contributed to the increase are: construction works, storage

cleaning, flushing, fire hydrant flow testing, well testing and rehabilitation, and major main breaks. Generally, system losses are about the same quantity each year, but the percentage of unaccounted water can change with variable sales.

The American Water Works Association (AWWA) states that the unaccounted-for water use should not exceed 10 percent. Based on these criteria, the unaccounted-for water in Glendale system is considered as "acceptable". Therefore, a leak detection survey is not necessary.

The City has increased its effort in identifying evident-use types of unaccounted-for water by coordinating with other City departments to meter their water usage for daily operations. Private contractors are also required to meter their water use. The Water Department also attempts to minimize meter inaccuracies through a small-meter replacement program to replace old meters that under-register due to age or were over-sized and large-meter testing and calibration program to assure the ongoing accuracy of the meters.

TABLE 2-4
GWP UNACCOUNTED FOR WATER

Fiscal Year	Percent	Volume
2005-06	6.2%	1,916
2006-07	1.3%	435
2007-08	6.6%	2,121
2008-09	5.1%	1,527
2009-10	4.7%	1,243
2015	4.5%	1,244
2020	4.5%	1,250
2025	4.5%	1,256
2030	4.5%	1,262
2035	4.5%	1,268

3. Water Demand Outlook

The population growth in the City is expected to be approximately 2% per year (minimal) over the next 20 years as the City is essentially built out. Development will likely be infilling of developed areas and higher density development as old single-family homes are demolished and multi-family housing

constructed. Many of the new developments are of mixed-used which includes commercial on the first floor and residential above.

With minimal population growth anticipated, there should be a slower increase in water use as the higher density development results in lower per capita water use. The biggest annual change in water use will be from the varying weather patterns. Compared to normal water demands, water use can decrease by 6 percent in the wetter years and can increase by 6 percent, in hot dry years. For planning purposes the City must be able to meet demands during hot dry years when water demands are high.

WATER SUPPLY SYSTEM - III

1. Overview

As previously discussed, water demand is increasing with population. Although population growth is very minimal, GWP is faced with many challenges that affect our water supply and thus as a water utility, it is essential to have sufficient amount of water supply to provide to our customers. In this section, a summary of GWP historical and projected water supply sources are discussed.

2. History

Near the beginning of the 1900's, a number of private mutual water companies, together with individual producers, supplied the water needs of the emergent population. This was accomplished through the use of local ground water sources, by way of water wells and pumps, within both the San Fernando and Verdugo Basins. To cope with the growing population and increasing demand, a Water Commission was appointed and recommended the purchase of four large private water companies to establish a municipal water utility. In 1914 the municipal water system began its operation (currently called Glendale *Water & Power*). In the years that followed, other water companies were purchased and added to the water system. As late as 1940, groundwater from the San Fernando and Verdugo Basins were the only sources of water in the City.

With future development dependent upon an adequate water supply, thirteen Southern California cities, including Glendale, agreed to the formation of the Metropolitan Water District of Southern California (MWD) in November 1928. MWD to constructed the 242 mile-long Colorado River Aqueduct to import water from the Colorado River as well as a water delivery system to deliver the water to the 13 member cities in the coastal areas of Southern California. Construction started in early 1933, and the initial facility was completed in 1941. Glendale first drew upon its MWD source in mid 1946.

In the late 1950's, it became apparent that the Colorado River water supply would not be sufficient to supply the ever-increasing demand with significant population growth and other communities

annexing to MWD. In 1960, California voters approved the issuance of a general bond to build the initial features of the State Water Project. The California Aqueduct System was constructed to transfer surplus water from Northern California to the semi-arid central and southern region of the state. MWD contracted for significant amounts of water to be delivered by the State Water Project and began delivering this water to its member agencies in 1972.

The production from the San Fernando Basin in the 1960's reached a peak of about 17,000 acre-feet per year (AFY). The Grandview groundwater collection system in the San Fernando Basin operated with a peak capacity of about 24,000 gpm (34.6 million gallons per day-MGD) into the potable water system.

In mid-1970's, the City's production was limited from the San Fernando Basin to about 12,000 AFY as part of a court decree arising from a lawsuit by the City of Los Angles, City of Los Angeles vs. the City of San Fernando. In 1975, the California Supreme Court decision in the Los Angeles suit further limited the City's production right.

In late 1979, Assembly Bill 1803 required that all water agencies using ground water must conduct tests for the presence of certain industrial solvents. These tests indicated that "volatile organic compounds" (VOC's) such as trichloroethylene (TCE) and perchloroethylene (PCE) were present in the San Fernando Basin groundwater supplies in concentrations exceeding State Department of Public Health's maximum contaminant levels (MCL). Both chemicals were used extensively in the past in manufacturing and dry-cleaning. At that time, health effects of the VOC's were not known. As a result, Glendale, along with other communities in the San Fernando Valley, had to further limit its use of San Fernando Basin supplies. The City suspended production from the basin because of the difficulty of meeting the MCL's for the VOC's. Prior to 2003, except for a small quantity (about 400 AFY) used at the Glendale Power Plant for cooling tower make-up water and irrigation at Forest Lawn Memorial Park, no water from the San Fernando Basin was being used in Glendale.

This loss of groundwater supply made the City almost totally dependent on MWD water supply. In the 1980's, the U.S. Environmental Protection Agency (EPA) designated the San Fernando Basin as a

Superfund site. This resulted in the construction of the Glendale Operable Unit consisting of a water treatment plant and eight (8) wells. In the summer of 2000, the use of San Fernando Basin groundwater was restored.

Other limitations to ground water use occurred in the late 1970's when production from the Verdugo Pick-up System in the Verdugo Basin was discontinued because of possible contamination of its shallow water source.

Due to the increase in population, economic growth, decrease in availability of local water supply, water quality problems and diminished water rights, Glendale's dependency on imported water from MWD increased to more than 90 percent of the total potable water need.

In the late 1970's, the City began delivering recycled water from the Los Angeles- Glendale Water Treatment Plant for irrigation purposes and for use in the cooling towers at the Glendale Power Plant. Expansion of the recycled water system, beginning in the early 1990's, greatly increased recycled water use.

3. Current Water Supply System

The City of Glendale currently has three sources of water available to meet demands which include groundwater, imported water from MWD, and recycled water. Each of these sources, as well as the quality of water available, with respect to the source, is described below. The entry points in the Glendale water system for the various supplies are shown in Figure 3.1. The location of the "out of the area" water sources is shown in Figure 3.2 which includes all interconnections with other agencies. Over the past 5 years, there has been a change in the mix of supplies used to meet water demands in the City. In the future, we project minor changes in water supplies. These changes and sources are discussed below.

Figure 3.1
Glendale MWD Entry Points

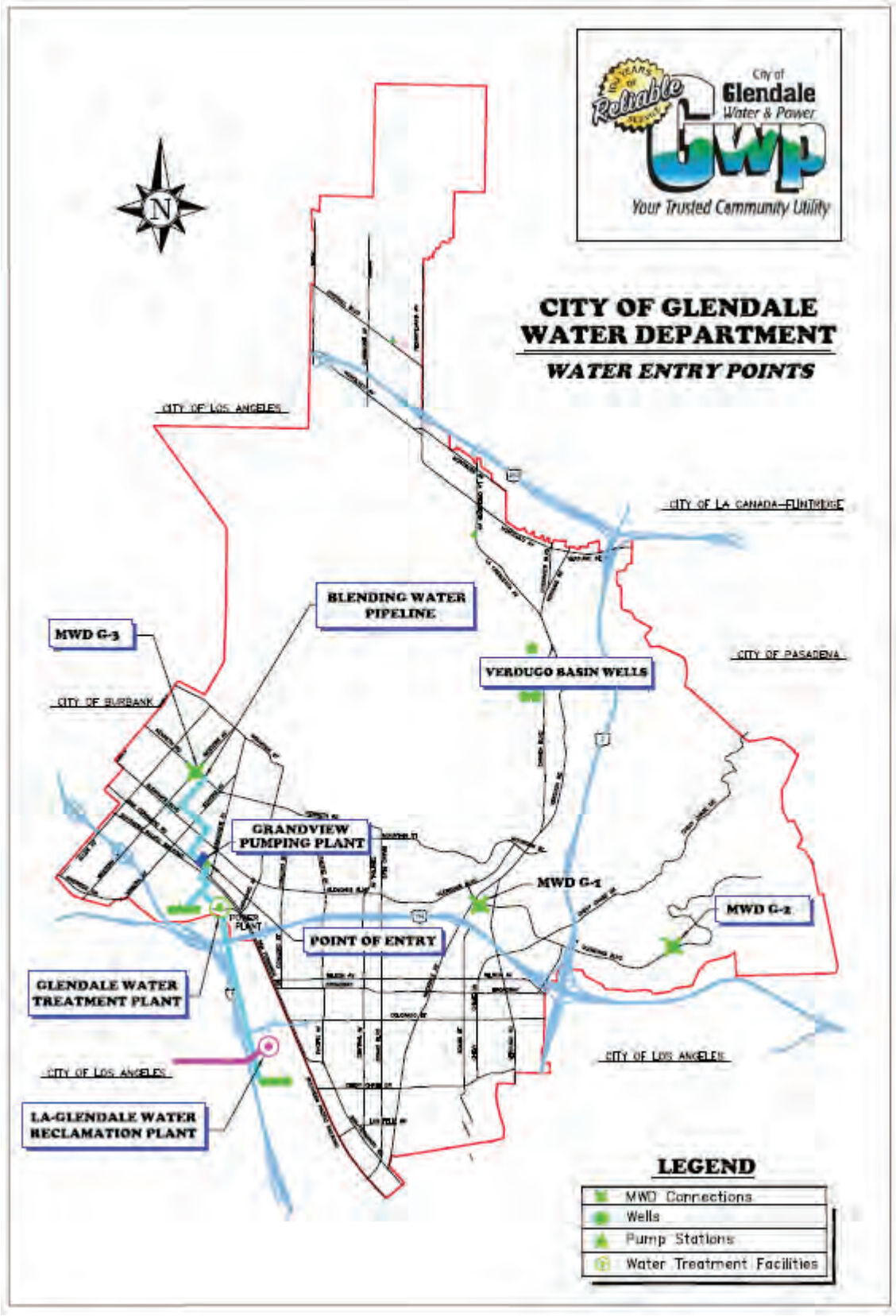
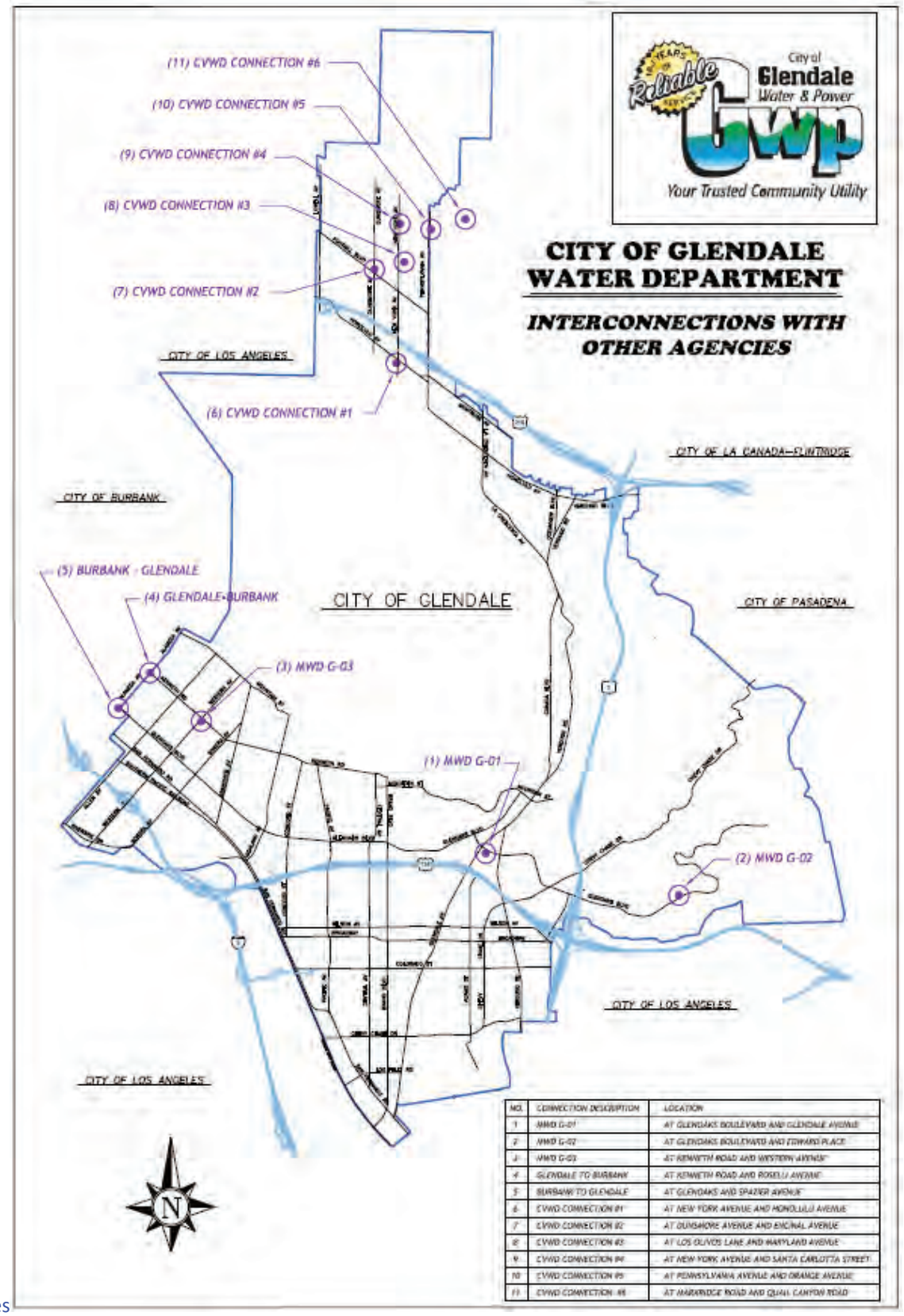


Figure 3.2
Glendale Interconnections with Other Agencies



3.1. San Fernando Basin

The City's water right to San Fernando Basin supplies is defined by the judgment (see Appendix C) entitled "The City of Los Angeles vs. the City of San Fernando, et al." (1979). While the judgment awarded the water rights to Los Angeles, it did allow a return flow credit (a water right based on a percentage of water used in the City that is returned to the groundwater basin). The City was also allowed to accumulate these credits if its water rights are not used. In the water year October 1, 2010, the City has a estimated storage credit of 50,861 AF within the basin. Much of this accumulation was a result of the City not being able to pump from the basin because of the groundwater contamination. Also, there is a right to produce water beyond the city's credits subject to a payment obligation to the City of Los Angeles based primarily on the cost of MWD alternative supplies. This right to produce water in excess of the return flow credit and the accumulated credits are significant to the operation of the Glendale Water Treatment Plant (GWTP), which is part of a U.S. Environmental Protection Agency (EPA) Superfund clean-up project in Glendale. The project is of a 5,000 gallon-per-minute (gpm) facility and delivers approximately 7,800 AFY to the City (about 28 percent of the City's total demand). Further discussion of this can be found later in this report. The various San Fernando Basin supplies are:

Return Flow Credit – Glendale is entitled to a return flow credit of 21 percent of all delivered water (including recycled water) in the San Fernando Basin and its tributary hill and mountain area. It is calculated by determining the amount of total water used in the City less 105 percent of total sales by Glendale to Verdugo Basin and its tributary hills. This credit ranges from about 5,000 AFY to 5,400 AFY depending on actual water use. This is the City's primary water right in the San Fernando Basin.

Physical Solution Water – Glendale has an agreement to extract excess water chargeable against the rights of the City of Los Angeles upon payment of specified charges generally tied to MWD's water rates. Glendale's physical solution right is 5,000 AFY.

Pumping for Groundwater Cleanup – Section 2.5 of the Upper Los Angeles River Area's Policies and Procedures, dated July, 1993, provides for the unlimited extraction of basin water for SUPERFUND activities, subject to payment of specified charges similar to physical solution water. This right became a significant factor with the completion of the Glendale Water Treatment Plant (GWTP) in 2000.

Carry-over extractions – In addition to current extractions of return flow water and stored water, Glendale may, in any one year, extract from the San Fernando Basin an amount not to exceed 10 percent of its last annual credit for import return water, subject to an obligation to replace such over-extraction by reduced extraction during the next water year. This provides an important year-to-year flexibility in meeting water demands.

For the San Fernando Basin, the rights described above give the City the right to extract from a practical point of view, subject to certain conditions and payment in some cases, any quantity of water anticipated to be needed for the City's future water resource program. Each water right used to produce from the San Fernando Basin has its own costs and availability considerations.

3.2. Verdugo Basin

Historically, groundwater supplies from the Verdugo Basin contributed a portion of the City's water supplies. This has been from wells and an underground water infiltration system. The Judgment in the Los Angeles lawsuit gave Glendale the right to extract 3,856 AFY from the Verdugo Basin. Crescenta Valley Water District also has water rights to extract 3,294 AFY and is the only other entity allowed to extract water from the Verdugo Basin.

Full use of these supplies has been limited over the past five years because of water quality problems, groundwater levels, and limited extraction capacity. In order to increase the use of these supplies, the City completed construction of the Verdugo Park Water Treatment Plant (VPWTP) in 1996. This facility has a capacity of 1,150 gpm and treats water from the two low capacity wells (referred to as Verdugo Wells A & B) and from the water supplies in the old Verdugo Pickup, horizontal infiltration system. Actual flows from these sources range between 300 gpm. The three existing wells referred to as Glorietta Wells 3, 4, and 6 (entry points B and C) and the Verdugo Park Water Treatment Plant (entry point G) alone will not utilize the City's entire water rights to the Verdugo Basin supplies and additional extraction capacity in the Verdugo Basin will be required to reach the water right capacity. The existing wells and VPWTP produce about 2000 AFY. The City has hired a consulting firm and determined possible sites for additional water extraction from the basin. Being an urban area, there are many

issues surrounding finding a desirable well site. Details on these wells will be addressed in Section III-5.7 in this report.

3.3. Metropolitan Water District

The Metropolitan Water District of Southern California (MWD) is a public agency organized in 1928 by a vote of the electorates of 13 Southern California cities which included Glendale. The first function of MWD was building the Colorado River Aqueduct to import water from the Colorado River. Water deliveries through the aqueduct began in the early 1940's. This imported water supplemented the local water supplies of the original 13 Southern California member cities. In 1972, to meet growing water demands in its service area, MWD started receiving additional water supplies from the State Water Project. The State Water Project is owned and operated by the State of California Department of Water Resources (DWR). MWD currently imports water from these two sources: (1) the Colorado River via the Colorado River Aqueduct and (2) the State Water Project via the California Aqueduct.

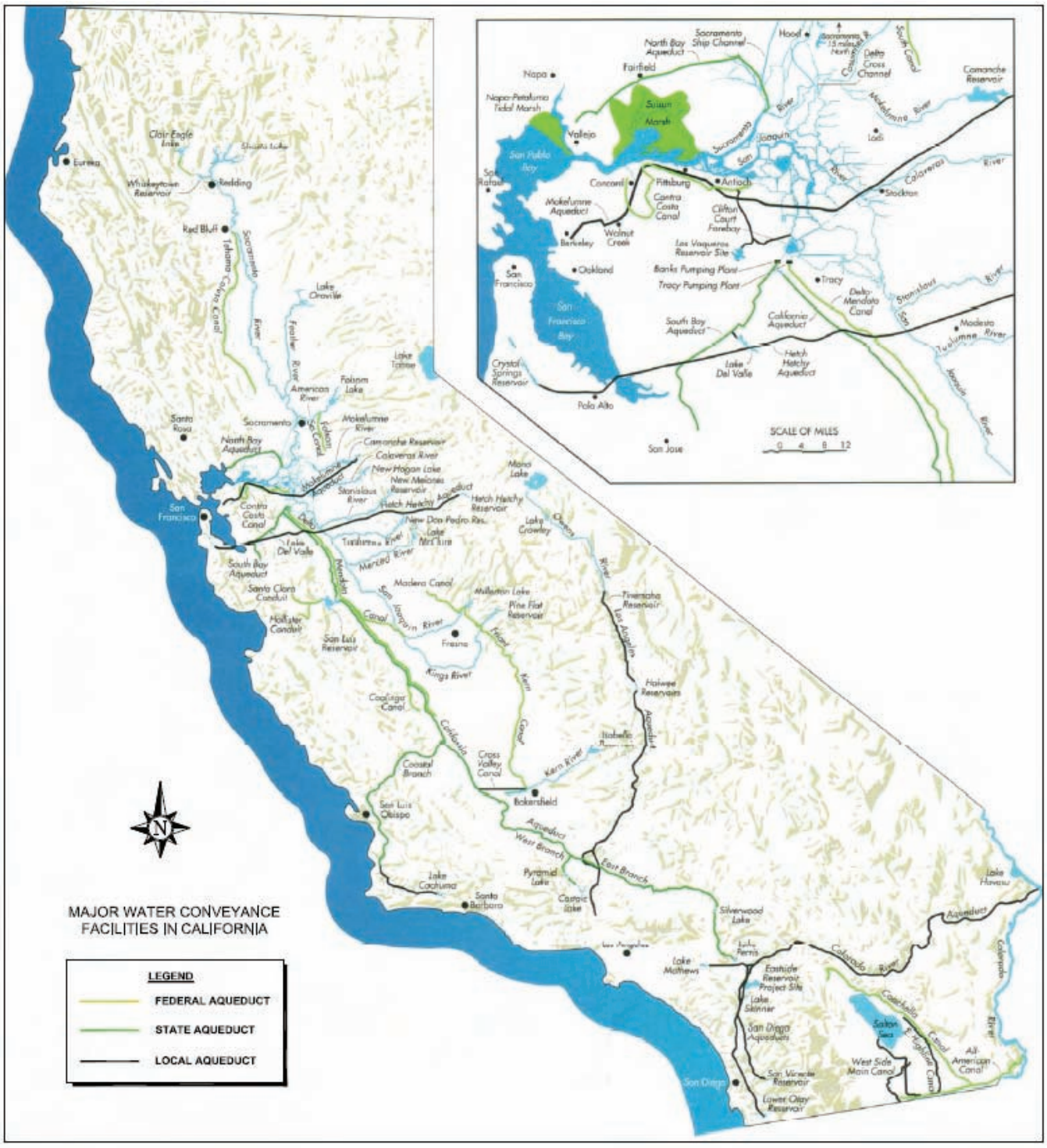
The locations of the above facilities are shown in Figure 3.3. MWD's service area includes the Southern California coastal plain. It extends about 200 miles along the Pacific Ocean from the city of Oxnard on the north, to the Mexican boarder on the south, and it reaches 70 miles inland from the coast. MWD is currently composed of 27 member agencies, including 14 cities, 12 municipal water districts, and one county water authority.

3.3a. Colorado River Water

The Colorado River Aqueduct conveys water 242 miles from the W.P. Whisett Pumping Plant Intake Facility at Lake Havasu, on the Colorado River, to its point of termination at Lake Matthews Reservoir, near the city of Riverside. From this reservoir, water is distributed to its 27 Member agencies throughout Southern California.

California is one of seven states that have rights to divert water from the Colorado River. MWD is one of 6 California entities that have rights to Colorado River water. Most of this water is used for irrigating agriculture in the Imperial Valley. California has a right to the Colorado River at 4.4 million acre-feet per year. MWD's basic right to California's share of Colorado River

Figure 3.3
Major Water Conveyance Facilities in California



Water is 550,000 acre-feet per year. Historically, California has been using about 5.3 million acre-feet per year of water. Additional water has been used primarily by MWD. This has always been a concern

to the other states that have rights to Colorado River water. A variety of programs have been designed to increase conservation of water supplies and storage supplies while still keeping the Colorado River Aqueduct full. Some of the programs are listed below. Detailed information on these many programs is provided in MWD's Regional Urban Water Management Plan.

- **Imperial Irrigation District / MWD Conservation Program** – Obtained an additional 105,000 AFY on average.

- **Palo Verde Land Management Crop Rotation, and Water Supply Program –** provides up to 133,000 AFY of water to be available in certain years and a minimum of 33,000 AFY**;**

- **Southern Nevada Water Authority and Metropolitan Storage & Interstate Release Agreement -** Nevada maintain its consumptive use within basic apportionment of 300,000 AFY;

- **Lower Colorado Water Supply Project –** Receives on an annual basis unused water by Needles and other entities**;**

- **Lake Mead Storage Program –** will secure approximately 23,200 AF by 2011**;**

- **Hayfield Groundwater Storage Program –** allows CRA water to be stored in the Hayfield Groundwater Basin for future withdrawal and delivery to the CRA**;**

3.3b. State Water Project

The second source of imported water for MWD is the State Water Project (SWP), which is owned by the California Department of Water Resources (DWR). SWP facilities comprise 32 storage facilities (reservoirs and lakes), 662 miles of aqueduct, and 25 power and pumping plants. The SWP originates at Lake Oroville, which is located on the Feather River in Northern California. That water, along with all additional unused water from the watershed flows into

Sacramento/San Joaquin Delta. Water from the Delta is then either pumped to water users in the San Francisco Bay area or transported through the California Aqueduct to water users in Central and Southern California.

DWR contracted to deliver water in stages to 29 SWP contractors, with an ultimate delivery of 4.2 million AF per year. Currently, DWR is delivering water to 29 SWP contractors. MWD is the largest, with a contracted entitlement of 1,911,000 AF per year, or approximately 46 percent of the total contracted entitlement. MWD receives deliveries of SWP supplies via the California Aqueduct at Castaic Lake in Los Angeles County, Devil Canyon Afterbay in San Bernardino County, and Box Springs Turnout and Lake Perris in Riverside County. The first delivery of SWP water to Metropolitan occurred in 1972.

The initial facilities of the SWP, completed in the early 1970's, were designed to meet the early needs of the SWP contractors. It was intended that additional SWP facilities, including water supply facilities, would be built over time to meet projected increases in contractors' delivery needs. Each contractor's SWP contract provided for a buildup in entitlement over time, with most contractors reaching their maximum annual entitlement by the year 1990. Since the completion of the initial SWP facilities in the early 1970's, no major water supply improvements have been added to the project.

This is primarily due to environmental issues in the Bay-Delta, which have limited the ability to pass water from Northern California through the Bay-Delta to the southern part of the state. CalFed, an association of State and federal agencies, has been assigned the task of balancing the competing needs and developing options to provide a long-term solution to the Bay-Delta Program and pledges to restore the Bay-Delta ecosystem, improve water quality, enhance water supply reliability and assure long-term stability for agriculture, urban and environmental uses. The plan promises benefits to the environment, California's economy, and to urban and agricultural users.

CalFed recently released a report on a long-term plan that outlines necessary actions to accomplish program goals, and is expected to include projects that provide additional water supply reliability to MWD and to its member agencies like Glendale.

MWD has initiated many programs to improve the reliability of the State Water Project supplies outside of the CalFed process. Some are:

- **Monterey Amendment** - Altered the water allocation procedures such that both shortages and surpluses would be shared in the same manner for all contractors, eliminating the prior 'agriculture first" shortage provision. .

- **SWP Terminal Storage -** rights to flexible storage at Lake Perris and Castaic Lake.

- **Yuba Dry Year Water Purchase Program –** provides for transfers of water from the Yuba county Water Agency during dry years through 2025.

- **Desert Water Agency/Coachella Valley WD SWP Table A Transfer –** MWD transferred 100,00 AF of SWP table A amount to Desert Water Agency/Coachella Valley WD and in turn obtained interruptible water service, full carryover amounts in San Luis Reservoir, full use of flexible storage in Castaic & Perris Reservoirs, and any rate management credits associated with the 100,000 AF. Also, able to recall the SWP transferred water in years in which MWD determines it needs the water to meet water management goals.

To date, MWD has stored significant quantities of water in these San Joaquin Valley groundwater basins storage projects, with more intended.

3.3c. Glendale-MWD Delivery Points

Glendale receives MWD water through three service connections shown as entry points D, E & F on Figure 3.1. The service connection number and capacity are summarized in Table III-1

below. In total, MWD has a total delivery capacity of 70 cubic feet-per-second (cfs). During hot summer days, it is common for Glendale to utilize the full capacity of the facilities. Any significant increase in demands on MWD could require another service connection.

Table 3-1
GWP METROPOLITAN CONNECTIONS & CAPACITY

Service Connection Number	Capacity (cfs)
G-1	48
G-2	10
G-3	20

Over the years, MWD has provided high level of reliability in meeting Glendale's supplemental water supply needs. It is believed that the reliability of water supply to the City will continue in the future as a result of the many water resource programs under way and the proposed future programs now being considered based on their Water Surplus and Drought Management (WSDM) Plan and Integrated Resources Plan (IRP). This source will always be a major factor in meeting the water needs of the City. The City closely follows the planning activities at MWD to assure they have adequate supplies to meet the needs of their member agencies.

3.4. Recycled Water

Information on Glendale's recycled water system and activities is provided in Chapter V.

3.5. Current & Projected Sources of Water Supply

The Glendale potable water system receives its water from two basic sources: local groundwater from the San Fernando and Verdugo Basins and imported surface water from Metropolitan Water District (MWD). Currently, the Glendale local groundwater system contributes approximately 35% of potable water used in the City. The objective of the City's Water Resource Plan, first prepared in 1985, is to develop more local supplies and identify the facilities to increase the use of local resources thereby reducing the need for imported water.

Currently, 59 percent of the potable water used in the City comes from the MWD. With the additional supplies and facilities, operation of the Glendale Water Treatment Plant (GWTP) and increased recycled water use, the goal in reducing dependence on the MWD has been accomplished.

Glendale foresees very little change in available sources and the amount of water supply needed to meet water demands. In the next 25 years, we expect the same amount of supply from the San Fernando Basin. On the other hand, we will be utilizing the City's full water rights in the Verdugo Basin with the addition of the new wells. Recycled water, further discussed in Chapter 5, will remain constant with very little addition. Imported water from MWD as stated in MWD's 2010 UWMP, "..show that the region can provide reliable water supplies under both the single driest year and the multiple dry year hydrologies (MWD 2010 UWMP, 2-15). These projections are reflected in the Table 3-2 below.

Table 3-2
CURRENT & PROJECTED SOURCES OF WATER SUPPLY (AF)

Water year	San Fernando Basin*	Verdugo Basin	Recycled Water	MWD Water	Total Water Supply
1998-99		1,635	1,458	27,365	30,458
1999-00		732	1,738	30,136	32,606
2000-01		2,086	1,673	29,033	32,792
2001-02	3,223	1,964	1,490	26,132	32,808
2002-03	6,959	1,277	1,341	22,803	32,380
2003-04	6,983	1,887	1,521	23,796	34,187
2004-05	6,059	2,008	1,224	22,678	31,970
2005-06	6,435	2,326	1,237	22,317	32,316
2006-07	6,522	2,495	1,336	23,829	34,182
2007-08	7,287	2,740	1,553	21,881	33,461
2008-09	6,617	2,208	1,607	20,874	31,306
2009-10	7,701	2,087	1,662	16,550	28,000
2015**	7,800	3,856	1,662	17,620	30,939
2020**	7,800	3,856	1,662	17,755	31,073
2025**	7,800	3,856	1,662	17,890	31,208
2030**	7,800	3,856	1,662	18,025	31,344
2035**	7,800	3,856	1,662	18,162	31,480

* Pumping from San Fernando Basin resumed in 2001-2002
** Projections

As compared to the MWD projected demands for Glendale, GWP's projections are lower. GWP projection are more accurate showing the decrease in water demand due to active conservation and historic water demand trends for the last 10 years. If MWD states they have enough water to supply us at the high water demand forecast, MWD will be able to provide reliable water at GWP's lower water demand projections. Please see Appendix J for MWD projected water demand for Glendale.

4. Sufficient Water Supply to Meet Water Demand

As a requirement in the UWMP Act, water utilities are required to project if sufficient water supply is available to meet projected water demands per various weather scenarios: normal, single dry year and multi dry year. As previously mentioned, assuming San Fernando Basin and recycled water provides the same amount of water supply and Verdugo Basin reaches the maximum water rights, MWD will make up the remaining supply. Projections of water supply in the next 25 years were calculated using the average increase and/or decrease of 10 years between 2000 through 2009. The average was a 0.09% increase per year.

The projections by sources can be found in the Table 3-3 below for the next 25 years. Projections were made assuming the average increase of 0.09% per year. Dry year and calculated assuming a 3% increase in water usage.

TABLE 3-3
GLENDALE'S WATER SOURCES OF SUPPLY TO MEET DEMANDS DURING NORMAL & DRY YEARS
(ACRE-FEET)

	Normal Year						Dry Year					
SOURCE	2010	2015	2020	2025	2030	2035	2010	2015	2020	2025	2030	2035
San Fernando Wells	7,701	7,800	7,800	7,800	7,800	7,800	7,701	7,800	7,800	7,800	7,800	7,800
Verdugo Wells	2,087	3,856	3,856	3,856	3,856	3,856	2,087	3,856	3,856	3,856	3,856	3,856
Metropolitan Water District	16,550	17,620	17,755	17,890	18,025	18,162	16,550	18,498	18,637	18,776	18,916	19,056
Recycled Water	1,662	1,662	1,662	1,662	1,662	1,662	1,662	1,662	1,662	1,662	1,662	1,662
Total Projected Sources	28,000	30,939	31,073	31,208	31,344	31,480	28,000	31,817	31,955	32,095	32,234	32,375

In Table 3-4 below, data was combined to reflect a summary of the total projected supply and demand for the next 25 years and comparing the difference in the amount of supply and demand assuming a

normal water supply year.

Table 3-4 Projected Supply and Demand Comparison - Normal Water Supply- AF Year						
	2010	2015	2020	2025	2030	2035
Supply Totals:	28,000	30,939	31,073	31,208	31,344	31,480
Demand Totals:	26,448	28,866	28,946	29,070	29,198	29,323
Difference	1,552	2,073	2,127	2,138	2,145	2,157
Difference as % of supply	5.5%	6.7%	6.8%	6.9%	6.8%	6.9%
Difference as % of Demand	5.9%	7.2%	7.3%	7.4%	7.3%	7.4%

In Table 3-5 below, data was combined to reflect a summary of the total projected supply and demand for the next 25 years and comparing the difference in the amount of supply and demand assuming a single dry water supply year.

Table 3-5 Projected Supply and Demand Comparison - Single Dry Year - AF year						
	2010	2015	2020	2025	2030	2035
Supply Totals:	28,000	31,817	31,955	32,095	32,234	32,375
Demand Totals:	26,448	29,732	29,815	29,942	30,074	30,203
Difference	1,552	2,085	2,141	2,153	2,160	2,172
Difference as % of supply	5.5%	6.6%	6.7%	6.7%	6.7%	6.7%
Difference as % of Demand	5.9%	7.0%	7.2%	7.2%	7.2%	7.2%

In Table 3-6 through Table 3-20 below, data was combined to reflect a summary of the total projected supply and demand for the next 25 years and comparing the difference in the amount of supply and demand assuming a multiple dry water supply years separated in 5 year increments as required by the UWMP Act.

2011-2015

Table 3-6 Projected supply during multiple dry year period ending in 2015 - AF Year					
	2011	2012	2013	2014	2015
Supply	30,563	30,872	31,184	31,499	31,817
% of projected normal	109.2%	110.3%	111.4%	112.5%	113.6%

Table 3-7 Projected demand multiple dry year period ending in 2015 - AFY					
	2011	2012	2013	2014	2015
Demand	28,560	28,848	29,140	29,434	29,732
% of projected normal	108.0%	109.1%	110.2%	111.3%	112.4%

Table 3-8 Projected Supply and Demand Comparison during multiple dry year period ending in 2015- AF Year					
	2011	**2012**	**2013**	**2014**	**2015**
Supply totals	30,563	30,872	31,184	31,499	31,817
Demand totals	28,560	28,848	29,140	29,434	29,732
Difference	2,003	2,023	2,044	2,064	2,085
Difference as % of Supply	6.6%	6.6%	6.6%	6.6%	6.6%
Difference as % of Demand	7.0%	7.0%	7.0%	7.0%	7.0%

2016-2020

Table 3-9 Projected supply during multiple dry year period ending in 2020 - AF Year					
	2016	**2017**	**2018**	**2019**	**2020**
Supply	30,696	31,006	31,319	31,636	31,955
% of projected normal	98.8%	99.8%	100.8%	101.8%	102.8%

Table 3-10 Projected demand multiple dry year period ending in 2020 - AFY					
	2016	**2017**	**2018**	**2019**	**2020**
Demand	28,640	28,929	29,221	29,517	29,815
% of projected normal	98.9%	99.9%	101.0%	102.0%	103.0%

Table 3-11 Projected Supply and Demand Comparison during multiple dry year period ending in 2020- AF Year					
	2016	**2017**	**2018**	**2019**	**2020**
Supply totals	30,696	31,006	31,319	31,636	31,955
Demand totals	28,640	28,929	29,221	29,517	29,815
Difference	2,056	2,077	2,098	2,119	2,141
Difference as % of Supply	6.7%	6.7%	6.7%	6.7%	6.7%
Difference as % of Demand	7.2%	7.2%	7.2%	7.2%	7.2%

2021-2025

Table 3-12 Projected supply during multiple dry year period ending in 2025 - AF Year					
	2021	**2022**	**2023**	**2024**	**2025**
Supply	30,830	31,141	31,456	31,774	32,095
% of projected normal	98.8%	99.8%	100.8%	101.8%	102.8%

Table 3-13 Projected demand multiple dry year period ending in 2025 - AFY					
	2021	**2022**	**2023**	**2024**	**2025**
Demand	28,762	29,053	29,346	29,643	29,942
% of projected normal	98.9%	99.9%	101.0%	102.0%	103.0%

Table 3-14 Projected Supply and Demand Comparison during multiple dry year period ending in 2025- AF Year					
	2021	2022	2023	2024	2025
Supply totals	30,830	31,141	31,456	31,774	32,095
Demand totals	28,762	29,053	29,346	29,643	29,942
Difference	2,068	2,089	2,110	2,131	2,153
Difference as % of Supply	6.7%	6.7%	6.7%	6.7%	6.7%
Difference as % of Demand	7.2%	7.2%	7.2%	7.2%	7.2%

2026-2030

Table 3-15 Projected supply during multiple dry year period ending in 2030 - AF Year					
	2026	2027	2028	2029	2030
Supply	30,964	31,277	31,593	31,912	32,234
% of projected normal	98.8%	99.8%	100.8%	101.8%	102.8%

Table 3-16 Projected demand multiple dry year period ending in 2030 - AFY					
	2026	2027	2028	2029	2030
Demand	28,889	29,181	29,476	29,774	30,074
% of projected normal	98.9%	99.9%	101.0%	102.0%	103.0%

Table 3-17 Projected Supply and Demand Comparison during multiple dry year period ending in 2030- AF Year					
	2026	2027	2028	2029	2030
Supply totals	30,964	31,277	31,593	31,912	32,234
Demand totals	28,889	29,181	29,476	29,774	30,074
Difference	2,075	2,096	2,117	2,138	2,160
Difference as % of Supply	6.7%	6.7%	6.7%	6.7%	6.7%
Difference as % of Demand	7.2%	7.2%	7.2%	7.2%	7.2%

2031-2035

Table 3-18 Projected supply during multiple dry year period ending in 2035 - AF Year					
	2031	2032	2033	2034	2035
Supply	31,099	31,413	31,731	32,051	32,375
% of projected normal	98.8%	99.8%	100.8%	101.8%	102.8%

Table 3-19 Projected demand multiple dry year period ending in 2035 - AFY					
	2031	2032	2033	2034	2035
Demand	29,013	29,306	29,602	29,901	30,203
% of projected normal	98.9%	99.9%	101.0%	102.0%	103.0%

Table 3-20 Projected Supply and Demand Comparison during multiple dry year period ending in 2035- AF Year					
	2031	2032	2033	2034	2035
Supply totals	31,099	31,413	31,731	32,051	32,375
Demand totals	29,013	29,306	29,602	29,901	30,203
Difference	2,086	2,107	2,129	2,150	2,172
Difference as % of Supply	6.7%	6.7%	6.7%	6.7%	6.7%
Difference as % of Demand	7.2%	7.2%	7.2%	7.2%	7.2%

5. System Improvements

The City of Glendale is implementing all Best Management Practices (BMPs) according to the schedule time table as set by the Urban Water Management Plan. There are two planned future water supply projects or programs that will increase water supply. The remaining projects are all system improvement projects and thus will not increase water supply.

1. Glendale Water Treatment Plant

The City has continued to expand the use of its local water supplies with the addition of the Glendale Water Treatment Plant (GWTP). The GWTP, which began delivering water to the community in the middle of 2000, has been operating at full capacity despite issues related to chromium-6 and has yielded an average production rate of 7 MGD. CDPH authorized a 5% increase in the maximum capacity (flow 5000 gpm to 5250 gpm) in October 2008.

2. Chevy Chase 968 Reservoir & Pump Station Replacement Project

In 1997 during a routine inspection of the reservoir, City staff observed cracks in the column foundation which were believed to be the result of the 1994 Northridge earthquake. Temporary repairs have been done and, if these temporary repairs continued, will be costly. It became apparent the most cost-effective solution is to replace the entire reservoir in a relatively short time.

The Chevy Chase 968 Reservoir Project included the replacement of the Chevy Chase 968 reservoir and pump station. The original reservoir was 14.5 MG buried concrete and the pump station included two pumps each rated at 1150 gpm, but only one pump could run at a time. The new reservoir is a new buried concrete 15 MG reservoir consisting of two equal size cells of 7.5 MG each. The project was completed in September 2010. The new Chevy Chase Reservoir 968 pump station has three pumps with the ability to run 2 pumps simultaneously.

3. Water Main Replacement Program

Another program to improve the water system is the Water Main Replacement. Work completed in the last 5 years is listed below:

Brand Blvd (FY 2005-06) – Installation of 0.9 miles of new water main.

Howard (FY 2005-06) – Installation of 1.6 miles of new water main.

Burchett (FY 2007-2008) – Installation of 1.8 miles of new water main.

Edmonton (FY 2008-2009) – Installation of 2.15 miles of new water main.

In Fiscal Years 2005-2010, about 6.45 miles of water mains, respectively, have been replaced including new service connections and additional fire hydrants.

4. Water Main Cleaning and Lining Program

Water main cleaning and lining has been on going for more than 10 years. The Department has a standing policy that the minimum size of distribution lines in the system is 8 inches. Smaller sizes have been replaced to increase capacity to meet the increasing demand for water. See Figure 10 showing details of both programs. Works completed in the last 5 years are:

1. Pelanconi (FY 2007-2008) – Cleaned & lined approximately 39,690’.

2. Central (FY 2008-2010) – Cleaned & lined approximately 38,077'.

5. Pumping Stations Improvement Program

The Department has continuously rehabilitated or replaced inefficient pumps and motors at all our pumping stations. The priority needs have been established and the following works completed have been the most recent:

1. Grandview Pump Station – Installation of third pump
2. San Luis Rey Pump Station – Replaced existing electrical equipment and the control wiring.
3. Fiber Optics Communication Project – Installation of fiber optic strands and connections to twelve water facilities.
4. Old Glorietta Pump Station – Replaced existing electrical equipment and the control wiring.
5. MWD G-3 Connection Upgrade – Upgraded from 12 cfs to 20 cfs.
6. Portable Pump connection Project – Installation of portable pump connections at 12 locations in the city.

6. Installation of Pressure Reducing Stations

In an effort to enhance reliability, the Water Department has installed several Pressure Reducing Valve (PRV) Stations throughout the distribution system. These new stations offer the system a much greater degree of redundancy during high demand periods as well as make it easier to take reservoirs out of service for maintenance purposes.

7. Groundwater Extraction Facility Replacement

The Glendale *Water & Power* Department is in process of siting, drilling and equipping a replacement well in the Verdugo Basin. The existing wells are not producing the expected production inspite of rehabilitation work which was completed in 2004-05. A decrease in the groundwater production has been noted in recent years and a new well will be the best alternative. The new well will reduce the City's dependency on MWD water.

The following are new well projects:

Table 3-21
NEW WELL PROJECTS

Project Name	Capacity (gpm)	Completion Date
Foothill Well	250	March-11
Rockhaven Well	700	2012
TOTAL:	**950**	

8. Water System Analysis (Hydraulic Modeling)

The Hydraulic Model of Glendale's potable distribution system was developed by Carollo Engineers beginning in May 2005. The model was completed in August 2006 but the contract included support services. The project was closed in May 2008.

The initial need for the model was the Stage 2 Disinfection By-Product Rule (DBPR) where an Intial Distribution System Evaluation (IDSE) could be conducted. The IDSE would identify water age throughout the system which correlates with higher levels of disinfection by-products (primarily trihalomethanes but also haloacetic acids). The intent of the IDSE was to locate the most vulnerable sites in the system for high DBPs. The City had the option of additional monitoring but saw this as a good opportunity to develop a hydraulic model and avoid the cost of extra monitoring. The model can now be used for planning and predicting fire flows.
The project is now complete.

9. Water Supervisory Control & Data Acquisition System (SCADA) Upgrade

The Water SCADA System Upgrade Project involves replacement of the existing SCADA communication system, all programmable logic controllers (PLCs), and the existing SCADA HMI system. The new SCADA communication system will provide fast and reliable communication between system components to transmit data and execute controls at the water facilities. Replacement of all PLCs with a single up-to-date non-proprietary technology will minimize maintenance issue and improve the

reliability of the whole water SCADA system. The new Wonderware HMI system will deliver additional functionalities and efficiency to the system operation. The design of the project began in January 2010 and expected to complete construction in June 2012.

10. Metropolitan Water District G-03 Service Connection Upgrade

A contract between the City and MWD was signed to increase the delivery capacity from 12 cfs to 20 cfs of their G-03 service connection to the Glendale's water system. This project was completed in November 2006 and has improved the blending capability and reliability of the MWD supply.

11. Future L.A. Interconnections

Glendale is working with City of Los Angeles, Department of Water and Power to establish two (2) interconnections between the two systems. These will increase Glendale's reliability by providing an emergency source of supply.

12. Advanced Meter Infrastructure (AMI)

The City has undertaken an Advanced Metering Infrastructure/Meter Data Management System (AMI/ MDMS) Project (Project) for both Water and Electric utilities. The Project will result in the replacement of virtually all of City's water and electric meters. Once the meters are replaced, customers will be able to have real time detailed data on their electric and water usage. The AMI infrastructure will also promote water conservation, reduce unaccounted for water and prevent water loss.

13. Future Water Supplies

The City expanded the use of its local water supplies with operation of the Glendale Water Treatment Plant (GWTP). However, because of the chromium-6 related issues, the reliability of this water source cannot be guaranteed into the future until a chromium-removal treatment is put into operation. The Chromium Removal Demonstration Facilities project was completed in October 2010. Currently, 70

percent of the water used in the City is provided by MWD. The Water Department is planning to increase water production in the Verdugo Basin by constructing a new well within the basin and increase the recycled water use by adding small users and expand the marketing effort to neighboring agencies. Both groundwater basins, per DWR Bulletin 118 Update 2003 has not been identified or projected to be in overdraft.

The increased development of our local water sources will firm up water supplies available to the City as the local water supplies are expected to be available during wet or dry years and even in times of extended drought. The imported supplies from Northern California and, to a lesser extent, the Colorado River may be affected during drought years. The MWD's storage programs also improve MWD's overall water reliability to provide all the water Glendale needs even during dry periods.

6. Water Reliability Issues

Glendale expects to be able to provide 100 percent of current and future water demand. The reliability of water supply fluctuates with the climate. This was determined by analyzing historical data. In a 25 year period between 1986 through 2010 the average usage was 30,199 AFY. During the past 25 years, we had a single dry water year in 1990 which is reflected with a 20% decrease from 1989 and then a 15% to 1991. Between 1992 through 1995, southern California was in drought (multiple dry water years). Table 3-22 and Table 3-23 summarize the findings below.

Table 3-22
Supply Reliability - AF Year

		Multiple Dry Water Years			
Average / Normal Water Year	Single Dry Water Year	1992	1993	1994	1995
30,199	25,857	**25,176**	**28,056**	**29,382**	**28,881**
% of Normal	85.6%	83.4%	92.9%	97.3%	95.6%

Table 3-23 Basis of Water Year Data	
Water Year Type	**Base Year(s)**
Average Water Year	1986-2010
Single-Dry Water Year	1990
Multiple-Dry Water Years	1992-1995

Reliability of water supplies is a key item for review in this document. The MWD - RUWMP provides significant information on providing a reliable supply of water to its member agencies such as Glendale. The MWD's Water Surplus and Drought Management (WSDM) Plan is the key document in their effort to do so. Please see Attachment B for a complete copy of the MWD's Water Surplus and Drought Management Plan. The plan will direct MWD to meet 100% reliability.

As one can see, there are significant planning efforts to minimize the impacts of a drought condition. If these MWD resources fail to provide needed supplies, the City will be requested to implement our Mandatory Conservation Plan.

Due to drought conditions, the City of Glendale recently revised their conservation ordinance. There is in effect at all times in the city a "no water waste" policy set forth. Except as otherwise provided in this chapter, at no time shall any person make, cause, use, or permit the use of water from the department for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this chapter or in an amount in excess of that use permitted by the conservation phase then in effect pursuant to action taken by the city council in accordance with the provisions. For a complete copy of the City of Glendale's Water Shortage Contingency Ordinance please see UWMP 2010 Volume II Appendix B.

To determine when each stage should be implemented, water usage is monitored by conducting readings of actual water usage in monthly meter reads. Should the usage exceed the allowable allotment, action will be taken to reduce water usage. In addition, the city is currently implementing the Advance Meter Infrastructure (AMI) which will allow for the city to collect real time data of water usage which will help increase conservation.

Should it become necessary to achieve a 50 percent reduction in water use, below are some of the potential methods for reduction in use. The City's Water Conservation Plan specifies the reduction along with some prohibited uses. It is envisioned, based on past experience, that should a reduction be required the City could implement a number of programs identified in Table 3-24 below.

Table 3-24
Consumption Reduction Methods

Consumption Reduction Methods	Stage When Method Takes Effect	Projected Reduction (%)
Voluntary rationing	1	10
Incentive to reduce consumption	1	10
Plumbing fixture replacement	1	10
Mandatory rationing	2	10-50
Restrict Building Permits	2	15-50
Use prohibitions	1	20-50
Water shortage pricing	7	50

7. Three-Year Minimum Water Supply

Based on normal demands during the drought years, the minimum three-year water supply is shown on Table 3-25. The quantities of water from the various sources and demands are expected to be the same except MWD during such a three-year period. If there is a need for significant demand reduction efforts, various voluntary or mandatory conservation efforts can be implemented. Additional water supplies from MWD are essential during drought years. These numbers could change depending on the severity of supply deficiency. A demand of 30,082 AF is assumed to be the normal water demand.

Table 3-25
Three Year Estimated Minimum Water Supply (AF)

	2011	2012	2013
San Fernando Basin	7,800	7,800	7,800
Verdugo Basin	3,856	3,856	3,856
MWD	16,764	16,981	17,200
Recycled Water	1,662	1,662	1,662
Total Supply	30,082	30,299	30,519

Water supplies from the San Fernando, Verdugo Basin, and recycled water should be unaffected by the drought conditions. If there is a shortage in water supply from MWD, Glendale distribution system could be affected. MWD is proposing contracts with its member agencies to supply water. These contracts will define, by contract, MWD's obligation to provide firm water to the City. It is anticipated that during any three-year drought, Glendale should have a sufficient supply to meet demands.

8. Transfer and Exchange Opportunities

Glendale's water system is also interconnected with the City of Burbank and Crescenta Valley Water District for short-term/emergency water service (Figure 3.2). When the need arises, these connections can be opened to deliver water into the Glendale distribution system to supplement demands and vice-versa. These should be viewed as only short-term transfer of water.

For the long term, MWD is engaged in "out-of-area" dry transfer and exchanges to improve local water supply reliability. It is discussed in MWD's 2010 Urban Water Management Plan In Attachment C. Glendale does not have the basic capability to implement these types of programs. We rely on MWD to perform these activities.

The inter-tie with Crescenta Valley Water District was completed. The preliminary design for an interconnection with Los Angeles is in the planning.

9. Desalination

Desalination process has been considered but found to be economically inefficient based on the City's distance from the ocean. The process involving converting salt water to drinking water, usually through reverse osmosis method, is very costly. Although City of Glendale is currently not using desalination, the City supports MWD and other agencies in the efforts of developing the use and technology of desalination, which increases reliability of the regional water system.

WATER QUALITY -IV

1. Background

In the 1980s, the U.S. Environmental Protection Agency (USEPA), under the federal Superfund law, began investigating the contamination of the San Fernando Valley Groundwater Basin. Tests conducted in the early 1980's indicated the presence of volatile organic chemicals (VOCs) in the basin. Two of the most prevalent VOCs are trichloroethylene (TCE) and tetrachloroethane (PCE). Based on the levels of VOCs detected, the basin was designated as a Superfund site and considered by the California Department of Public Health (DPH) to be an extremely impaired source.

In the 1990s, EPA identified parties potentially responsible for the contamination and required that they construct cleanup treatment facilities. Cleanup facilities were constructed in North Hollywood, Burbank and Glendale. Treated water from these facilities is being used as a drinking water source for the public.

In 2000, the City took over operation of the Glendale treatment plant constructed under the federal Superfund Program. The Glendale treatment plant was established to remove the VOCs in ground water supplies generally along San Fernando Road in the City of Glendale and along Goodwin Street in the City of Los Angeles. The source for the treatment plant consists of eight wells. The eight wells and the Glendale Water Treatment Plant together are referred to as the Glendale Operable Unit (GOU).

The treatment plant uses packed tower aeration (PTA) to remove the VOCs, followed by liquid phase granular activated carbon (GAC) treatment before the water is disinfected and sent to the Grandview pumping plant. The treatment plant is permitted to treat and deliver up to 5250 gpm. At the Grandview pumping plant, aqua ammonia is added to the water to form chloramines and the water is then blended with water purchased from the Metropolitan Water District (MWD) prior to entering the distribution system.

Shortly before operation of the GOU began, public concern arose about traces of chromium 6 in the

ground water supplies. Glendale was reluctant to deliver this water to its customers. The City began accepting water from the facility into the distribution system only after the City adopted a self-imposed limit of chromium 6 in water delivered to the distribution system. This self-imposed limit is well below the current federal and state drinking water standards for total chromium (of which chromium 6 is a part).

The City then embarked on a three phase study to develop technologies to remove chromium 6 from drinking water supplies. This effort has been funded primarily by the federal and state governments, the American Water Works Association Research Foundation and cities in the San Fernando Valley – Los Angeles, Burbank, Glendale, and San Fernando. The first two phases consisted of bench testing and pilot testing. The third phase, construction of two demonstration-scale test facilities was completed in 2010 and as of this writing (February 2011) testing is still underway at these two facilities for two technologies to remove chromium 6.

In 2009 the California Office of Environmental Health Hazard Assessment (OEHHA) published a proposed Public Health Goal (PHG) of 0.06 parts per billion (ppb) for chromium 6. After a period of public comment and external peer review, OEHHA in December 2010 published a revised draft PHG of 0.02 ppb for chromium 6. A PHG is a non-enforceable health goal and is the first step in the regulatory process for setting a drinking water standard. Once the PHG is final, California DPH will set an enforceable drinking water standard for chromium 6 taking technical and economic issues into account. After the PHG is final, it will likely take DPH 2-3 years to propose and publish a final drinking water regulation for chromium 6.

The GOU provides about 7,700 AFY to the City and will meet about 28 percent of projected water demands.

2. Contaminants

EPA requires numerous water contaminants be monitored and mitigated if over the limit. GWP monitors over 100 contaminants. Of these, perchlorate, TTHMs, HAAs, PCE, TCE, and Chromium are contaminants that impact future water availability.

2.1. Perchlorate

Test results for perchlorate on samples taken in the system were not detected.

2.2. Disinfection Byproduct – TTHMs and HAAs

The City has consistently met the State and Federal MCL for TTHM of 80 ppb. To demonstrated compliance 16 sites are sampled quarterly. Compliance is based on a running annual average of quarterly averages of all 16 sites. EPA has published a Stage 2 of the Disinfection Byproduct (DBP) Rule. Under the Stage 2 DBP Rule, each compliance location will need to meet the annual average of 80 ppb, instead of averaging all distribution system location. The City has undertaken a Capital Improvement Project to improve the disinfection in the northern portion of the City and thus help ensure that the system will be in compliance with the Stage 2 DBP Rule. Please see Figure 4.1 below for TTHM report.

Figure 4.1
TTHMs report

State of California
Drinking Water Program

Department of Public Health
ATTACHMENT 18b

Quarterly TTHM Report for Disinfection Byproducts Compliance (in µg/L or ppb)

System Name: City of Gendale System No.: 1910043 Year: 2010 Quarter: Fourth

Year:	2006				2007				2008				2009				2010			
Quarter:	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Sample Date (month/date):	1/11	4/12	7/12	10/11	1/10,17	4/4	7/11	10/10	1/9	4/9	8/13	10/6	1/14	4/7	7/8	10/13	1/12	4/14	7/14	11/3
Site 1	16.0	16.1	11.0	6.2	11.5	33.9	14.1	29.2	33.2	23.0	51.0	35.0	19.0	18.0	28.0	24.0	17.0	26.0	14.0	19.0
Site 2	19.1	6.7	9.9	9.6	8.0	15.4	10.1	26.5	31.0	25.0	38.0	33.0	17.0	21.0	15.0	22.0	15.0	17.0	26.0	17.0
Site 3	26.2	24.6	23.8	13.8	9.0	24.0	19.8	29.1	29.7	18.0	67.0	32.0	21.0	22.0	40.0	42.0	18.0	20.0	41.0	31.0
Site 4	14.2	7.3	11.7	14.5	9.6	14.4	10.3	31.6	31.0	16.0	52.0	33.0	17.0	19.0	14.0	21.0	15.0	14.0	10.0	15.0
Site 5	24.4	36.7	34.3	21.1	18.6	33.1	24.6	54.4	38.7	32.0	51.0	45.0	23.0	32.0	36.0	33.0	25.0	30.0	27.0	22.0
Site 6	32.9	22.5	27.7	34.5	19.0	43.4	20.4	54.5	25.6	57.0	54.0	56.0	34.0	36.0	54.0	50.0	23.0	34.0	42.0	41.0
Site 7	33.3	20.0	26.2	44.9	40.3	30.0	21.0	66.4	36.8	42.0	69.0	52.0	33.0	36.0	41.0	50.0	21.0	34.0	43.0	35.0
Site 8	36.5	19.7	63.1	19.2	49.7	26.9	21.0	41.8	27.0	38.0	66.0	54.0	30.0	39.0	50.0	52.0	32.0	24.0	52.0	36.0
Site 9	16.1	9.0	8.6	20.9	17.2	23.6	11.1	39.5	40.1	23.0	35.0	32.0	17.0	20.0	13.0	23.0	16.0	14.0	11.0	16.0
Site 10	15.0	3.7	36.2	26.0	48.9	26.4	25.2	50.6	61.8	26.0	69.0	38.0	18.0	28.0	44.0	51.0	34.0	30.0	51.0	21.0
Site 11	19.5	17.7	15.2	15.1	21.4	39.0	23.4	51.9	26.0	25.0	45.0	39.0	30.0	36.0	27.0	47.0	26.0	22.0	40.0	20.0
Site 12	34.3	38.8	57.0	40.2	25.1	62.9	28.5	86.0	35.5	44.0	73.0	53.0	28.0	35.0	38.0	50.0	31.0	66.0	51.0	70.0
Site 13	64.1	48.8	38.4	32.1	30.3	52.0	43.2	56.6	43.1	48.0	44.0	47.0	34.0	33.0	48.0	46.0	26.0	33.0	56.0	44.0
Site 14	37.1	31.6	38.2	24.2	32.4	54.2	42.2	57.7	46.6	81.0	62.0	49.0	34.0	33.0	41.0	38.0	26.0	41.0	56.0	46.0
Site 15	81.9	63.0	31.1	58.4	29.9	72.4	44.7	123.0	69.7	60.0	77.0	73.0	55.0	65.0	50.0	67.0	48.0	58.0	77.0	71.0
Site 16	40.1	28.6	34.5	22.6	28.9	49.4	36.7	138.0	78.3	33.0	59.0	45.0	34.0	34.0	48.0	44.0	27.0	29.0	53.0	35.0
Quarterly Average	31.9	24.7	29.2	25.2	25.0	37.6	24.8	58.6	40.9	36.9	57.0	44.8	27.8	31.7	36.7	41.3	25.0	30.8	40.6	33.7
Running Annual Average				27.7	26.0	29.2	28.1	36.5	40.4	40.3	48.3	44.9	41.6	40.3	35.2	34.3	33.7	33.4	34.4	32.5
Meets Standard?* (check box)	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☐ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐	Yes ☑ No ☐
Number of Samples Taken	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16

Identify the sample locations in the table below.

Site	Sample Location	Site	Sample Location
1	1433 Garden St.	9	520 W. Wilson Ave.
2	1922 Glenwood Rd.	10	808 Elk Ave.
3	1731 Allen Ave.	11	1630 Wabasso Way
4	1407 Pacific Ave.	12	3242 Emerald Isle
5	1500 Glenmont Dr.	13	2814 Invale Dr.
6	978 Coronado Dr.	14	510 Whiting Woods
7	818 Avonoak Terrace	15	5001 Reynard Ave.
8	2146 Chevy Chase Dr.	16	3641 Stancrest Dr.

Comments: *For Site 11 - 4th Quarter, the sample was taken not at 1630 Wabasso Way but at the next sampling station, 2217 Via Saldivar.*

Signature Date

*If, during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the standard, then the system is out of compliance at the end of that quarter.

3/28/02

2.3. TCE, PCE and Chromium

As mentioned in the background, PCE, TCE and hexavalent chromium were detected in Glendale's water supply and thus was designated as a superfund site. The Glendale water treatment plant was thus built to clean the water from these contaminants. See Figures 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 below graph of detected concentrations for PCE, TCE and chromium separated by the North wells and South wells. PCE has also been detected in the Verdugo Basin wells but are below MCL.

Figure 4.2
Glendale WTP - PCE Concentrations – North Wells

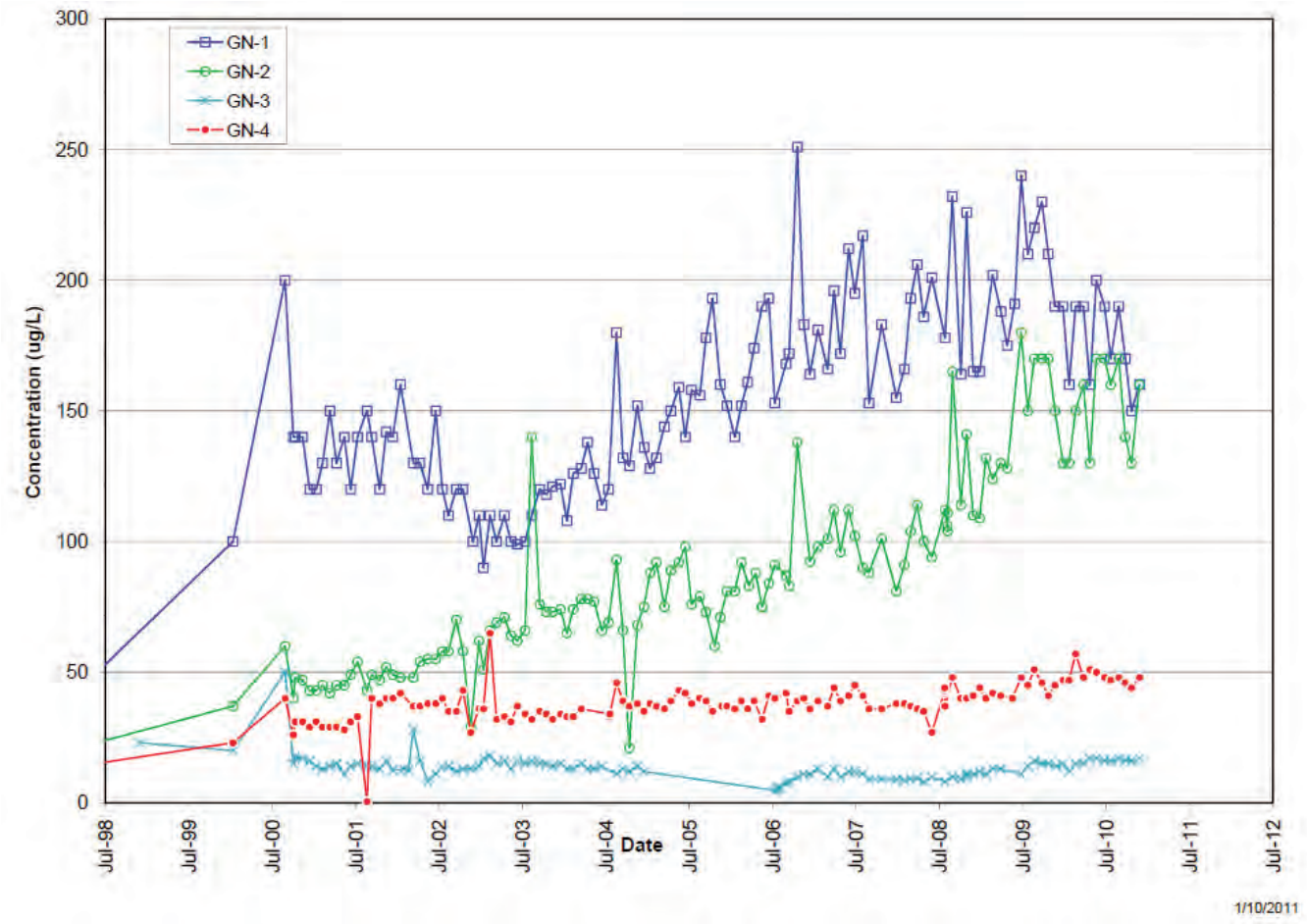


Figure 4.3
Glendale WTP - PCE Concentrations – South Wells

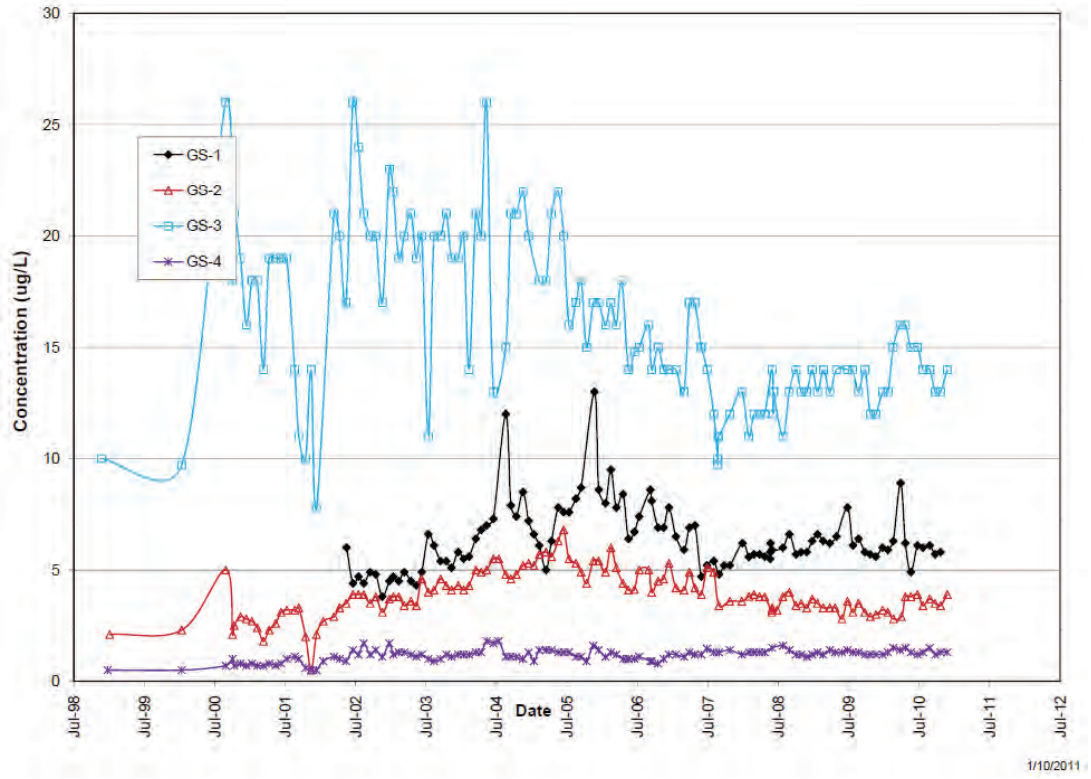


Figure 4.4
Glendale WTP - TCE Concentrations – North Wells

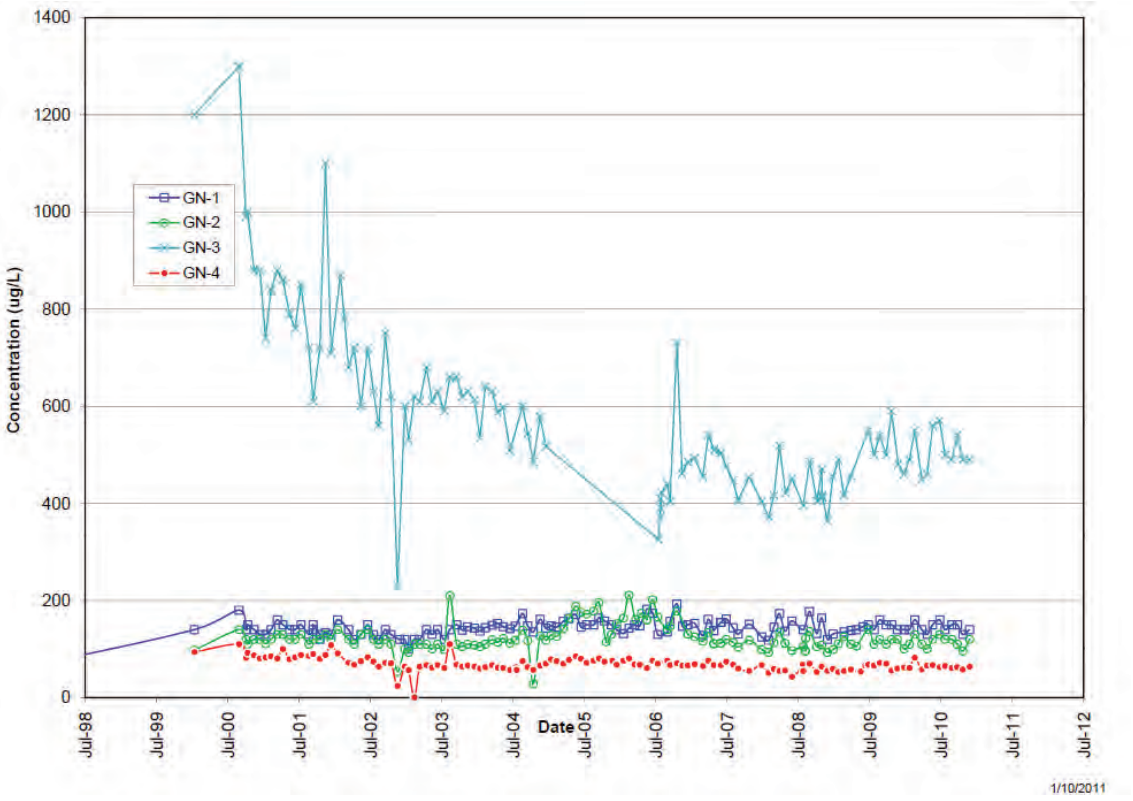


Figure 4.5
Glendale WTP - TCE Concentrations – South Wells

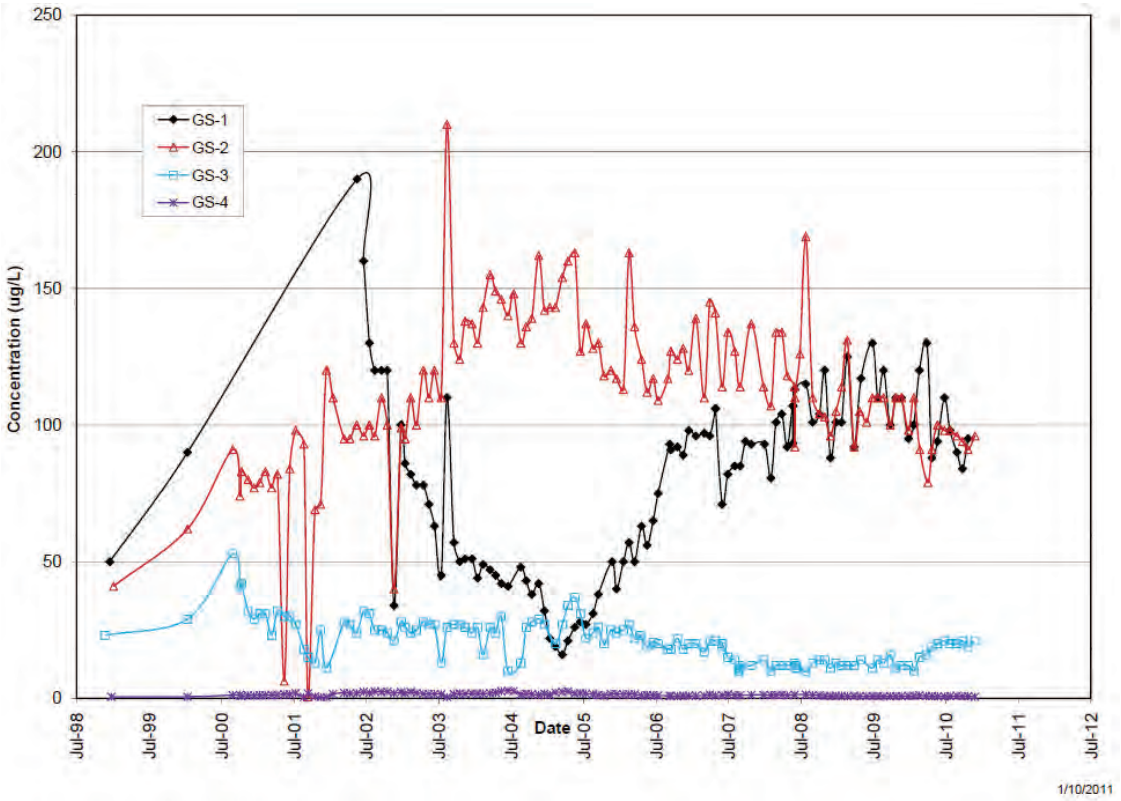


Figure 4.6
Glendale WTP – Hexavalent Chromium Concentrations – North Wells

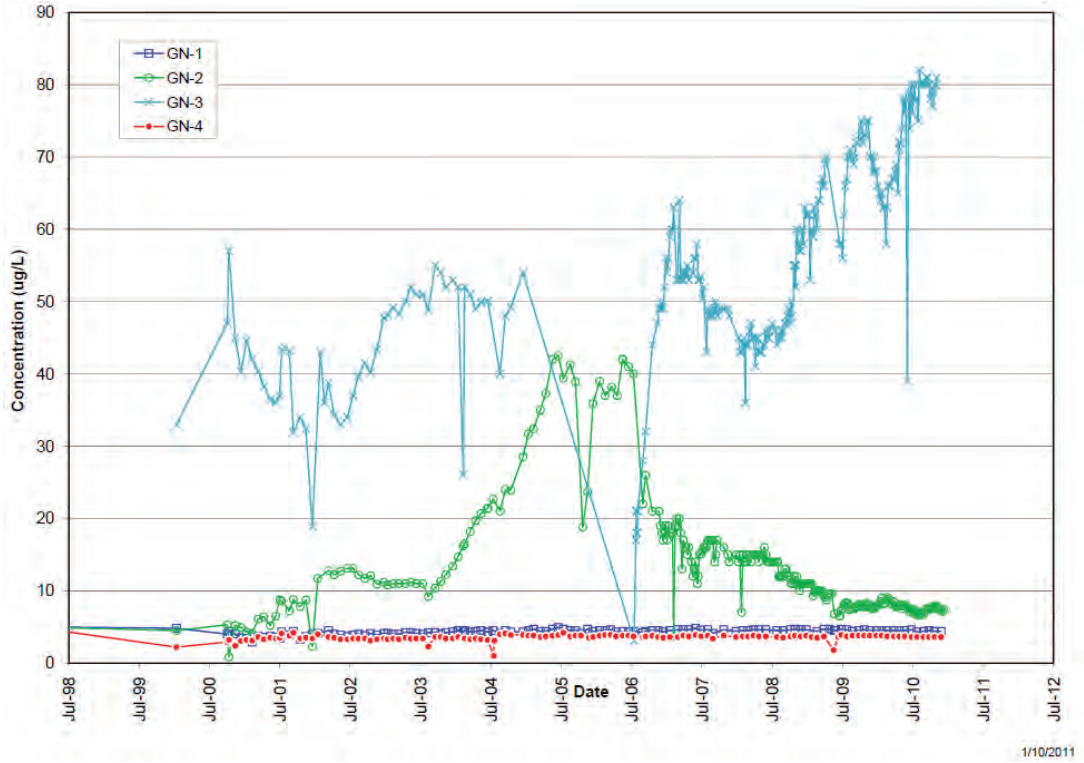
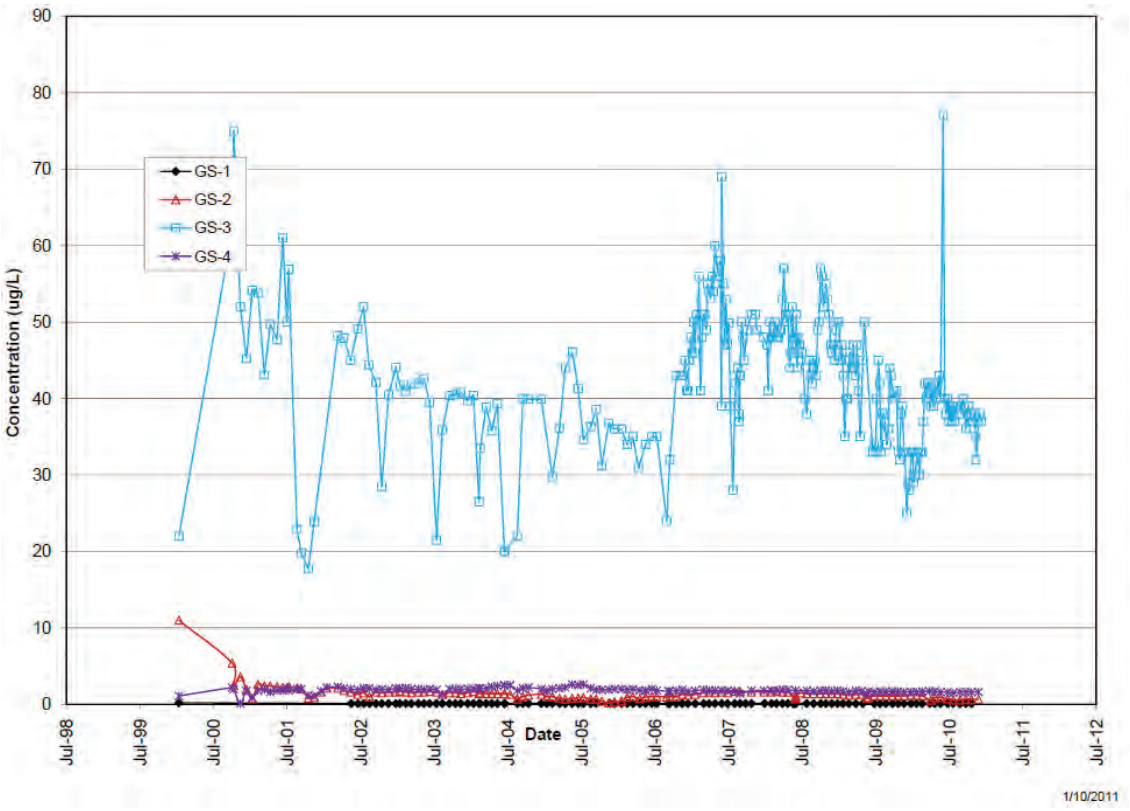


Figure 4.7
Glendale WTP – Hexavalent Chromium Concentrations – South Wells



3. Water Quality Effect on Sources

3.1. San Fernando Basin

WELLS – Glendale Water Treatment Plant

As has been discussed in the previous sections, the GWTP was originally built to remove the volatile organic chemicals in the San Fernando Basin. With the concern of chromium 6, studies are on-going to develop the technology for its removal.

Should the Chromium content and other contaminants increase through time from the basin and blending cannot meet the federal and state requirements, the effect would be the increase in the use of MWD water. The reliability of MWD source is described in MWD's 2010 Urban Water Management Plan (Attachment C).

3.2. Verdugo Basin

Glorietta Wells

The Glorietta Wells have been the main source of local water from the Verdugo Basin. Historically, a water quality parameter of concern in the basin is the high concentrations of nitrates. It is believed that the nitrates are from the historical use of septic tanks in the La Crescenta area. Now that the areas are sewered, the nitrate levels are expected to decrease in the future. Water from the Glorietta wells is blended with MWD supplies in one of the City's large storage facilities. The resulting levels do not have any impact in the usability of the groundwater supplies.

PCE has been detected in the Glorietta Wells ranging from 1 to 3 ppb. Levels have been stable over the years and EPA has determined that no remedial action will be required for the Verdugo Basin. In 2008, methyl-tert-butyl ether (MtBE) was detected at approximately 0.5 ppb (the drinking water MCL is 13 ppb) in one of the three Glorietta wells. In the 2 and ½ years since the initial detection, the level of MtBE has not increased.

The three Glorietta wells produce approximately 1,640 AF/year and are projected to provide about 6 percent of the City drinking water supply.

Verdugo Park Water Treatment Plant

The Verdugo Park Water Treatment Plant (utilitzing diatomaceous filtration followed by chlorination) was built in the early 90's to capture water from existing underground water infiltration pick-up system. Since the expected production is highly variable, two shallow wells were added to deliver water to the system. This source is considered to be under the influence of the surface water for regulatory purposes.

The nitrates levels at the effluent ranges from 2 to 4 ppm as N. The MCL for nitrate as N is 10 mg/L. The VPWTP typically produces around 400 gpm. To increase production from the Verdugo Basin,

GWP is developing two additional wells. The Foothill Well is undergoing final testing and a permit to operate the well from DPH is expected in early 2011. The well is expected to produce about 200 gpm. Due to the level of nitrates in the well, the water will be blended in one of the city's storage reservoirs. In addition, the City will also be developing a second well in the northern portion of the city. This "Rockhaven" well is anticipated to have a production of 500-700 gpm. Testing of a pilot-well indicated elevated levels of nitrate at the MCL. In addition there was a low-level detection of perchlorate. During development of the well further water quality testing of the well will be done to better define water quality conditions. The Rockhaven well is located in a portion of the Verdugo Basin where another utility (Crescenta Valley Water District) has experienced MtBE contamination. However, there is no way of knowing for certain if there is MtBE contamination that could be a concern for the Rockhaven well in the future. The utility will conduct aggressive monitoring at the Rockhaven site to provide an early warning of potential contamination. The water department conducted a preliminary assessment of various treatment technologies for the removal of nitrates and will be conducting further investigations in the future.

3.3. Metropolitan Water District

With MWD as the main source of water supply delivered by the City to its constituents, its reliability both on availability and water quality has always been a concern by Glendale and other member agencies its serves.

Due to degradation of the quality of water in the San Fernando basin in the 90's, the city's dependency on MWD water increased to nearly 95% of the total supply delivered. Glendale can receive water from either of two of MWD's five treatment plants; Weymouth and Jensen. These plants also have two primary sources of water; Colorado River and the State Water project. With the City's initiative to reduce dependency on MWD supply, recent developments and improvements on local sources have reduced the use of imported water to about 60%.

The reliability and water quality of MWD water has been discussed in detail in MWD's Integrated Resources Plan (Attachment A) and in MWD's Urban Water Management Plan (Attachment C).

RECYCLED WATER -V

1. Background

The City of Glendale has been delivering recycled water since the late 1970's from the Los Angeles/Glendale Water Reclamation Plant (LAGWRP). This is a 20 million gallon-per-day (MGD) facility owned by the Cities of Los Angeles and Glendale. Glendale is entitled to 50% of any effluent produced at the plant. Treated wastewater that is not used in either the Glendale or Los Angeles system is discharged to the Los Angeles River and eventually reaches the ocean.

2. Wastewater System

2.1. Wastewater System

The City owns, operates, and maintains one wastewater pumping station (Doran Street Wastewater Pumping Plant) that lifts sewage from a low point in the collection system to a maintenance hole at a higher elevation. The pumping plant is equipped with four 1,150-gpm, 25-horsepower submersible pumps (one emergency standby) and one 3-horsepower sump pump.

Existing wastewater collection system within Glendale consists of approximately 360 miles of underground wastewater pipelines. These pipelines range from 8 inches to 42 inches in diameter, and approximately 87 percent of them are 8-inches in diameter. Vitrified clay pipes (VCP) are the most commonly used in the wastewater collection system.

2.2. Wastewater Generation and Collection

The existing wastewater system collects sewage at its point of origin and conveys wastewater in a southerly and southwesterly direction to the Los Angeles North Outfall Server (NOS), located along the Los Angeles River. Similar to most wastewater systems, Glendale's collection system uses the natural topography to allow gravity to convey wastewater to its point of final discharge into the NOS. Glendale's topography, in combination with physical configuration of the system, has divided the service area into eight major drainage basins or tributary areas.

Wastewater flows are measured at prescribed locations prior to final discharge. The City, in

cooperation with the City of Los Angeles, constructed six flume facilities, one site with in-line telemetering equipment, and installed a flow meter at the pump station to measure the flows.

In addition to the development of the areas associated with these major drainage basins, each basin was further divided into smaller tributary areas or sub-basins. These basins were derived to distribute wastewater flows throughout the system and were based on existing pipeline connectivity, unique demand patterns, isolation of areas with known hydraulic constraints, and integration of facilities downstream of significant dischargers.

Wastewater generated by residents and businesses is collected and conveyed by the City's sewer infrastructure and discharge to either the City of Los Angeles's Hyperion Treatment Plant (LAHTP) or to the Los Angeles-Glendale Water Reclamation Plant (LAGWRP), with the sludge discharged to the Hyperion System.

The LAGWRP treatment consists of a series of processes that successively remove solids until the resulting water meet Title 22 tertiary effluent requirements. Four levels of purification are provided: preliminary, primary, secondary, and tertiary treatment with disinfection.

2.3. Wastewater Disposal

Most solids are separated from the wastewater during the primary and secondary processes at the LAGWRP. The resulting sludge is returned to the NOS to the Hyperion Treatment Plant. The remaining wastewater is then further treated to eliminate any remaining impurities. Final product is used in recycled water programs or discharge to the Los Angeles River.

2.4. Treatment Facilities

The source of recycled water in the City is the Los Angeles/Glendale Water Reclamation Plant located near Colorado Boulevard, and the Los Angeles River, and is owned by the Cities of Los Angeles and Glendale. This facility is part of Los Angeles Hyperion Waste Water system. LAGWRP is what is referred to as a "skimming plant" designed to reduce the flows of raw sewage in the transmission pipelines and also to provide treated wastewater for recycling "inland" purposes. The solids from the

treatment process are discharged back into the transmission system and removed at the Hyperion Treatment Plant in El Segundo. LAGWRP has a capacity of about 20 MGD. Treated wastewater is either delivered to the Cities of Los Angeles and Glendale for recycled water use, or discharged to the Los Angeles River. The City of Pasadena also has rights to 60 percent of Glendale's capacity but has not yet exercised these rights. The current level of treatment is Title 22 (tertiary) with nitrogen removal (NdN). Recycled water from LAGWRP provides recycled water to landscape irrigation to cemeteries, schools, parks and high rises.

Information on quantities collected and treated at the plant pumped to the Greenbelt system is provided in Table 5-1.

TABLE 5-1
WASTE WATER TREATED AT LAGWRP &
DISCHARGED TO RIVER

Year	Quantity Treated (AF)	Quantity Discharged (AF)
2005	13,884	10,594
2010	19,962	15,573
2015	17,966	13,474
2020	18,864	14,148
2025	19,807	14,855
2030	20,798	15,598
2035	21,838	16,378

3. Recycled Water Projects

The City of Glendale has many recycled water projects designed to serve different parts of the City. Each is reviewed below.

3.1. Power Plant Project

Recycled water deliveries were first made to the Glendale Power Plant for use in the cooling towers and to Caltrans for irrigation along the 134 Freeway near the 5 Freeway in the late 1970's. A pipeline was constructed from the LAGWRP to the Glendale Power Plant. Recycled water is used as make-up

water in the power plant cooling towers and for irrigation by Caltrans in the area of Freeways 5 and 134.

3.2. Forest Lawn Project

This project, completed in 1992, was a joint project with the City of Los Angeles. This facility, a 30-inch diameter pipeline project, was constructed to deliver recycled water for irrigation to Forest Lawn Memorial Park in South Glendale. Recently, the City began deliveries to an irrigated street median on Brand Boulevard from Colorado Boulevard and Los Feliz Boulevard. Los Angeles proposes to extend the system from its South Glendale terminus into Elysian Park and into the downtown Los Angeles area.

3.3. Expansion Project

In the late 1980's, planning was initiated on expanding the recycled water system. Construction started in the early 1990's for the $16 million project and completed by 1992. The system was extended in three phases to complete the backbone of the distribution system. The expanded system will also be used to deliver water to cities of Pasadena and Los Angeles who are partners in the project. Each segment is discussed below:

3.3.1. Verdugo – Scholl Project

The project was designed to deliver recycled water to the Oakmont Country Club for irrigation with another section in Glenoaks Canyon to deliver recycled water to the Scholl Canyon Golf Course for irrigation, and to the Scholl Canyon Landfill for dust control and irrigation. Another major user of this water is Caltrans for irrigation along the 134 and 2 Freeways. Additional users include schools, parks, and roadway median strips.

The portion of the project up to Scholl Canyon was a joint effort with the City of Pasadena. Pasadena provided funds for Glendale to increase the size of the facilities so deliveries could be made to Pasadena from the Scholl Canyon area. Pasadena continues to review the possibility to extend the system.

3.3.2. Brand Park Project

Consists of a pumping plant, storage tanks, and pipeline and connections to its pipeline serving the Glendale Power Plant and extending to a tank above Brand Park. This section delivers recycled water for irrigation to Brand Park, Grandview Cemetery and along the street medians on Glenoaks Boulevard.

4. Recycled Water Delivery System

The recycled water delivery system comprises of 21 miles of mains, 5 storage tanks, 6 pumping plants and 56 customers currently using about 1,785 AFY. The specific features of this recycled water program are shown in more detail on Figure 5.1 & 5.2 below.

Figure 5.1
Recycled Water System Layout

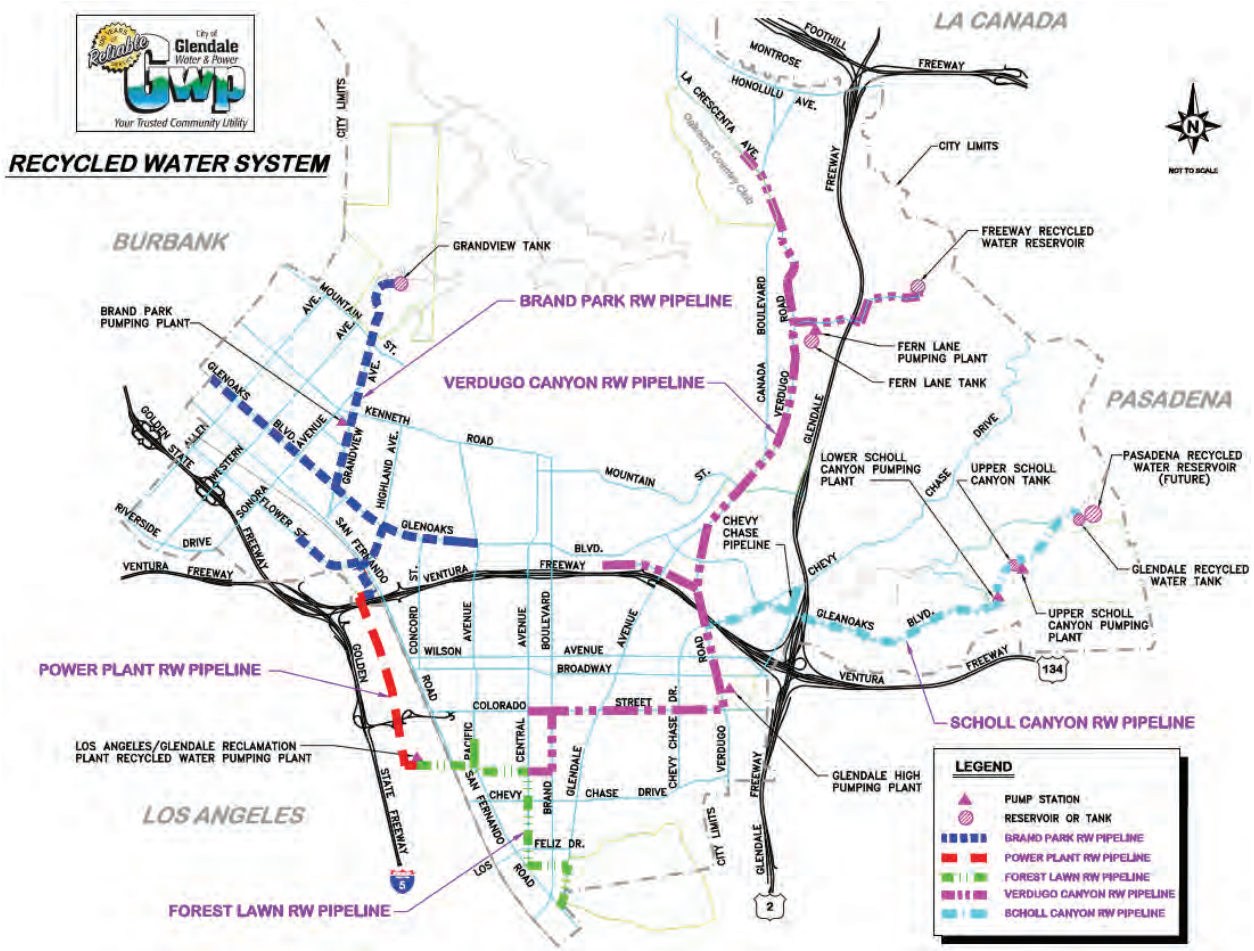
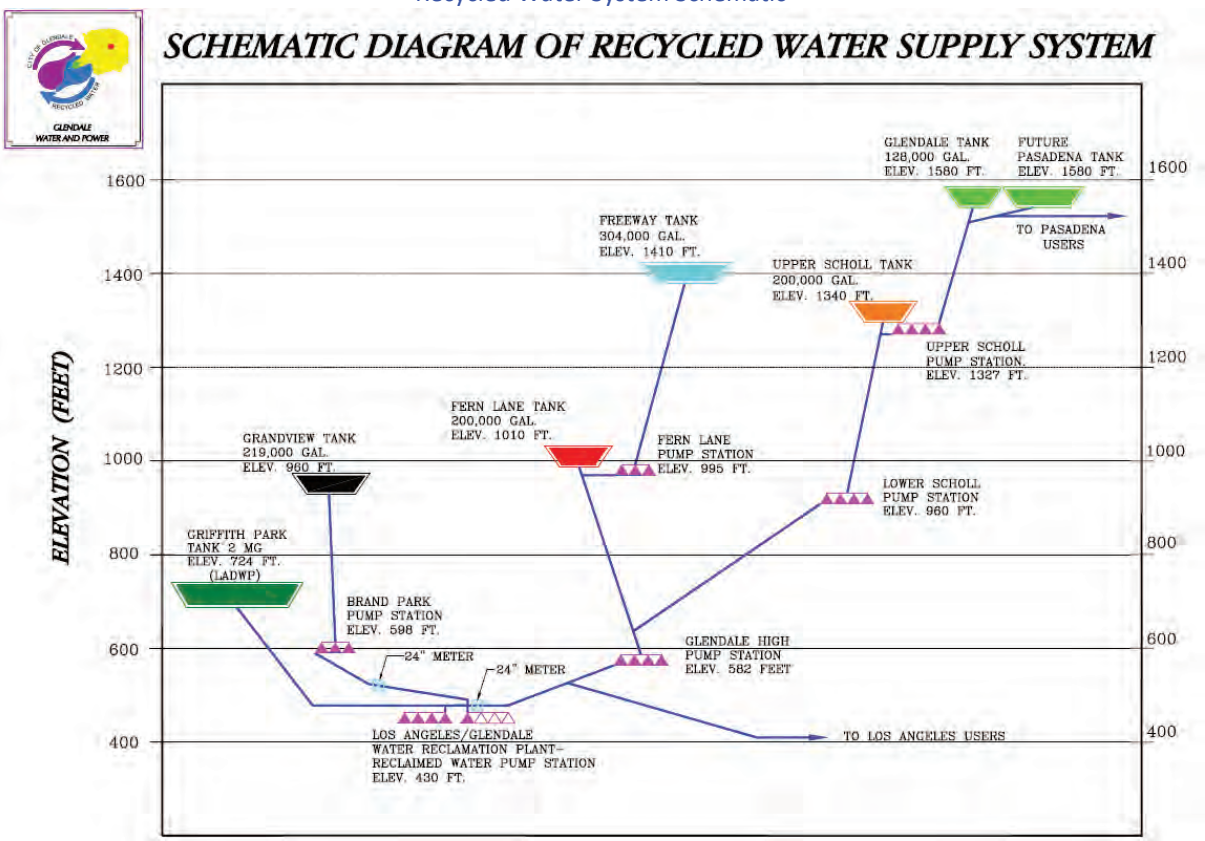


Figure 5.2
Recycled Water System Schematic



The current users from the various recycled water projects are tabulated and shown on Appendix F. This will give the reader a general idea of the scope of the expansion program. Recycled water use has increased from 430 AF in 1990-91 to 1,785 AF in 2009-2010. The expected deliveries from the various projects are shown on Table 5-2. As you can see, we project no increase in recycled water usage. Glendale developed a Recycled Water Expansion plan that will increase recycled water usage by 900 AFY. However, due to the current economic recession all recycled water projects have been postponed. Moreover, Glendale will be able to achieve the SBx7-7 requirement of 20% reduction by 2020 without the recycled water expansion project. This will be further explained in the Water Conversation Section VI.

TABLE 5-2 RECYCLED WATER SALES (AFY)							
PROJECTS	**2005 Projection for 2010**	**2010***	**2015**	**2020**	**2025**	**2030**	**2035**
Brand Park Pipeline	170	130	130	130	130	130	130
Forest Lawn Pipeline	350	450	450	450	450	450	450
Power Plant Pipeline	450	450	450	450	450	450	450
Verdugo-Scholl Pipeline	1,040	755	755	755	755	755	755
Other Potential Projects	0	0	0	0	0	0	0
TOTAL:	**2,010**	**1,785****	**1,785**	**1,785**	**1,785**	**1,785**	**1,785**

**Reduce Funding availability delayed many recycled water projects and thus reduced recycled water usage.*

***Numbers do not match production number due to added back-up potable water during outages.*

The postponed recycled water expansion plan included extensions of service is being considered to Fremont Elem. School, Pacific Park, Polygon Homes, Toll Jr. High, Keppel High School, Hoover High and fully serve Grandview Memorial Park (a third of the area is receiving recycled water for irrigation). There are also plans to extend the recycled water line to the northern portion of Glendale (Crescenta Valley) to service Crescenta Valley Park and Deukmejian Wilderness Park. Future recycled water users in the City are shown on Appendix G.

5. Recycled Water Quality

Due to complaints from customers regarding green stains on wall sprayed by recycled water, the Water Department established a monitoring program to determine recycled water condition throughout the service area and to what extent good residual from the treatment plant is maintained. The study shows that treated water leaving the plant with chlorine residual of 5 ppm or more, was observed to have a decrease in chlorine residual to almost zero in half way of the distribution system. Turbid, smelly and dirty water have been noted on most sampling stations. Request to increase dosage in the plant was made but golf courses adjacent to the treatment plant were highly concerned the concentration of chlorine would burn their greens.

In view of the above, the City initiated a chlorination program for its recycled water system in the early 2000. Due to the safety concern in the use of gas, chlorine tablets were used at the Glendale High

pumping station. Chlorination of the tanks started gradually, tests were conducted and residual monitored until demand was met in the distribution system. Less than a year after the program was initiated, recycled water started clearing, the smell was gone, and residual started to be noticeable throughout the system. The effectiveness of the program was further proven by the small amount of sediment and sludge found during the cleaning of a tank that had previously had a large amount of sediments and growth before the chlorination. Since manual chlorination involves a lot of manpower, study of more permanent chlorination stations is being done.

6. Recycled Water Use Regulation

The City requires the use of recycled water when appropriate as determined by the City's Director of *Water & Power*. As a result, even if recycled water cannot be provided at the time, the potential users may still be required to install a separate irrigation system so that recycled water can be delivered at a later date without major modifications to the irrigation system. In these projects, the "purple" irrigation pipe and control boxes must be used. Pressure test are conducted to assure no cross-connection exists between the potable system and irrigation. Records are kept which will permit an easy conversion of the system to recycled water use in the future.

7. High Rise Office Buildings

The City requires dual plumbing systems in new high-rise office buildings so as recycled water becomes available, it can be used for sanitary flushing purposes in the buildings without retrofitting. Developers of new buildings have accepted this requirement and it is routine to require this installation. A listing of office buildings with dual plumbing is provided on Table 5-3.

As of April 18, 2004, Glendale Community College began using recycled water for sanitary flushing in two of their dual-plumbed buildings. They are also in the planning process to add another dual plumbed building. Due to the State's recent concern in the installation of a swivel-el connection for dual plumbed connections and limit its use for irrigation purpose only, users that do not have dual-plumbing system are required to apply the "air-gap" method for backflow prevention. This connection can be used in case of any service interruption or system shutdown from the LAGWRP due to

maintenance, power failure, etc.

TABLE 5-3

Office Buildings Dual-Plumbed To Use Recycled Water For Sanitary Programs

Location	Stories
655 N. Central Avenue	24
400 N. Brand Blvd	15
450 N. Brand Blvd	15
611 N. Brand Blvd	10
610 N. Central	6
Police Building – Isabel Street	2
207 Goode Ave	6
Disney Campus	6

The City is committed to expand the use of recycled water as time goes on. Although, we are currently restricted by the economy but any new developments in areas where a recycled water is available are required to connect. In addition, developments where recycled water is not available, they are still required to plumb for future connection so that when recycled water is available they can connect without extension modifications.

8. Encouraging Recycled Water Use

Glendale has extensively promoted the use of recycled water from traditional irrigation project use to dual plumbed office buildings using recycled water. With the incentive rate of twenty five percent less than the cost for potable water, recycled water use and service connections increased from 3 connections and 333 AF in 1990 to 56 recycled water users and 1,785 AF consumed by the end of FY 2009-2010, respectively.

TABLE 5-4

ACTIONS USED TO ENCOURAGE RECYCLED WATER USE

Methods	Used
Subsidized Costs	Yes
Grants	Yes/No
Dual Plumbing Standards	Yes
Regulatory Relief	No
Regional Planning	Yes
Incentive Program	Yes
Long Term Contract	Yes
Rate Discount	Yes
Prohibit Specific Fresh Water Use	Yes
Low Interest Loan	No
Public Education and Information	Yes
Require Recycle Water Use	Yes
Others	

The City encourages recycled water use by providing water at a 25 percent discount from the potable water rates. This is designed to assist users in the costs incurred in converting to recycled water use, regulatory involvement in the use of recycled water, etc. For major users, this can be a major savings in water costs. Table 5-4 summarizes the many actions to encourage recycled water use.

FINANCIAL AND REVENUE IMPACT – VI

1. Overview

The purpose of this section is to provide information on the financial and revenue impacts on the Water System associated with reduced water sales. For customers of the Water System, water rates are composed of (i) a service charge component, designed to cover a portion of the fixed costs of the Water System, and (ii) a commodity charge calculated based on usage, designed to encourage water conservation. An adjustment charge, without limit, is also levied to recover the cost of purchased water and the cost of purchased electricity. The adjustment charge can be increased or decreased every six months.

Typical determinates of the level of water demand includes local temperatures and rainfall. High temperatures and low rainfall (i.e. dry years) are associated with high water demand while low temperatures and high rainfall (i.e. wet years) or periods of water conservation are associated with low water demand. Dry years and wet years increase and decrease water demand, respectively. During periods of low water demand, the utility would collect less revenue, both from the commodity charge component, as well as the adjustment charge component. The net effect of lower revenue from the commodity charge creates a shortfall since it is designed to cover fixed expenses. The lower revenue from adjustable component has limited net impact since it offsets costs that would also be lowered with lower sales, and is automatically recalculated. Lower revenue from sales could have a significant effect on the financial condition of the utility. Because of these differing conditions, the utility must maintain sufficient financial reserves to address differing revenue years.

An evaluation of differing water use patterns and their impact on the financial operations of the utility is discussed and evaluated in the Urban Water Demand Management Process.

2. Low Demand Periods

During periods of low water demand, the utility would collect less revenue. This period could occur during the early stages of a drought when an agency maintains a public education program to encourage customers to reduce water use. The net effect of lower revenue from the commodity charge creates a shortfall since it is designed to cover fixed expenses. To mitigate the impact of the revenue shortfall, the water utility can typically perform a combination of reducing costs, increasing rates, and/or funding operations through accumulated reserves. Sustained revenue shortfalls over a number of years, can adversely affect the financial position of the utility.

This was the situation during the drought of the late 1980's and early 1990's. If the sustained drought condition results in mandatory reduction in water use, the financial consequences to the City are different. Table 6-1 provides a list of some of the components discussed in this report. Some of the methods to overcome the financial impacts are presented in Table 6-2.

TABLE 6 - 1

COMPONENTS OF REVENUE IMPACT

Components	Discussed
Review of rate adjustment	YES
Development of reserves	YES
Change in quantity of sales	YES
Impact on customer's bill	YES
Distribution of customer impacts between customer types	YES
Impacts to water supplier of higher rates and penalties	YES
Cost recovery reviews	YES

TABLE 6 - 2

METHODS TO OVERCOME REVENUE/EXPENDITURE IMPACTS

Methods	Used
Reserve fund	YES
Change rate structure	YES
Reduce overhead	YES
Decrease capital expenditures	YES
Revise planning estimates	YES
Others	

3. Drought Periods

During periods of mandatory water conservation and implementation of the City's Mandatory Water Conservation Plan, there is an option for the City to adjust the water rates due to revenue shortages resulting from the implementation of water conservation measures.

4. Penalties and Charges during Mandatory Conservation

As previously presented, during implementation of the City's Mandatory Water Conservation Plan, penalties are imposed on customers who do not comply with the water conservation provisions. Such penalties include a written courtesy notice, civil remedies and criminal penalties. Refer to the City's Mandatory Water Conservation Ordinance in Appendix B.

5. Summary

The water system has exposure to the risk of reduced water sales either through environmental drivers or water conservation measures, which results in revenue shortfalls. To mitigate the impact of a revenue shortfall, the water utility can typically perform a combination of reducing costs, increasing rates, and/or funding operations through accumulated reserves. Sustained revenue shortfalls over a number of years, can adversely effect the can adversely affect the financial position of the utility as

well as customers, in the form of higher water rates and/or penalties for use in excess of allocation. See Table 6-3 shows that GWP has raised rates for 4 of the 5 previous fiscal years to make up for such shortfalls.

Table 6-3
Sales Summary

	FY2006*	FY2007	FY2008*	FY2009*	FY2010*
Sales (HCF)	13,027,685	13,890,779	13,368,980	12,834,973	11,102,887
Total Revenue ($)	31,189	33,277	34,817	36,068	35,716

*Rate Increase within fiscal year

WATER CONSERVATION – VII

1. Overview

The City of Glendale is continually challenged by many factors that are restricting water supplies. Water conservation is one option to reduce demands and thus increase water supply. During past droughts, residents and businesses have aggressively implemented conservation to achieve demand reductions. During fiscal year 2009-2010, water use was 11% lower than water used in fiscal year 2008-2009. GWP will continue to promote and encourage water conservation through the many programs and incentives.

2. Conservation and Public Affairs Programs

After the unusually large amount of rain and snow Southern California received during the end of 2010, it is sometimes difficult to remember that dry years are not a phenomenon in California. They are the norm, and periodically come in pairs, or threes, or fours. Of necessity, the "wise use of water" must become a "way of life". Using less water is still the easiest, cheapest and best hope for a stable water situation. Therefore, water conservation is an important water demand management measure in Glendale's Urban Water Management Plan.

In response to water year 2006-2007, the dryest year on record in California and the west, on June 26, 2007 the Glendale City Council adopted a resolution implementing Phase 1 of the City's water conservation plan asking for 10% voluntary water conservation from our citizens. This resolution also reaffirmed our "No Water Waste" policy, a section of the Water Conservation Chapter that had been in effect since1991 in the City's Municipal Code.

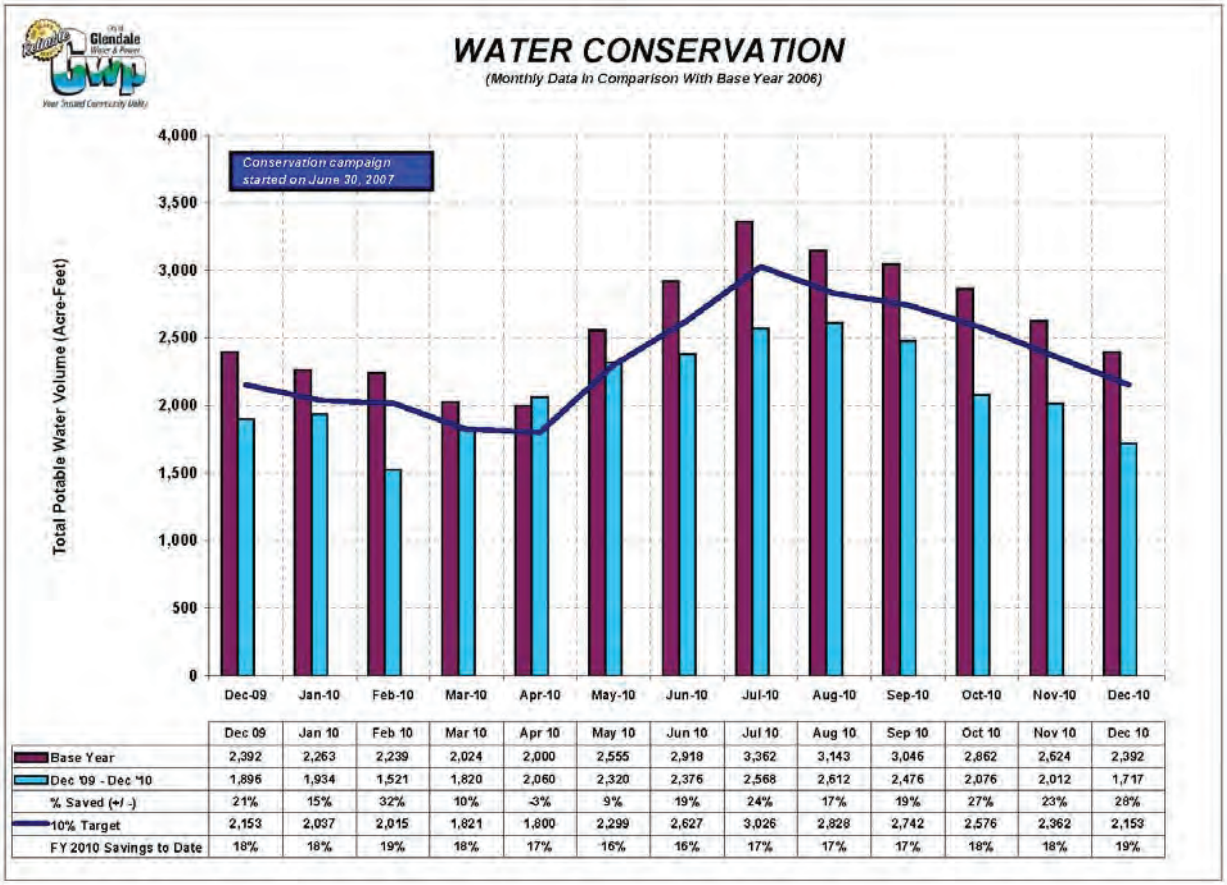
Thus began a vigorous Water Conservation Campaign with the theme "Glendale…It's Time to Save Water". Tips on how to reduce water use were delivered to customers through direct mail materials, bill inserts, newspaper ads and articles, our GTV6 government television station and community meetings. City trucks carried signs stating "Water…Don't Waste It". Using the year 2006 at a base

year, GWP asked our customers to reduce their water usage by 20 gallons of water per day. Our customers responded to this request. However, the water savings realized from this campaign did not meet our goal of 10% savings. We achieved only a little over 7% reduction in water use.

Then in 2008-2009, the water shortage in Southern California became severe and different from any we have experienced before. More than 60% of Glendale's water is imported from Northern California, through the Sacramento-San Joaquin Delta (the Delta), and from the Colorado River as a member agency of Metropolitan Water District of Southern California (MWD). Both these water supply areas were experiencing serious drought conditions at the same time, a phenomenon never before seen. Further, court rulings limited pumping from the Delta to protect endangered fish. This prompted MWD to enact a mandatory conservation plan, the first time in 18 years member agencies were ordered to save water or pay large penalties.

In the summer of 2009, Glendale Water & Power presented a revised and expanded Water Conservation Ordinance to the City Council. They approved it and on August 11, 2009, the City Council declared Phase II of the City's water conservation plan in effect. This 10% mandated water conservation effort imposed limits on landscape watering to Tuesdays, Thursdays and Saturdays, 10 minutes per irrigation station. It also deferred all new and retrofit landscape planting with the exception of California Friendly Plants. A new Water Conservation Campaign informing our customers about the mandatory water conservation program resulted in significantly larger water savings than 10%. To date, the average water savings have been 19%. (see Figure 7.1)

Figure 7.1
Water Conservation Comparison



	Dec 09	Jan 10	Feb 10	Mar 10	Apr 10	May 10	Jun 10	Jul 10	Aug 10	Sep 10	Oct 10	Nov 10	Dec 10
Base Year	2,392	2,263	2,239	2,024	2,000	2,555	2,918	3,362	3,143	3,046	2,862	2,624	2,392
Dec '09 - Dec '10	1,896	1,934	1,521	1,820	2,060	2,320	2,376	2,568	2,612	2,476	2,076	2,012	1,717
% Saved (+/ -)	21%	15%	32%	10%	-3%	9%	19%	24%	17%	19%	27%	23%	28%
10% Target	2,153	2,037	2,015	1,821	1,800	2,299	2,627	3,026	2,828	2,742	2,576	2,362	2,153
FY 2010 Savings to Date	18%	18%	19%	18%	17%	16%	16%	17%	17%	17%	18%	18%	19%

3. Best Management Practices (BMPs)

As an original member of the California Urban Water Conservation Council (CUWCC), in 1991 Glendale signed the CUWCC Memorandum of Understanding (MOU) that includes Best Management Practices (BMPs) for Water Conservation. When signing the MOU, water suppliers agree to implement the BMPs in their water conservation programs and consider water conservation on an equal basis with other water management options.

As signatories, these agencies also agree to submit bi-annual standardized reports to the CUWCC providing sufficient information to inform the CUWCC on the progress being made towards implementing the BMP process. These reports are also included in the annual report the CUWCC is required to make to the State Water Resources Control Board (State Board).

Since 1991, Glendale's water conservation policies and practices have followed the compliance requirements of these BMPs. Failure to demonstrate that an agency is meeting these specified water conservation measures jeopardizes an agency's ability to receive State grants.

TABLE 7-1

Pre-1008 BMPs

BMP 1:	**Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers** Develop and implement a strategy targeting and marketing water use surveys to single-family residential and multi-family residential customers.	**BMP 2:**	**Residential Plumbing Retrofit** Identify single-family and multi-family residences constructed prior to 1992. Develop a targeting and marketing strategy to distribute or directly install high-quality, low-flow showerheads, etc.
BMP 3:	**System Water Audits, Leak Detection and Repair** Annually complete a prescreening system audit to determine the need for a fullscale audit.	**BMP 4:**	**Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections** Require meters for all new service connections. Read meters and bill customers by volume of use. No greater interval for meter reading than bi-monthly. Written plan to test all meters, schedule of replacement.

BMP 5:	**Large Landscape Conservation Programs and Incentives** For non-residential customers, provide support and incentives to improve landscape water use efficiency. Eto-based water use budgets for dedicated irrigation meters. Offer water use surveys.	**BMP 6:**	**High-Efficiency Clothes Washers** Offer a financial incentive for the purchase of high-efficiency clothes washing machines (HEW) meeting a water factor value of 8.5 or less.
BMP 7:	**Public Information** Implement a public information program to promote water conservation and water conservation related benefits.	**BMP 8:**	**School Education** Implement a school education program for all school districts and private schools in water suppliers' service area to promote wate conservation and water conservation related benefits.
BMP 9:	**Commercial, Industrial, Institutional** Implement program to accelerate replacement of existing high-water-using toilets with 1.6 gallons or less.	**BMP 10:**	**Wholesale Agency Assistance Programs** Wholesale water suppliers will provide financial incentives, or equivalent resources.

BMP 11:	**Retail Conservation Pricing** Promotes water conserving retail water rate structures called conservation pricing. Requires volumetric rates.	**BMP 12:**	**Conservation Coordinator** Designation of a water conservation coordinator and support staff
BMP 13:	**Waste Prohibitions** Enact water waste prohibitions.	**BMP 14:**	**Residential ULFT Replacement Programs** Implementation of programs for replacing existing high-water-using toilets with ultra-low-flush (1.6 gallons or less) toilets in single-family and multi family residences.

In December 2008, the BMPs were substantially revised and updated to reflect advances and changes in water conservation practices and technologies. The 14 BMPs are now organized into five categories. Two categories, Utility Operations and Education, are “Foundational BMPs”, because they are considered to be essential water conservation activities by any utility and are adopted for implementation by all signatories to the MOU as ongoing practices with no time limits. The remaining BMPs are “Programmatic BMPs” and are organized into Residential, Commercial, Industrial, and Institutional (CII), and Landscape categories. The minimal activities required of each signatory are encompassed within each list.

The 2009-2010 BMPs data reports reflect the 2008 BMPs revisions.

CURRENT BMPs – REVISED 2008

Foundational BMPs		Programmatic (Quantifiable) BMPs	
BMP 1:	Utility Operations	BMP 3:	Residential
	BMP3: System Water Audits		BMP 1: Residential Surveys
	BMP4: Metering		BMP 2: Residential Retrofits
	BMP 10: Wholesaler Incentives		BMP 6: High-Efficiency Clothes Washers
	BMP 11: Rates		BMP 14: Ultra-Low-Flush Toilets
	BMP 12: Conservation Coordinator	BMP 4:	Commercial, Industrial, Institutional
	BMP 13: Water Waste Prohibitions		BMP 9: Commercial, Industrial, Institutional
BMP 2:	Education	BMP 5:	Landscape
	BMP 7: Public Information		BMP 5: Large Landscape
	BMP 9: School Education		

As soon as they are available from the CUWCC, the 2005-2010 final BMPs coverage reports will be inserted in Volume II of this report as Appendix D.

Glendale has conducted a review of the implementation plan and schedule provided in the 2005 UWMP. All BMPs have been implemented in accordance with the schedule set forth in the plan.

4. Water Conservation Act of 2009

The Water Conservation Act of 2009, Senate Billx707 requires water agencies to reduce per capita water use by 20% by 2020. Water supplies are required to set a water use target for 2020 and an interim target for 2015 using one of the four methods listed in the "Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use." In order to be eligible to receive State grants and loans, each water utility must meet the adopted targets.

Four methodologies were defined to calculate the water use target. Three of the methods are defined in Water Code Section 10608.20(a)(1). The last method was developed by DWR. The four methodologies include the following:

Method 1 – Eighty percent of the water supplier's baseline per capita water use

Method 2 – Per capita daily water use estimated using the sum of performance standards applied to indoor residential use; landscaped area water use; and commercial, industrial, and institutional uses.

Method 3 – Ninety-five percent of the application state hydrologic region target as stated in the draft 20x2020 Water Conservation Plan

Method 4 – Per capita daily water use estimated using meter, indoor residential, landscape irrigation and water loss savings.

Water utilities will be required to report interim compliance in 2015 as compared to the estimated interim target. The actual compliance will be reported in 2020. Base per capita water use must be reported in gallons per capita per day (gpcd).

Using the methodologies produced the DWR produced document "Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use" GWP calculated baseline per capita water use, the 2020 target and the interim target for 2015. Table 7-1 presents results of the calculations. Refer to Attachment H for the detail calculations and technical analysis.

Using Methodology 3, base daily per capita water use is 143.1 gpcd using a ten-year average between July 1, 1999 and June 30, 2009 and 144.3 gpcd using a five-year average ending between July 1, 2003 and June 30, 2008. In 2008 total water deliveries were 33,882 AFY compared to total recycled water sales of 1555 AFY, approximately 4.6% of total deliveries (less than 10%). Thus, a ten year baseline period was selected.

GWP adopted Method 3 to set the 2015 interim and 2020 water use targets. Method 3 requires setting the 2020 water use targe to 95% of the applicable State hydrologic region target as provide in the State's Draft 20x2020 Water Conservation Plan. GWP is within State hydrologic region 4 of 149 gpcd. The 95% of the hydrologic region was 142 gpcd. According to the methodology 3, we calculated 95% of the five-year average base daily per capita water use, 137 gpcd. GWP is required to set the 2020 target to the smaller of the 2 gpcds. GWP's interim 2015 target is 140.1 gpcd and the 2020 target is 137.0 gpcd. Please refer to Table 7-2 below for calculations.

Table 7-2
WATER PER CAPITA WATER USE USING METHOD 3
(Gallons per capita/per day)

Fiscal Year	Population (1)	AF	Glendale Per Water Use Capita Use (Gallons/day)
2000-2001	188,952	31,119	147.0
2001-2002	191,594	28,095	130.9
2002-2003	193,983	31,039	142.8
2003-2004	196,382	32,666	148.5
2004-2005	197,251	30,745	139.2
2005-2006	197,277	31,079	140.6
2006-2007	197,037	32,846	148.8
2007-2008	197,580	31,908	144.2
2008-2009	198,903	29,699	133.3
2009-2010	201,893	26,338	116.5
10 year -Base Daily Per Capita Water Use (gpcd) 2000-2009			143.1
5 year -Base Daily Per Capita Water Use (gpcd) 2004-2008			144.3
Maximum allowable GPCD target in 2020 (95% of 5 yr)			137.0
Method 3 gpcd (95% of hydrologic)			141.6
2020 Target			**137.0**
2015 Interim Target			**140.1**

(1) Serving Population

(2) Ten-year average based on fiscal year between July 1, 1999 and June 30, 2009

(3) Five-year average based on fiscal year between July 1, 2003 and June 30, 2008.

In Figure 7.2 below, you can see that from 2010 through 2035 GWP will be able to meet the 2015 and 2020 base per capita water goals.

Figure 7.2
Historic & Projected Base Per Capita Water Use (gpcd)