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To: Chairman Kelby Robison & MVWD Board of Directors

From: Joseph Davis, General Manager

Date: June 5, 2024

Subject: Moapa Valley Water District Conservation Plan Update

Background

Nevada Revised Statute requires municipalities to update their Water Conservation Plans every 5 years. Staff performed the anticipated updates and sent the document to the Division of Water Resources to verify all the necessary statutory requirements were incorporated.

Staff received correspondence from the Division the 2024 Moapa Valley Water District Conservation Plan has met all statutory requirements and has been approved.

Suggested Motion

Move to approve and adopt the 2024 Moapa Valley Water District Conservation Plan

MOAPA VALLEY WATER DISTRICT

WATER CONSERVATION PLAN

April 2024

OWNER:
Moapa Valley Water District
601 N Moapa Valley Blvd
P. O. Box 257
Logandale NV 89021
(702)-397-6893

ENGINEER:
Farr West Engineering
1310 Dalwood Ct.
Reno, Nevada 89521
(775) 851-4788

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Moapa Valley Water District (MVWD) provides potable water to customers within a service area that includes the towns of Overton, Logandale, Glendale, and Moapa. MVWD began water service in 1960 and since that time the service area has experienced an average population growth rate of approximately three percent per year. The most recent estimates indicate a current population of approximately 8,500 in the Moapa Valley area. A three to four percent per year average growth trend is expected to continue in Moapa Valley because of the areas favorable living conditions, which include a rural atmosphere and relatively short commute to Las Vegas. Generally speaking, the customer class that will experience the most growth will be residential with little growth being anticipated in the commercial and industrial classes.

According to Nevada Statutes Chapter 477 the MVWD was created for the purpose of "providing for the storage, conservation, distribution and sale of water within the District; authorizing the District to purchase, acquire and construct the facilities necessary to serve water to consumers within the District...". MVWD's primary goal is to deliver quality water to its customers. To achieve that goal, the existing water distribution system must be kept in good repair and new water infrastructure must be constructed to keep pace with growth. Additionally, existing water supplies must be properly managed and other potential water sources developed. An important part of that development and management is conservation.

Conservation is only effective if both water purveyors and customers participate in efforts to save. For its part, MVWD's conservation responsibilities include leak detection and system maintenance, water reuse where possible, public education, creation of financial and regulatory incentives, and all other conservation management practices. Management practices include balancing conservation measures with District revenue requirements so that high quality water delivery can be guaranteed.

Conservation by water customers is crucial to the success of the conservation plan. The highest use category in the MVWD service area is residential so it is important that residential customers use water wisely. The principle purpose for wise water use is not to diminish quality of life for residential consumers but to reduce waste. Because of this the most important consumer conservation measures include the elimination of leaks, the use of water efficient appliances and equipment, and the installation of efficient irrigation systems.

This conservation plan has been created with the above mentioned elements in mind and includes the following:

- Conservation goals
- Existing and planned conservation measures and incentives
- MVWD use profile
- Educational materials
- Landscape code
- Drought plan

This plan is compliant with Nevada Revised Statutes (NRS) sections 540.121 through 540.151 and is available for public inspection at the following location:

Moapa Valley Water District
601 N Moapa Valley Blvd
P. O. Box 257
Logandale NV 89021
(702)-397-6893

Public comments about this plan are encouraged. Written comments may be sent to the address above.

The following are the MVWD conservation goals. Some of these goals involve ongoing efforts and others are definite projects that will improve the Districts ability to manage available water. Project related goals will be revised or replaced by new goals as the conservation plan and District needs are periodically reviewed. Examples of ongoing goals include public education and leak detection.

1.1 Service

While conservation is important, it is just as important to make sure that MVWD receives enough revenue to continue providing efficient water delivery. All proposed conservation measures will be studied prior to implementation to insure that measures allow for maximum conservation without limiting or impairing MVWD's ability to provide optimal service.

1.2 Drought Plan Activation

Droughts can be difficult to define. For this reason parameters for determining the application of drought measures and specific levels of drought conditions need to be established in advance. Clark County has adopted the drought plan created by the Southern Nevada Water Authority (SNWA). For drought management, the SNWA plan uses four supply conditions: **(1) No Drought, (2) Drought Watch, (3) Drought Alert and (4) Drought Critical**. MVWD is currently using the SNWA drought plan but is also working on its own plan. MVWD working toward determining its own set of drought triggers to determine the point at which drought measures should be implemented. Since groundwater is currently the only source of supply for MVWD, percentage drops in well levels could be used as well as other conditions that are specific to the MVWD service area.

1.3 Effluent Use

MVWD has the goal of reusing an average 200,000 gallons per day of treated effluent from a proposed new wastewater treatment facility. To achieve this goal MVWD and the Clark County Water Reclamation District are working together toward the construction of the new treatment plant. Currently plans for the new facility have been completed and are ready to go to bid. The treated effluent could be used for parks, landscapes around public buildings and new golf courses.

1.4 Construction of a Demonstration Garden

As part of its five year plan, the district has included the construction of a demonstration garden. The purpose of the garden would be to promote the efficient use of water through low water use landscapes.

1.5 Schools Conservation Education

Two MVWD personnel are certified water conservation practitioners by the American Water Works Association (AWWA). MVWD also purchased a groundwater model to be used for educational purposes. MVWD, in cooperation with local schools, use these resources to offer water conservation instruction to school age children. Partnering with local schools also allows for additional distribution of the educational materials already in use by the District. Additionally, these resources are used in presentations at special events such as youth festivals, Boy and Girl Scout activities, and 4-H. To be successful in this effort MVWD will maintain a high profile among such organizations so that they are aware such presentations are available.

1.6 Unaccounted-for Water

After years of 6% unaccounted-for-water loss, the District started to see an increase in unaccounted water. In 2019 the District invested in Leak Logging equipment to identify leaks in the distribution system. The program has been successful at identifying small leaks throughout the distribution system. Unfortunately, in 2020 the District started experiencing large failure rates over a 30,000 feet section of faulty 24-inch transmission main that has attributed to the higher than normal unaccounted-for-water loss. **MVWD has developed a plan to reduce unaccounted-for**

water. The plans goals include a reduction in unaccounted-for water to 10% in Fiscal Year (FY) 2026, 9% in FY 2028 and 7% in 2029.

1.7 Plan Review and Benchmarks

General benchmarks have been established by which the effectiveness of this conservation plan may be measured. Table 1.1 shows benchmarks for estimating residential water use that were taken from the Environmental Protection Agency (EPA) website.

TABLE 1.1

Residential Estimation Benchmarks

Type of Use	Likely Range of Values
INDOOR USES	
Average household size	2.0 – 3.0 persons
Frequency of toilet flushing	4.0 – 6.0 flushes per person per day
Flushing volumes	1.6 – 8.0 gallons per flush
Fraction of leaking toilets	0 – 30 percent
Showering frequency	0 – 1.0 showers per person per day
Duration of average shower	5 – 15 minutes
Shower flow rates	1.5 – 5.0 gallons per minute
Bathing frequency	0 – 0.2 baths per person per day
Volume of water	30 – 50 gallons per cycle
Washing machine use	0.2 – 0.5 loads per person per day
Volume of water	45 – 50 Gallons per cycle
Dishwasher use	0.1 – 0.3 Loads per person per day
Volume of water	10 – 15 gallons per cycle
Kitchen faucet use	0.5 – 5.0 Minutes per person per day
Faucet flow rates	2.0 – 3.0 gallons per minute
OUTDOOR USES	
Average lot size	5000 – 8000 square feet
Average house size	1200 – 2500 square feet
Landscape area	4000 – 5000 square feet
Fraction of lot size in turf	30 – 50 percent
Water application rates	1 – 5 feet per year
Homes with pools	10 – 25 percent
Pools evaporation losses	3 – 7 feet per year
Frequency of refilling pool	1 – 2 times per year

The benchmarks from table 1.1 can be used to estimate the daily ranges of personal and residential water usage. Table 1.2 shows the results of these calculations.

TABLE 1.2

Range of Water Use in Gallons per Day

Use	Per Individual (Low)	Per Individual (High)	Per Residence (Low)	Per Residence (High)
Toilets	6.4	48.00	19.14	143.52
Showers	0.00	75.00	0.00	224.25
Baths	0.00	10.00	0.00	29.90
Washing Machine	9.00	25.00	26.91	74.75
Dish Washer	1.00	4.50	2.99	13.46
Kitchen Faucet	1.00	15.00	2.99	44.85
Bathroom Faucet	1.00	9.00	2.99	26.91
Landscape	N/A	N/A	24.59	153.70
Total	**18.40**	**186.50**	**80.61**	**711.34**

The residential ranges in table 1.2 were established using an average household size of 2.99 persons per residence taken from the 2000 United States Census data for Moapa Valley. According to table 1.2, the average household would use 395 gallons per day (gpd). MVWD customers used 151 gallons per day per residence in 2023. Although MVWD customer's average use is below 395 gpd, there is still room for improvement. Table 2.6 estimates that 10 percent of the total amount used from 1998 to 2024 can be conserved. By applying that same 10 percent to the average residential total over that same period of time (assuming the 2024 residential daily usage of 189 gpd), each residence should save approximately 180,000 gallons over 23 years.

This plan will be reviewed every five years and revised to meet the current specific conservation needs of the MVWD service area. Water use should be compared to historical usage information and estimates in section 2 as well as the benchmarks in table1.2.

1.8 Submeters

MVWD is considering the implementation of a sub-metering program for multifamily projects. The "NATIONAL MULTIPLE FAMILY SUBMETERING AND ALLOCATION BILLING PROGRAM STUDY" found that sub-metering achieves significant water savings compared with conventional single metering. The study was done with the cooperation of ten water utilities including SNWA. A copy of the executive summary of the study is included in Appendix F.

1.9 Plan Goal

The primary goal of the conservation plan is to encourage water conservation within the District.

END OF SECTION

SECTION 2 – WATER USE PROFILE AND FORECAST

This section outlines a profile of water production and use as well as a quantitative description of the MVWD water system that will include the following:

- Water rights information
- Existing supply sources and their production
- System water use profile with customer classifications and unaccounted for water
- Water use forecast using projected population growth

The purpose of this section is to compare water sources with demand and establish a basis for conservation measures and incentives.

2.1 Water Rights

2.1.1 Ground Water Rights. Table 3.3 is a summary of current ground water right permits held and applications filed by MVWD. The information in this table comes from an February 2014 "Report on the Status of Water Rights and Water Permits" prepared for MVWD by Stanka Consulting, LTD in Carson City.

TABLE 2.1

Summary of MVWD Ground Water Rights

Name	Use	Duty (AFA)	Permit Number
Logandale Well	Municipal	644.39	68524
Logandale Well	Municipal	280.55	69523*
Logandale Well	Irrigation	1,569.45	24007
Baldwin Spring	Municipal & Domestic	2,132.20	13445
MX-6 Well	Municipal	**	46932
Jones Spring	Municipal & Domestic	723.80	22739
Arrow Canyon Well #1	Municipal	**	55450
Arrow Canyon Well #2	Municipal	6792.71	66043
Arrow Canyon Well #1	Municipal	**	52520
Lytle Well	Irrigation	90	26371

2.1.2 Surface Water Rights. MVWD surface water rights exist via ownership of stock in the Muddy Valley Irrigation Company. Each preferred share is equal to 8.36 acre-feet annually (AFA) and common shares equal .79 AFA. MVWD owns 150.376 preferred shares or 1257 AFA (150.376 x 8.36) and 294.67 common shares or 232.79 AFA (296.67 x .79). Thus the MVWD total surface water rights amount to 1490 AFA.

2.2 Supply Sources, Production and Storage

Table 2.2 shows 2023 average monthly demand and peak demand for each active well in the MVWD system. Table 2.3 shows annual averages and peaks for 2018 through 2023 for each well.

TABLE 2.2

Monthly Well Demand Summary for MVWD 2023

Name	2023 Average Monthly Demand (gal)	2023 Peak Demand (gal)	Month of Peak Demand
MX Well	0	0	Not Applicable
Arrow Canyon Well	58,352,210	86,033,000	July
Baldwin Spring	12,376,916	39,104,000	January
Jones Spring	0	0	Not Applicable
Logandale Well	0	0	Not Applicable

TABLE 2.3

Well Demand Summaries for MVWD 2018 – 2023

Name	Average Annual Demand (gal)	Peak Demand (gal)	Year of Peak Demand
MX Well	0	0	Not Applicable
Arrow Canyon Well	764,314,582	808,152,128	2020
Baldwin Spring	127,320,799	287,071,000	2022
Jones Spring	0	0	Not Applicable
Logandale Well	0	0	Not Applicable

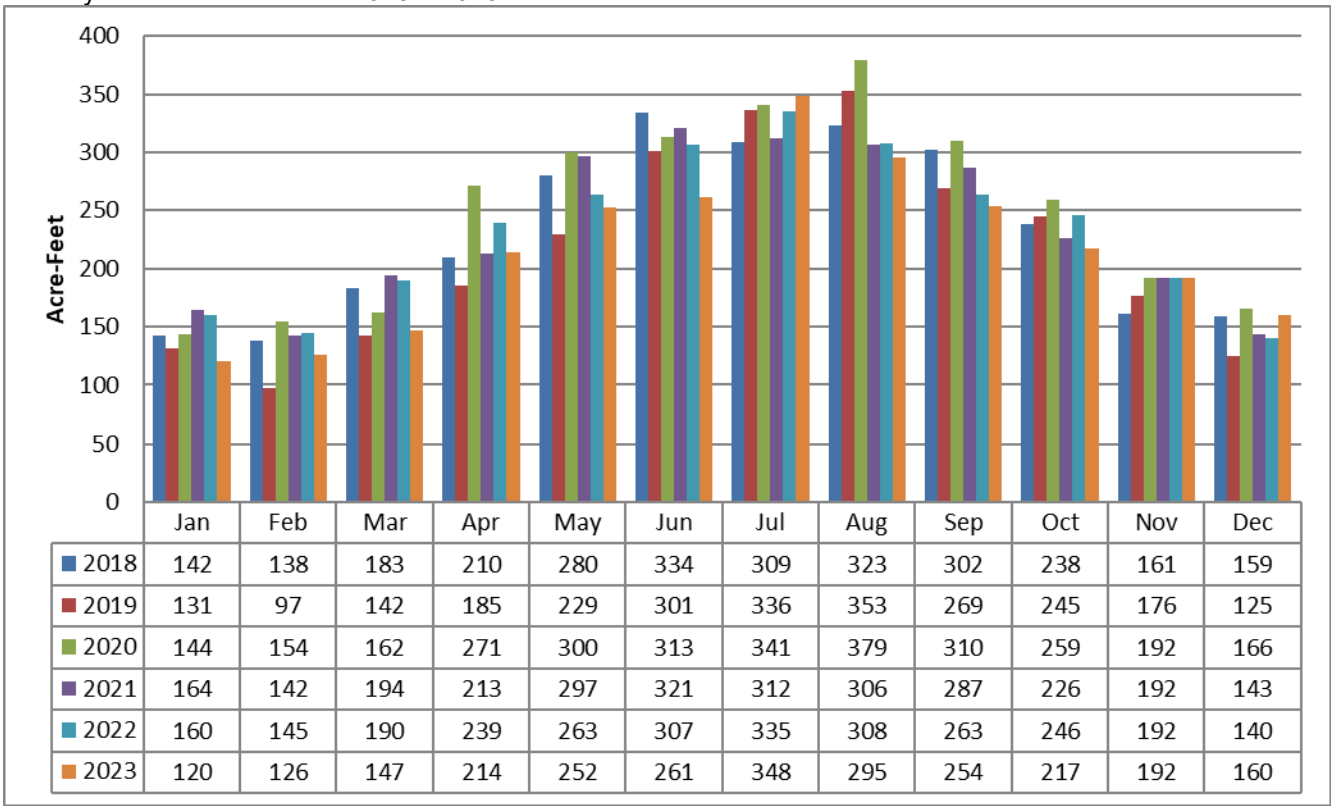
Figure 2.1 shows production amounts by month for the years 2018 through 2023. It is interesting to note that although there has been steady population growth in the Moapa Valley area during this period, water production has been steady with the exception of 2023 when there was a production decrease.

Figure 2.2 graphs individual well production from 2018 through 2023. During this period the Arrow Canyon well made the greatest contribution to the system, producing an average of 68.5% of the total followed by Baldwin, . The groundwater basin for all wells is the Muddy River Springs.

Storage facilities for the district include: one, 3.0 million gallon tank; two, 1.5 million gallon tanks; two, 1.0 million gallon tanks; one, 200,000 gallon tank; and one, 100,000 gallon tank. Total storage capacity = 8.3 million gallons.

FIGURE 2.1

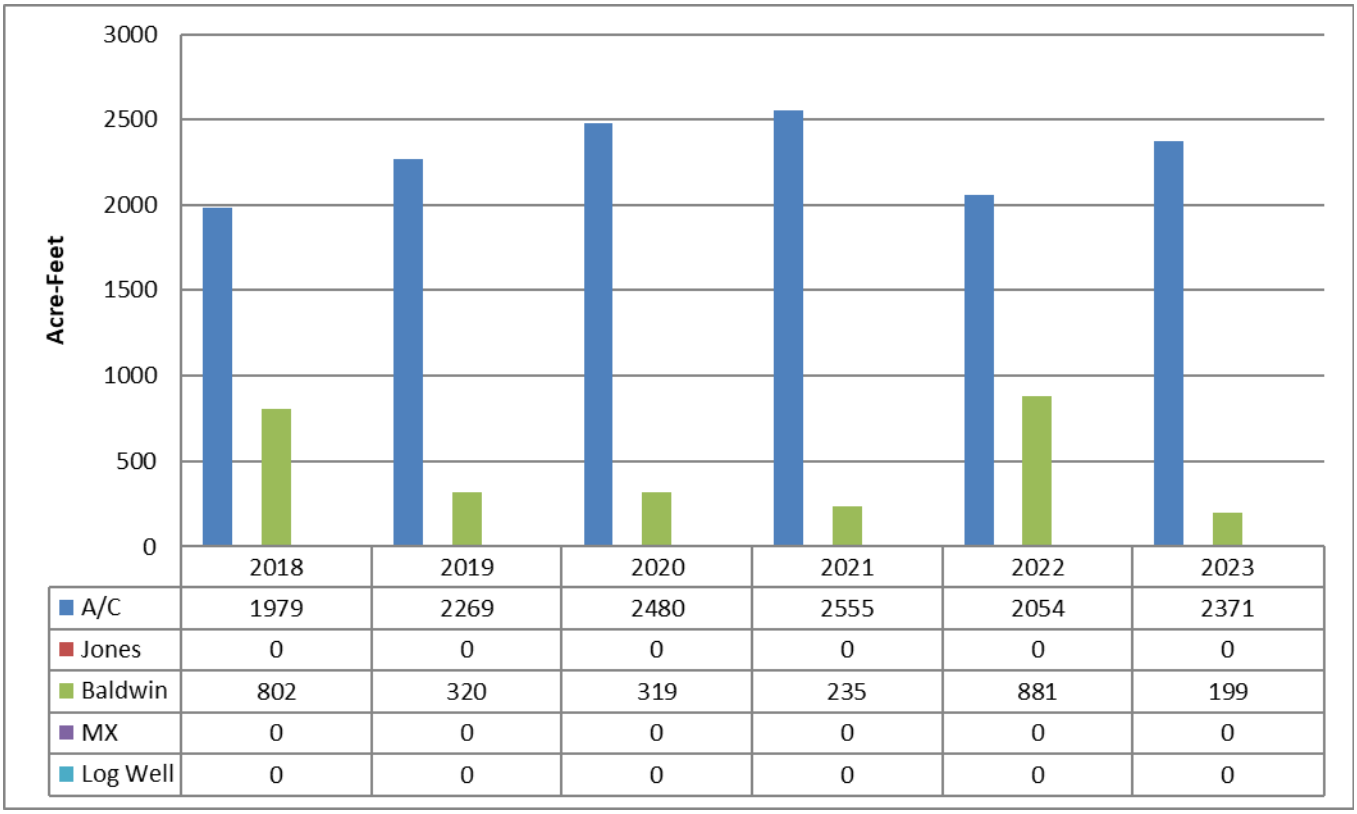
Monthly Production Amounts 2018 – 2023



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	142	138	183	210	280	334	309	323	302	238	161	159
2019	131	97	142	185	229	301	336	353	269	245	176	125
2020	144	154	162	271	300	313	341	379	310	259	192	166
2021	164	142	194	213	297	321	312	306	287	226	192	143
2022	160	145	190	239	263	307	335	308	263	246	192	140
2023	120	126	147	214	252	261	348	295	254	217	192	160

FIGURE 2.2

Annual Well Contributions 2018 – 2023



	2018	2019	2020	2021	2022	2023
A/C	1979	2269	2480	2555	2054	2371
Jones	0	0	0	0	0	0
Baldwin	802	320	319	235	881	199
MX	0	0	0	0	0	0
Log Well	0	0	0	0	0	0

2.3 Water Use Profile

MVWD provides water for the following basic categories of water consumers:

- Metered Customers
- Hydrants, including construction use
- County
- Cemeteries
- Nevada Department of Transportation (NDOT)
- Miscellaneous

The yearly total of water sold in each of these basic customer categories is included in table 2.4.

TABLE 2.4

Amount of Water Sold to All Customers 2021 through 2023 (Acre-feet)

Customer	2021	2022	2023
Metered	1968	1670	1732
Hydrant	29	36	60
County	213	359	304
Cemeteries	27	25	24
Miscellaneous	.07	3	0.22
NV Energy	0.86	0.5	1.27
Total	**2237.93**	**2124.05**	**2121**

Metered customers are further classified according to connection type. Metered classifications include:

- Single-family residential.
- Multi-family residential, including apartments and mobile home parks.
- Industrial
- Commercial, including retail businesses, hotels and motels, and services.
- Institutional, including county, state and church use.

Table 2.5 shows the number of meters and units served for the metered customer classifications. Because of their low usage there are approximately 17 non-residential (commercial, etc...) meters included in the single-family residential category. Hotel and motel meters include units with and without kitchens.

TABLE 2.5

Metered customers

Customer Class	Customer	No. of Meters	Units Served
Single-family residential	Home owners	3051	3051
Multi-family residential	Apartments, Mobile home parks	26	464
Commercial	Service businesses, Retail, Hotels and Motels	79	87
Industrial	Manufacturers	15	15
Institutional	County, State, Churches	60	60

Figure 2.3 shows the gallons per capita per day residential use for 2021 through 2023. The chart demonstrates that per capita use has declined since 2019. To obtain these results, single-family and multi-family residential consumption numbers were combined and divided by total population estimates.

FIGURE 2.3

Metered Customer Annual Consumption 2021 – 2023

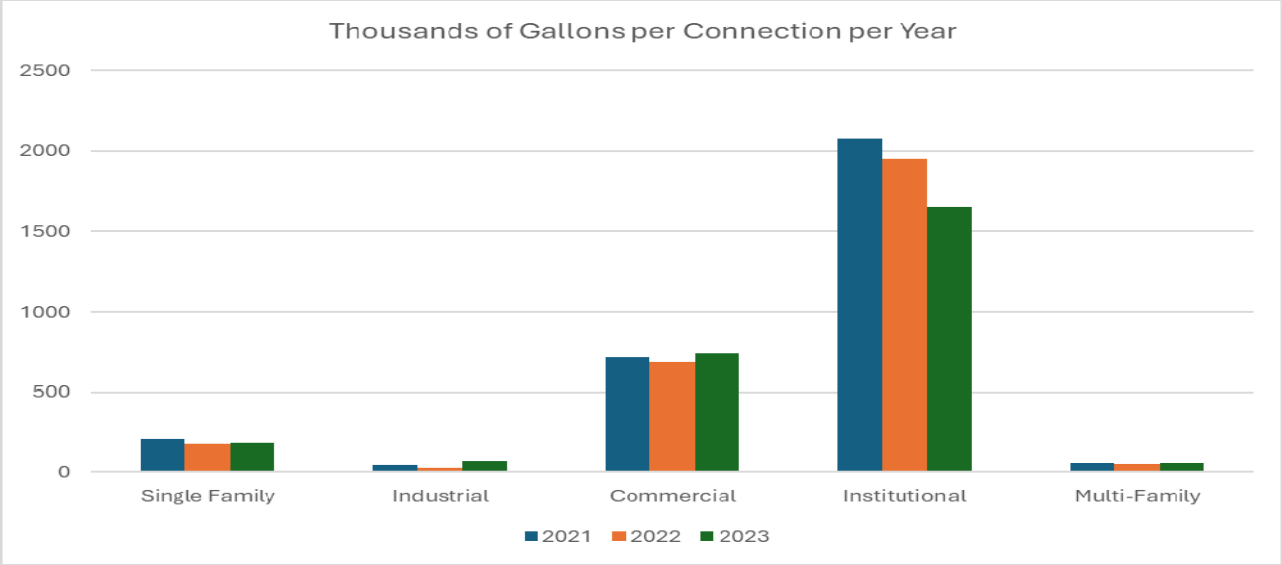


Figure 2.4 shows the gallons per capita per day residential use for 2021 through 2023. The chart demonstrates that per capita use has declined since 2019. To obtain these results, single-family and multi-family residential consumption numbers were combined and divided by total population estimates.

FIGURE 2.4

Residential Use per Capita per Day

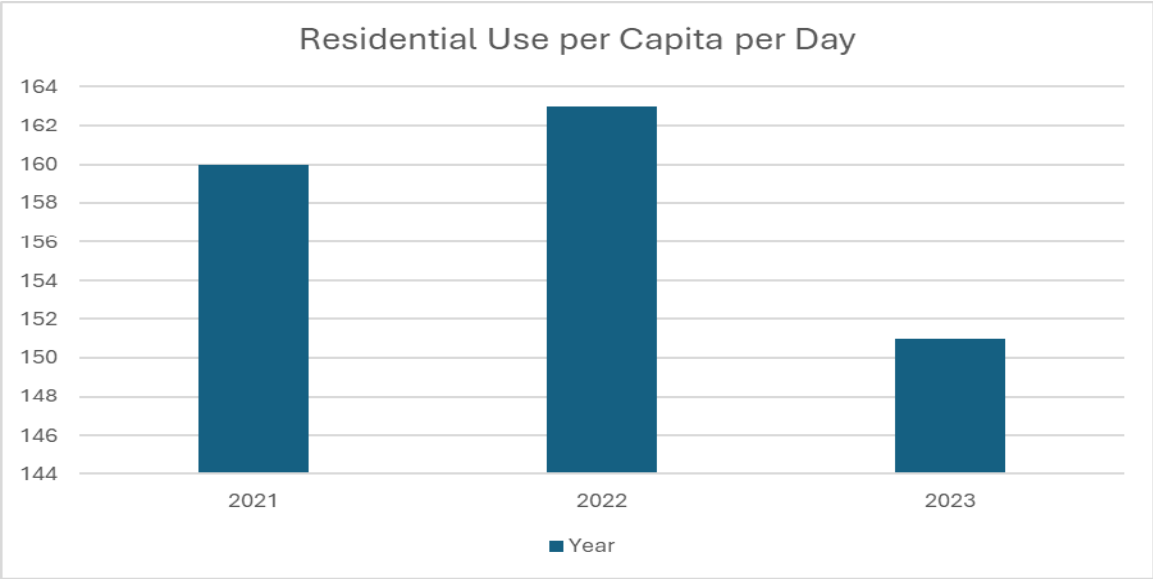


FIGURE 2.5

Use percentages for metered customer classifications

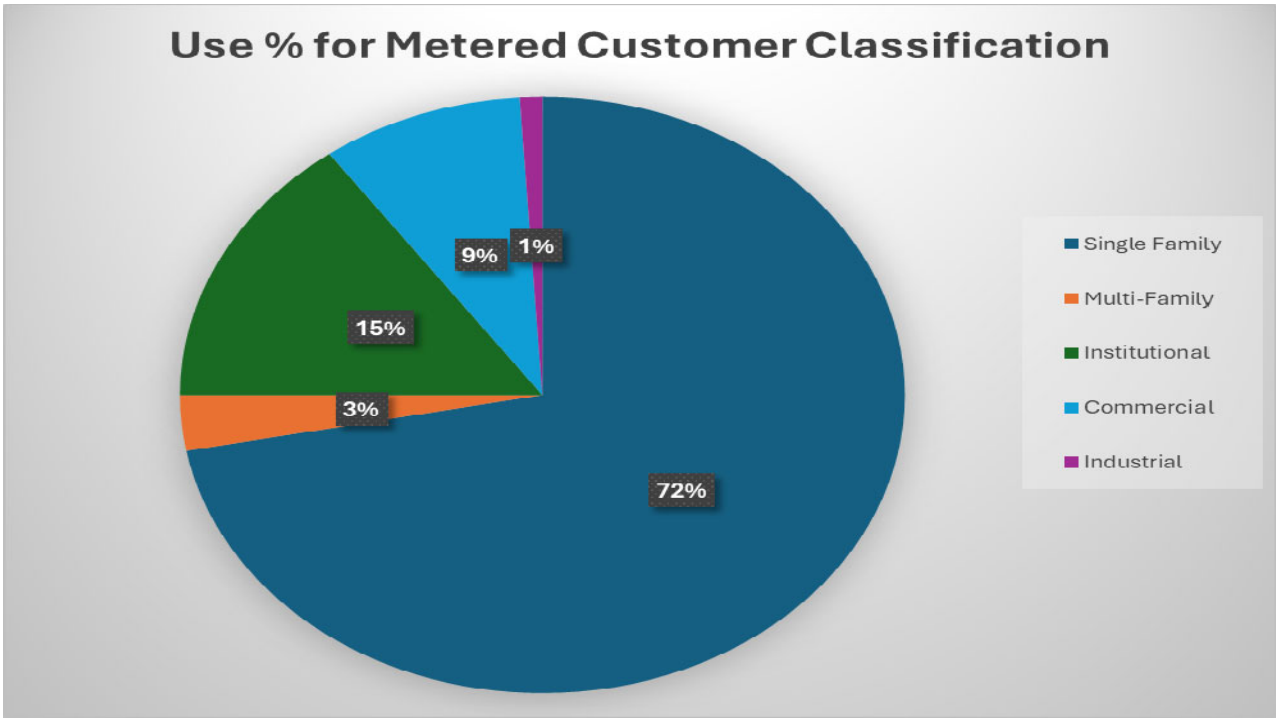
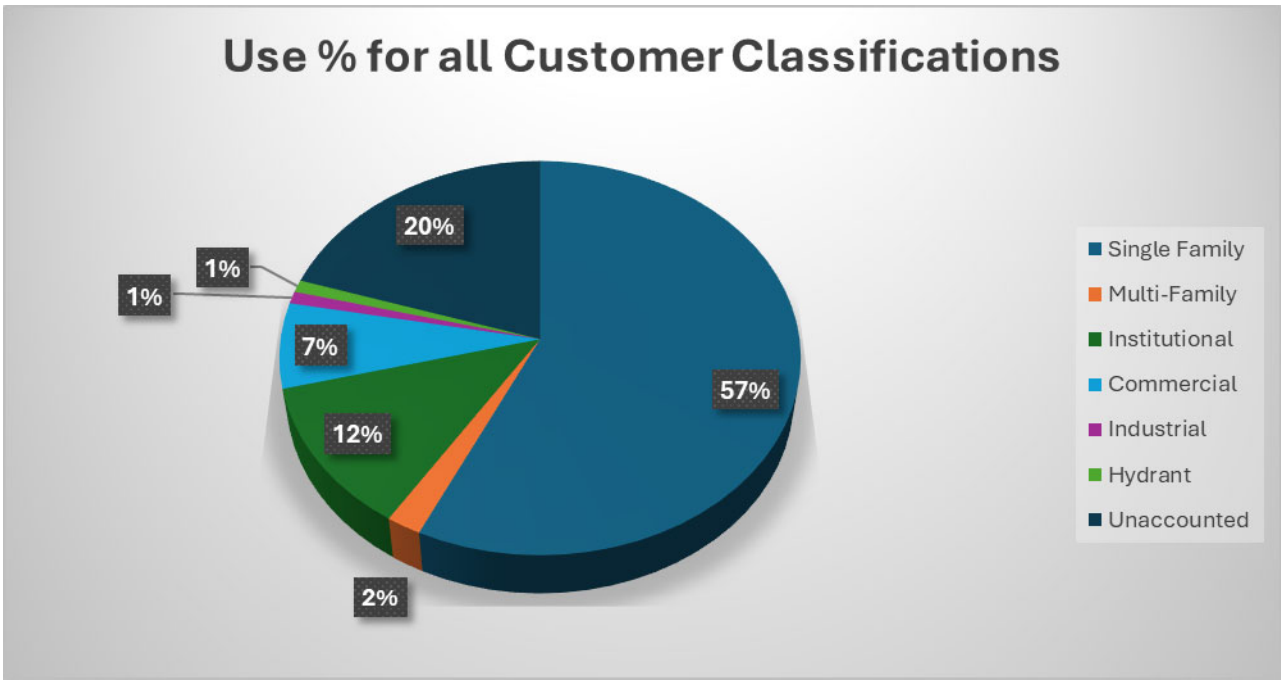


FIGURE 2.6

Use percentages for all customer classifications



2.4 Water Demand Forecast

Table 2.6 and Figure 2.7 are taken from Chapter 5 of "Wastewater Flow Projections", of the Northeast Clark County 208 Water Quality Management Plan Amendment. The MVWD demand forecast is higher than that in the 208 plan amendment because of different population estimates; however the projected water rights are adequate to meet the demand in either case.

The 208 plan estimate shows demand with and without conservation. Although the chart seems to indicate that demand with conservation is not substantially different than demand without, the total water saved over the 22 year period would be 10 percent of the total amount consumed, or 9186 acre-feet. The amount conserved is equivalent to two years supply of water.

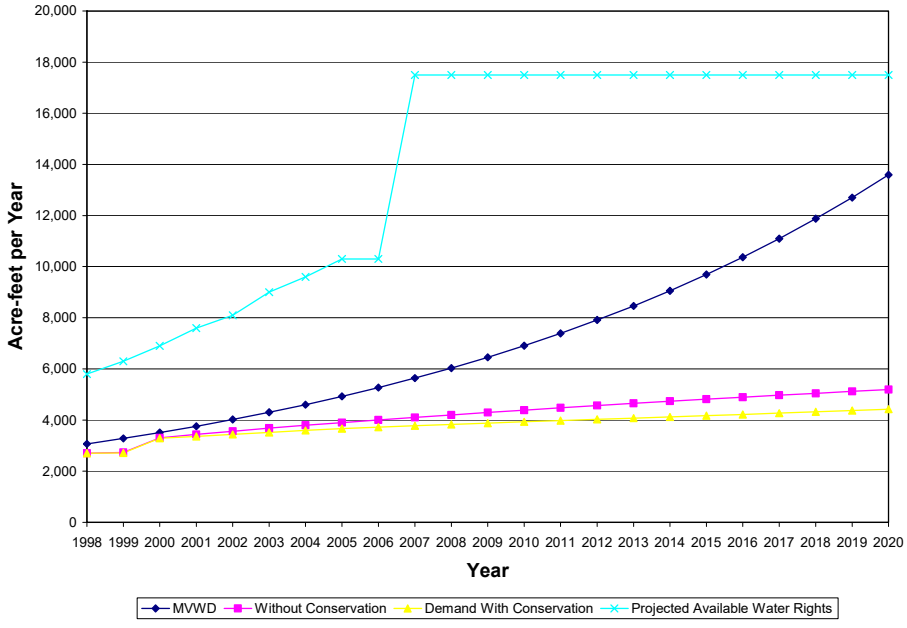
TABLE 2.6

Estimated Plan Water Demands and Amount Saved Through Conservation (Gallons Per Year)

Year	No conservation	Conservation	Amount Conserved
2010	3,147	2,987	52,136,160
2011	2,445	2,323	39,753,822
2012	2,667	2,534	43,338,183
2013	2,628	2,497	42,686,481
2014	2,681	2,520	52,462,011
2015	2,748	2,555	62,889,243
2016	2,817	2,592	73,316,475
2017	2,887	2,627	84,721,260
2018	2,959	2,693	86,676,366
2019	3,033	2,730	98,732,853
2020	3,109	2,798	101,339,661
Total	**31,121**	**28,856**	**738,052,515**

FIGURE 2.7

Demand and Projected Water Rights Forecast through 2020



END OF SECTION

Conservation incentives are those things that increase awareness and encourage conservation. There are three general categories of conservation incentives; Educational, Financial, and Regulatory. MVWD has implemented educational and financial incentives and is subject to the regulatory incentives governing Clark County. This section covers the incentives that are currently in place in MVWD as well as those planned for the future.

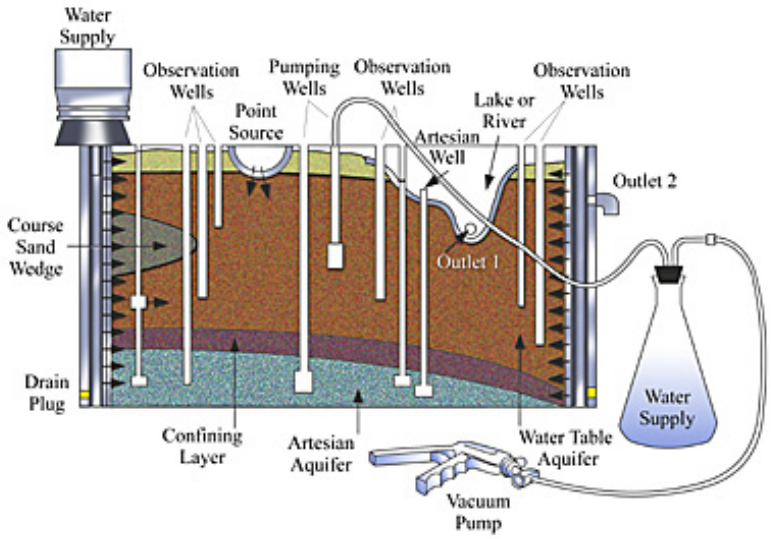
3.1 Educational Conservation Incentives

3.1.1 Literature. MVWD has a number of educational pamphlets that relate to water conservation, most of which have been published by the American Water Works Association (AWWA). MVWD distributes these materials to water customers in May of even years and November of odd years. Appendix A has a summary of that literature and samples of the guides.

3.1.2 Ground Water Model. MVWD will be obtaining a ground water model (see figure 3.14) to use in school presentations. These presentations will be done periodically within the local school district.

FIGURE 3.1

University of Nebraska Standard Ground Water Model



3.1.4 Education for Large Water Consumers. Certain MVWD customers consume large amounts of water as a natural result of their functions. These customers have the responsibility of irrigating landscapes that may include large turf areas. Schools, county facilities, and cemeteries are among such users. MVWD can encourage these entities to use water more efficiently by sponsoring courses offered by the Irrigation Association. These courses provide information on irrigation techniques including audits, design, installation and maintenance. Information for the Irrigation Association may be found at www.irrigation.org.

3.2 Financial Conservation Incentives

3.2.1 Rates. MVWD uses an inclining block rate structure, meaning that rates increase with consumption and thus encourage conservation. Rates within the district are divided into two classes; residential and commercial/industrial. Table 3.1 shows residential rate blocks and table 3.2 commercial/industrial.

TABLE 3.1

Residential Rates

Residential Rates				
1/1/24 - Residential Rate Class				
	R1	R2	R3	R4
Meter Size	3/4"	1"	1 1/2"	2"
Service Charge	$47.17	$56.60	$125.76	$179.92
Volume Charge Per 1,000 Gallons				
Volume Charge - Block 1	$3.27	$3.27	$3.27	$3.27
Volume Charge - Block 2	$3.63	$3.63	$3.63	$3.63
Volume Charge - Block 3	$3.97	$3.97	$3.97	$3.97
Volume Charge - Block 4	$5.05	$5.05	$5.05	$5.05
Usage - Block 1	6,000	6,000	6,000	6,000
Usage - Block 2	12,000	12,000	12,000	12,000
Usage - Block 3	52,000	52,000	52,000	52,000
Excess Usage - Over	70,000	70,000	70,000	70,000

TABLE 3.2

Commercial/Industrial Rates

Commercial Rates							
1/1/24 - Commercial Rate Class							
	C1		C2	C3	C4	C5	C6
Meter Size	3/4"	1"	1 1/2"	2"	3"	4"	6"
Service Charge	$47.17	$56.60	$125.76	$179.92	$319.65	$490.84	$917.05
Volume Charge Per 1,000 Gallons							
Volume Charge - Block 1	$3.27	$3.27	$3.27	$3.27	$3.27	$3.27	$3.27
Volume Charge - Block 2	$3.63	$3.63	$3.63	$3.63	$3.63	$3.63	$3.63
Volume Charge - Block 3	$3.97	$3.97	$3.97	$3.97	$3.97	$3.97	$3.97
Volume Charge - Block 4	$5.05	$5.05	$5.05	$5.05	$5.05	$5.05	$5.05
Usage - Block 1	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Usage - Block 2	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Usage - Block 3	52,000	52,000	52,000	52,000	52,000	52,000	52,000
Excess Usage - Over	70,000	70,000	70,000	70,000	70,000	70,000	70,000

3.2.2 Savings from Efficient Plumbing Fixtures. Even though the Federal Energy Policy Act (FEPA) has mandated the manufacture and installation of efficient plumbing fixtures since 1994, there are still inefficient fixtures and appliances in use. Table 3.3 shows the potential savings from efficient fixtures.

TABLE 3.3

Potential Water Savings

Fixture*	Fixture Capacity	WATER USE (gpd)		WATER SAVINGS (gpd)	
		Per Capita	Per Household**	Per Capita	Per Household**
Toilets***					
Efficient	1.5 gal/flush	6.0	16.2	N/A	N/A
Low-Flow	3.5 gal/flush	14.0	37.8	8.0	21.6
Conventional	5.5 gal/flush	22.0	59.4	16.0	43.2
Conventional	7.0 gal/flush	28.0	75.6	22.0	59.4
Showerheads†§					
Efficient	2.5 [1.7] gal/min	8.2	22.1	N/A	N/A
Low-Flow	3.0 to 5.0 [2.6) gal/min	12.5	33.8	4.3	11.7
Conventional	5.0 to 8.0 gal/min	16.3	44.0	8.1	22.0
Faucets†§					
Efficient	2.5 [1.7] gal/min	6.8	18.4	N/A	N/A
Low-Flow	3.0 [2.0] gal/min	8.0	21.6	1.2	3.2
Conventional	3.0 to 7.0 gal/min	13.2	36.6	6.4	17.2
Fixtures Combined					
Efficient	N/A	21.0	56.7	N/A	N/A
Low-Flow	N/A	34.5	93.2	13.4	36.4
Conventional	N/A	54.5	147.2	33.5	90.4

Source: Amy Vickers, "Water Use Efficiency Standards for Plumbing Fixtures: Benefits of National Legislation", *American Water Works Association Journal.* Vol 82 (May 1990): 53

*Efficient = post-1994, Low-Flow = post-1980, Conventional = pre-1980; **Assumes 2.7 persons per household.

***Assumes four flushes per person per day. Does not include losses through leakage.

†For showerheads and faucets: maximum rated fixture capacity [measured fixture capacity]. Measured capacity equals about 2/3 the maximum.

§Assumes 4.8 shower-use-minutes per person per day and 4.0 faucet-use-minutes per person per day.

The potential savings shown in table 3.3 could make a plumbing retrofit program feasible.

3.3 Regulatory Conservation Incentives

3.3.1 Codes and Ordinances. The landscape code for the MVWD service area is found in the Clark County Unified Development Code (Title 30), Chapter 30.64. The code is called "Site Landscape and Screening Standards" and is known as the landscape development code. It includes an extensive plant list which is included in Appendix C.

Currently there are no golf courses in the MVWD service area but it is likely that at least one will be constructed in the near future. Prior to construction a code requiring use of treated effluent for golf course irrigation should be established.

Clark County has adopted the SNWA Drought Plan. Although the drought declaration triggers in the plan apply specifically to the Las Vegas area (see section 1.2), the measures included in the plan can be implemented anywhere in Clark county. Section 1.2 discusses the MVWD goal regarding drought declaration.

END OF SECTION

This section describes current and planned conservation measures within the MVWD service area. A conservation measure is a device or practice that reduces water consumption. Conservation measures are divided into two fundamental categories; 1. Hardware or equipment and, 2. Behavior or management practices. Examples of hardware measures include low-volume toilets and irrigation rain sensors. Examples of behavioral measures include not using the toilet as a trash can and watering lawn less frequently.

Some conservation measures are mandated by state and/or federal laws and others are voluntarily implemented by local water purveyors and/or customers. This section describes both current MVWD conservation measures and those that the District plans to implement in the future.

4.1 Plumbing Standards

The most recent federal plumbing standards (table 4.1) are included here since these standards are applicable to the MVWD service area. It is valuable to include California's standards for reference since in most cases California's requirements are more stringent. The comparison infers that there are plumbing fixtures available that exceed federal efficiency requirements thereby offering consumers alternatives that maximize conservation efforts.

TABLE 4.1

Federal and California Plumbing Standards

	FEDERAL ENERGY POLICY ACT (FEPA)		CALIFORNIA	
Device	Manufacture	Effective Date	Sale and Installation	Effective Date
Shower Heads	2.5 gpm*	1/1/94	2.5 gpm	3/20/92
Lavatory Faucets	2.5 gpm	1/1/94	2.2 gpm	3/20/92
Sink Faucets	2.5 gpm	1/1/94	2.2 gpm	3/20/92
Metering Faucets	*	1/1/94	†	7/1/92
Tub Spout Diverters	Not included in FEPA		0.1 to 0.3‡	3/20/92
Residential Toilets	1.6 gpf	1/1/94	1.6gpf	3/20/92
Flushometer Valves	1.6 gpf§	1/1/97	1.6 gpf	1/1/92
Commercial Toilets	1.6 gpf	1/1/97	1.6 gpf	1/1/94
Urinals	1.0 gpf	1/1/94	1.0 gpf	1/1/92

* Gallons per minute.

** 0.25 gal/cycle (pertains to maximum water delivery per cycle.

† Hot water maximum flow rate range from 0.25 to 0.75 gal/cycle and/or from 0.5 gpm to 2.5 gpm, depending on controls and hot water system.

‡ 0.1 (new), to0.3 gpm (after 15,000 cycles of diverting).

§ Gallons per flush.

4.2 MVWD Conservation Measures

4.2.1 MVWD Supervisory Control And Data Acquisition (SCADA). Although the SCADA system itself does not conserve water, it is a management tool that can be used to conserve. SCADA can be used to detect distribution system leaks and to regulate pressure. Pressure regulation can help to reduce the amount of water lost when leaks occur or when valves are left open. SCADA is considered a management practice conservation measure.

4.2.2 Training. MVWD has two service personnel trained in conservation. The training was done by through AWWA and both employees are AWWA conservation certified. This is a management practice measure.

4.2.3 Wastewater Reuse. Currently the sewer ponds in Overton, Nevada have an average inflow of .201 million gallons per day. MVWD is working with the Clark County Water Reclamation District on a proposed project to build a wastewater treatment plant in order to reuse the approximately 200,000 gallons per day of wastewater. The treated effluent could be used to irrigate public parks, landscaping around public buildings, construction projects, and golf courses (there are currently no golf courses in the MVWD area but there soon will be).

4.2.4 Meter Calibration Program. MVWD has a meter calibration program that includes periodic testing of meters within the service area. The service area has been divided into four routes. The program is progressing slowly but steadily since calibration takes approximately fifteen minutes per meter.

4.2.5 Bowman Reservoir Surface Water Treatment Project. Per an April 2005 Water Treatment Evaluation done by Black and Veatch, MVWD is "evaluating the use of Bowman Reservoir as a viable source of potable water supply". The use of water from the reservoir would require that it be treated.

4.2.6 Leak Detection and Repair. The detection and repair of leaks is an ongoing measure for MVWD and the district has put great effort into the maintenance of the delivery system. As part of its effort to find leaks, MVWD has instituted a proactive approach to leak detection. The leak detection program deploys leak sound detection loggers each morning in a grid pattern to listen for undetected leaks in the distribution system. The goal of the program is to use a grid pattern that ultimately covers the entire distribution system trice a year..

4.2.7 Drought Measures. Nevada Statutes chapter 477 section 3 item 14 states that MVWD has the power "To restrict the use of district water during any emergency caused by drought...". Clark County has adopted the SNWA drought plan. The plan includes measures for residential, commercial, industrial, and institutional water use. It also contains specific factors that trigger drought declarations in the Las Vegas area (see section 1.2) but don't apply to MVWD. However the drought measures in the plan are applicable to the MVWD and that part of the plan can be applied within the District. A copy of the SNWA/Clark County Drought Plan is included in Appendix D.

4.3 Consumer Conservation Measures

4.3.1 Sub-metering. Sub-meters are meters installed in the main water lines that enter the individual units of multi-family properties (apartments, condominiums, duplexes, etc...) and/or subdivided areas of commercial, industrial, or institutional (ICI) facilities. Traditionally such properties and facilities were built with one master meter that served the entire complex or facility. Sub-meters can be used as a measure that property or company owners can use to conserve water and cut costs. Submetering has the following basic advantages:

- Decrease in overall water consumption of 18% to 39%[1]
- Fair allocation of water costs to residents.
- Potential increase in property owners net operating income.
- Increase in water use efficiency
- Proper allocation of water costs within ICI operations

[1] *Submetering, RUBS, and Water Conservation,* prepared for the National Apartment Association and the National Multi Housing Council by Industrial Economics Incorporated, June 1999.

In residential applications, sub-meters can reduce consumption by making the individual users responsible for their own water bill. When water use by multi-family units is measured by a single meter, leaks in individual units often go undetected. Measuring the consumption of each unit may also discourage waste.

In ICI applications separate meters can by used for individual processes thereby encouraging use efficiency. Landscape irrigation can be monitored separately from facility use. In institutions such as

universities, water costs can be directed to the departments that use the water. Manufactures can cut costs and determine which processes or equipment needs to be improved or replaced.

There are some disadvantages to sub-metering. Retrofits may be expensive and may prove to be economically unfeasible. Also some of the financial incentive for landlords to install conservation devices (low-volume toilets and low-flow fixtures) is removed. These shortcomings however are not present in new construction. Whether new construction or retrofit, consideration should be given to both conservation and cost.

4.3.2 General Consumer Conservation Measures. Consumer residential, landscape, industrial, commercial and institutional measures are included in Appendix B.

END OF SECTION

Read any good meters lately? Guide provides instruction for reading and interpreting meter information. It also teaches water customers how to measure the amount of water they use in different applications (see figure 3.1).

Yes, you can...fix a leaky faucet by yourself pamphlet gives step-by-step instructions on how to fix a leaking faucet. It includes a list of tools necessary to perform the repairs (see figure 3.2).

FIGURE A.1

FIGURE A.2

Preventing Floods and Leaks in Your Home emphasizes the importance of locating a master valve and discusses where it might be. It also deals with faucet, toilet, and hose leaks (see figure 3.3).

Disaster Preparedness, Storing Water for Emergencies addresses four important emergency questions; How much water should be stored, How long can tap water be stored safely, What is a boil water order, and How will I know when the water is safe again (see figure 3.4).

FIGURE A.3

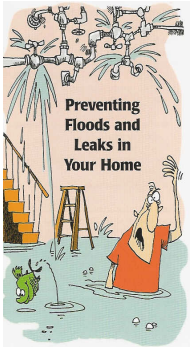
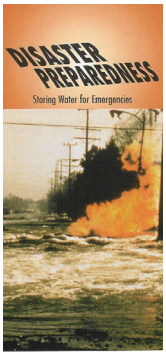


FIGURE A.4



25 Facts About Water is a list of 25 water facts that encourage conservation (see figure 3.5).

FIGURE A.5

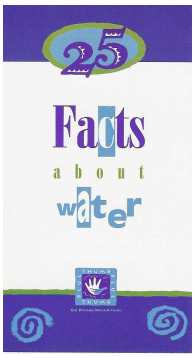
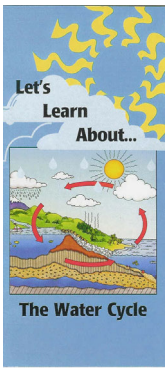


FIGURE A.6



Lets Learn About the Water Cycle diagrams the seven stages of the water cycle (see figure 3.6).

FIGURE A.7

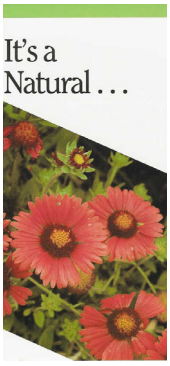
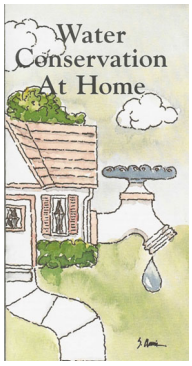


FIGURE A.8



Its a Natural makes suggestions regarding landscape including planning, design, soils, and irrigation (see figure 3.7).

Water Conservation at Home discusses in-home conservation practices for bathroom, kitchen, and outdoor water use (see figure 3.8).

55 Facts Figures & Follies of Water Conservation is similar to “25 Facts about Water” but it provides a bit more information (see figure 3.9).

FIGURE A.9

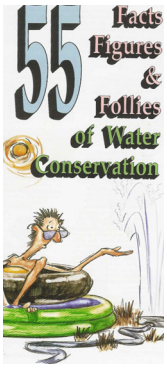


FIGURE A.10

In addition to the above mentioned AWWA publications, MVWD distributes three University of Nevada Cooperative Extension Fact Sheets. Fact Sheet 90-09 “Making a Little Water Go a Long Way in Your Home” contains residential conservation tips (see figure 3.10), Fact Sheet 90-40 “Watering Tips to Beat the Drain on the Southwest’s Water Supply” provides tips to make landscapes more water efficient (see figure 3.11) and Fact Sheet 91-32 is a list of low water-use plants for southern Nevada (see figure 3.12).

FIGURE A.11

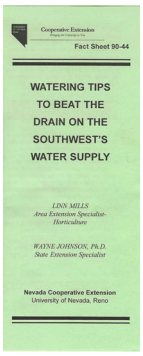
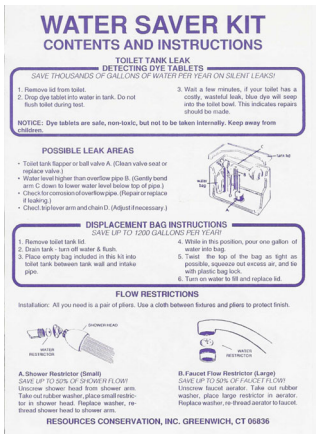


FIGURE A.12

3.1.2 Conservation Kit. Along with literature MVWD distributes free conservation kits. These kits contain leak detecting dye tablets, shower and faucet head flow restrictors, and a toilet tank displacement bag (see figure 3.13). A sample kit is included in Appendix A.

FIGURE A.13

MVWD Conservation Kit



B.1 RESIDENTIAL CONSERVATION MEASURES

B.1.1 Behavioral Measures

B.1.1.1 Residential Water Audits. Water audits could target high use customers first and then be offered to all customers. The following elements should be part of an effective audit.

- Purpose for the audit.
- Estimation of use for all fixtures and appliances.
- Check for and repair leaks.
- Evaluation of Landscape (See "Landscape Conservation Measures)
- Evaluation of outdoor water use.
- Evaluate efficiency measures.
- Educate customers using available flyers

An audit should take no more than 30 to 45 minutes.

B.1.1.2 Additional Measures. The sample pamphlets in Appendix A include additional behavioral conservation measures.

B.1.2 Hardware/Equipment Measures

The following is a list of devices/practices that will reduce water consumption in the home.

Measure	Description
Bathroom/Kitchen Fixtures	
Low-flow toilets	1.6 gallons per flush
Toilet retrofit devices	Bladders (bags), dams, early close flappers, other hardware and adjustments
Toilet leak repairs	Includes detection (dye tabs) and replacement of worn parts.
Low-volume shower heads	2.5 gallons per minute @ 80 psi
Showerhead retrofit devices	Includes temporary cutoff valves and restrictors.
Low-volume faucets	2.5 gallons per minute @ 80 psi
Faucet retrofit devices	Includes aerators, activation sensors, self closing and metered valves
Faucet maintenance	Includes washer replacement, repacking, tightening, and cleaning aerators
Water pressure reduction	Only needed if house pressure exceeds what's required
High Efficiency Appliances	
Clothes washers	27 gallons per load
Dish washers	4.5 gallons per load

B.2 LANDSCAPE CONSERVATION MEASURES

B.2.1 Behavioral Measures

B.2.1.1 Landscape Water Audits. Landscape water audits should be conducted on park and golf course irrigation systems and could be considered an option on residential irrigation systems, targeting high-volume users.

- Purpose for the audit.
- Estimation of outdoor use based on meter records.
- Check for and repair leaks.
- Evaluation of Landscape (size, soil, amount of turf, types of plants)
- Evaluation of irrigation system (Timers, Use of drip, Precipitation amounts).
- Efficiency recommendations.
- Educate customers using available flyers

A residential landscape audit should take no more than an hour. Parks and golf courses could take substantially longer.

B.2.1.2 Xeriscape™. Xeriscape is a method of landscaping that employs low-water use plants, turf, ground covers, shrubs and trees. It includes careful planning, soil analysis, and irrigation system design.

B.1.1.3 Additional Measures. The sample pamphlets in Appendix A include additional behavioral conservation measures.

B.2.2 Hardware/Equipment Measures

Landscape hardware measures consist of two basic groups: (1) Landscape materials and (2) irrigation equipment.

Measure	Description
Landscape Materials	
Trees, plants, and grass	Should be well suited to climate and altitude and be drought tolerant
Organic mulch	Grass clippings, leaves, wood chips, bark, and pine needles. Organic mulches help to retain soil moisture and keep ground cool around plants.
Inorganic mulch	Boulders, gravel, pavers, decomposed granite, and stepping stones. Inorganic mulches are generally more for decorative purposes but they reduce the amount of trees, plants, and turf thereby conserving water.
Compost	Made of manure or biosolids and wood, straw, grass, and leaves. Helps plants stay healthy and retains moisture in the soil.
Irrigation Equipment	
Valves	Should be sized to meet requirements and checked periodically for leaks
Sprinkler Heads	Should match water volume requirements of area being irrigated.
Sprinkler Nozzles	Should have proper arc of coverage and proper trajectory.
Irrigation Controllers	Should have required number of stations, programs, and starts. Also rain delays and sensor terminals.
Drip irrigation	Insures water is directed to where it's needed.

B.3 INDUSTRIAL, COMMERCIAL, AND INSTITUTIONAL (ICI) CONSERVATION MEASURES

B.3.1 Behavioral and Hardware/Equipment Measures

B.3.1.1 ICI Water Audits. Since ICI water audits can require a substantial amount of time (4 hours or more), it may be necessary to have a private engineering firm hired by the water user conduct the audit. There is incentive for ICI customers to pay for audits since the results of an audit could translate into substantial savings. An ICI water audit should include the following elements:

- Support from ICI owners, managers, and employees
- Survey/Estimation of facility use based on meter records.
- Calculation of water-related costs.
- Evaluation of efficiency measures.
- Evaluation of payback periods for measures.
- Efficiency recommendations and implementation.
- Tracking and reporting system.

B.3.1.2 Manual Washing. Manual washing is cleaning done on surfaces with hoses and cloths.

MANUAL WASHING

Behavioral Measures	Hardware/Equipment Measures
• Surfaces should be swept or brushed off before using water to clean.	• High pressure low-volume hoses with automatic shut-off nozzles • High-pressure pumps, steam cleaners.

B.3.1.3 Vehicle Washing. Vehicle washing includes manual washing and automated car washes or a combination of both.

VEHICLE WASHING

Behavioral Measures	Hardware/Equipment Measures
• Limit number of spray nozzles and set flow rates at lowest volume and pressure required. • Adjust nozzles in automated systems so that they take full advantage of gravity and position. Also make sure water shuts off after vehicles have passed. • Increase conveyor speeds or reduce rinse cycle time. • Sweep wash area before using water to clean. • Establish a regular maintenance schedule that includes checking for leaks and making repairs.	• Recycling systems. These would include filters and storage tanks. • High pressure pumping systems.

B.3.1.4 Kitchens and Restaurants. Kitchen and restaurant conservation is divided into four areas of application; 1. Food and drink preparation, 2. Dishwashing, 3. Garbage disposal and scraping trough, and 4. Ice making.

FOOD AND DRINK PREPARATION

Behavioral Measures	Hardware/Equipment Measures
• Presoak and wash food service articles in basins instead of running water. • Reduce thawing of food with hot water unless required by law. If required use lower flow. • Avoid running water to melt ice in sinks. • Use full loads in dishwashers and other automated equipment. • Serve water only when requested by customers.	• Low-volume faucets • Hands-free foot pedal valves for faucets • On demand hot water dispensers

DISHWASHING

Behavioral Measures	Hardware/Equipment Measures
• Presoak utensils, dishes, and pots and pans in basins of water instead of using running water prior to loading dishwashing machines. • Scrape food off of plates rather then use running water. • Operate scraping troughs only while dishes are actually being washed. • Assess the water efficiency of the current dishwashing system to determine where improvements might be made. • Always wash full loads in automated machines. • Operate conveyor type dishwashers only when dishes are actually passing through the machine. • Verify that the dishwashing equipment is using the minimum amount of flow recommended by the manufacturer. • Since many older automated dishwashing systems are neither energy nor water efficient, evaluate the cost of retrofitting or replacing existing equipment. • Turn dishwashers off when not in use. • Routinely check all dishwashing equipment to ensure there are no leaks. • Post signs requesting that personnel minimize their use of utensils, dishes, and pots and pans to save water.	• Manual pre-wash sprayers with “dead man” shut off controls. • Low-flow spray heads on all sprayers. • New water efficient dishwashing equipment. • Electronic eye sensors that shut off conveyer type systems when dishes are not passing through the machine.

GARBAGE DISPOSER AND SCRAPING TROUGH

Behavioral Measures	Hardware/Equipment Measures
• Eliminate disposers and troughs. • Use the minimum acceptable flow rate on all machines. • Reuse wastewater in the mixing chamber of the disposer.	• Garbage strainers (instead of disposers) • Sensors that detect the amount of flow in a disposer and regulate flow accordingly. • Solenoid valves that turn water off when the disposer is off. • Flow regulators for disposer supply lines.

ICE MAKERS

Behavioral Measures	Hardware/Equipment Measures
• Use the minimum flow rate recommended by the manufacturer on water cooled icemakers. • Adjust machines to produce ice only when it's needed. Collect spent cooling water and reuse it for non-potable purposes.	• Air-cooled icemakers. • Re-circulating systems for water-cooled icemakers. • Ice flake machines that use less bleed off than cube machines.

B.3.1.5 Laundries and Laundromats. This section includes measures that are applicable in hotels, motels, hospitals, nursing homes, diaper services, restaurants, and coin operated Laundromats.

LAUNDRIES AND LAUNDROMATS

Behavioral Measures	Hardware/Equipment Measures
• Operate equipment with full loads only. • Reduce water levels for partial loads. • Back flush filters or softeners only when necessary.	• Computer controlled rinse water reclamation systems. • Wash and rinse water treatment and reclamation systems. • Continuous batch washers. • Ozone laundry systems. Horizontal axis washers.

B.3.1.6 Swimming Pools. The measures in this section can be applied to commercial and residential swimming pools.

SWIMMING POOLS

Behavioral Measures	Hardware/Equipment Measures
• Limit the frequency of pool refilling. • Cover the pool with an insulated cover when not in use to reduce losses due to heat and evaporation. • Reduce the level of the pool to avoid losses due to splashing. • Lower the pool temperature. • Back wash filters only when necessary. If backwash is timed, verify that frequency is efficient. • Regularly check pool for leaks and cracks. Keep pool and filter clean to avoid unnecessary backwashing.	There are no special equipment measures that would help conserve water in pools. It is important however that available equipment is efficient and used properly.

B.3.1.7 Cooling Systems. This section includes measures for three types of cooling systems: 1. Single-pass, 2. Evaporative, and 3. Equipment. Single-pass cooling uses fresh water to cool without re-circulating any of the water used in the first pass. Evaporative coolers are used for cooling in commercial and residential applications and are commonly known as swamp coolers. Equipment cooling includes both single-pass and re-circulating systems that are used to cool equipment and machinery.

SINGLE-PASS COOLING

Behavioral Measures	Hardware/Equipment Measures
• Reuse water for landscaping, vehicle washing, or another cooling application that allows for water to be at a higher temperature. • Eliminate single-pass systems.	• Air-cooled equipment (i.e. compressors, pumps, icemakers, etc...) • Automatic controls that insure coolers only operate when needed.

EVAPORATIVE COOLING

Behavioral Measures	Hardware/Equipment Measures
• Regularly check for leaks in hoses and pan. • Replace pads at least annually. • Shut cooler off when building is unoccupied. • Annually service the equipment by oiling moving parts and cleaning off accumulated scale or corrosion.	There are currently no equipment measures for evaporative coolers. The design of the coolers is relatively simple.

EQUIPMENT COOLING

Behavioral Measures	Hardware/Equipment Measures
• Reuse water in single pass systems for other cooling purposes. Examples of reuse include cooling molten materials, landscape, of boiler make-up water. • Replace al single pass cooling systems with closed-loop systems or replace water-cooled equipment with air-cooled.	

B.3.1.8 Heating Systems. This section deals with conservation measures for boilers and steam generators which are used to heat large buildings and multiple-building facilities.

HEATING SYSTEMS

Behavioral Measures	Hardware/Equipment Measures
• Regularly inspect systems for leaks and make repairs. • Insulate all piping. • Limit boiler bleed-off to a level that satisfies water quality requirements. • Discharge blow-down into an expansion tank instead of using cold water to cool it.	• Flow meters for make-up and blow-down valves. • Automatic controls to discharge blow-down.

B.3.1.9 Leaks and Water Losses. This section covers water conservation measures relating to leaks and losses.

LEAKS AND WATER LOSSES

Behavioral Measures	Hardware/Equipment Measures
• Regularly check for leaks at all water connections. Keep in mind that higher pressure applications have more incidence of leakage. • Regularly check all vessels that contain water for cracks or bad seals. • Regularly check all heating and cooling systems. • Repair any leaks that are discovered.	• Leak detection equipment. This could include sonic or probe type equipment. • Any equipment used to stop a leak. This would depend on the material of the pipe or vessel that has a leak.

B.3.1.10 ICI Maintenance Practices. This section reemphasizes maintenance conservation measures for ICI facilities that have been mentioned in previous sections. These measures should become standard procedure at all ICI facilities.

- Create a maintenance schedule that includes schedules for leak detection inspections and meter reading, and repair procedures.
- Monitor water-use records keeping track of any increases or decreases in use.
- Conduct water audits every one to three years.
- Shut off supply lines to areas that are not being used.
- Install pressure reducers where feasible.
- Keep a maintenance schedule to clean cooling and heating equipment regularly.
- Recycle and reuse water when feasible.
- Insulate all hot water pipes.
- Replace old equipment with water saving equipment.
- Install timers wherever possible.
- Educate employees on water saving techniques.

B.4 General Residential Behavioral Measures

This list of conservation behaviors and is divided into four parts: Home, Landscaping, Community, and Miscellaneous.

HOME BEHAVIORS

1. When washing dishes by hand, don't let the water run while rinsing. Fill one sink with wash water and the other with rinse water.

2. Evaporative coolers require a seasonal maintenance checkup. For more efficient cooling, check your evaporative cooler annually.

3. Run your washing machine and dishwasher only when they are full and you could save 1000 gallons a month.

4. Use the garbage disposal sparingly. Compost instead and save gallons every time.

5. Keep a pitcher of water in the refrigerator instead of running the tap for cold drinks, so that every drop goes down you not the drain.

6. Check your water meter and bill to track your water usage.

7. Wash your produce in the sink or a pan that is partially filled with water instead of running water from the tap.

8. Use a broom instead of a hose to clean your driveway or sidewalk and save 80 gallons of water every time.

9. If your shower can fill a one-gallon bucket in less than 20 seconds, then replace it with a water efficient showerhead.

10. Collect the water you use for rinsing produce and reuse it to water houseplants.

11. We're more likely to notice leaky faucets indoors, but don't forget to check outdoor faucets, pipes, and hoses for leaks.

12. When you shop for a new appliance, consider one offering cycle and load size adjustments. They are more water and energy-efficient than older appliances.

13. Time your shower to keep it under 5 minutes. You'll save up to 1000 gallons a month.

14. Install low-volume toilets.

15. When you clean your fish tank, use the water you've drained on your plants. The water is rich in nitrogen and phosphorus, providing you with a free and effective fertilizer.

16. Put food coloring in your toilet tank. If it seeps into the toilet bowl, you have a leak. It's easy to fix, and you can save more than 600 gallons a month.

17. Plug the bathtub before turning the water on, and then adjust the temperature as the tub fills up.

18. Designate one glass for your drinking water each day. This will cut down on the number of times you run your dishwasher.

19. Don't use running water to thaw food.

20. Grab a wrench and fix that leaky faucet. It's simple, inexpensive, and can save 140 gallons a week.

21. When doing laundry, match the water level to the size of the load.

22. Teach your children to turn the faucets off tightly after each use.

23. Before you lather up, install a low-flow showerhead. They're inexpensive, easy to install, and can save your family more than 500 gallons a week.

24. Soak your pots and pans instead of letting the water run while you scrape them clean.

25. Make sure you know where your master water shut-off valve is located. This could save gallons of water and damage to your home if a pipe were to burst.

26. Turn off the water while you brush your teeth and save 4 gallons a minute. That's 200 gallons a week for a family of four.

27. Make sure your toilet flapper doesn't stick open after flushing.

28. Make sure there are aerators on all of your faucets.

29. Install an instant water heater on your kitchen sink so you don't have to let the water run while it heats up. This will also reduce heating costs for your household.

30. Cut back on rinsing if your dishwasher is new. Newer models clean more thoroughly than older ones.

31. Bathe your young children together.

32. Winterize outdoor spigots when temps dip to 20 degrees F to prevent pipes from bursting or freezing.

33. Insulate hot water pipes so you don't have to run as much water to get hot water to the faucet.

34. Drop that tissue in the trash instead of flushing it and save gallons every time.

35. If your toilet was installed prior to 1980, place a toilet dam or bottle filled with water in your toilet tank to cut down on the amount of water used for each flush. Be sure these devices do not interfere with operating parts.

36. Install water softening systems only when necessary. Save water and salt by running the minimum number of regenerations necessary to maintain water softness.

37. Wash clothes only when you have a full load and save up to 600 gallons each month.

38. Listen for dripping faucets and toilets that flush themselves. Fixing a leak can save 500 gallons each month.

39. Cook food in as little water as possible. This will also retain more of the nutrients.

40. Turn the water off while you shampoo and condition your hair and you can save more than 50 gallons a week.

41. Choose new water-saving appliances, like washing machines that save up to 20 gallons per load.

42. Select the proper size pans for cooking. Large pans require more cooking water than may be necessary.

43. Turn off the water while you shave and you can save more than 100 gallons a week.

44. If you accidentally drop ice cubes when filling your glass from the freezer, don't throw them in the sink. Drop them in a house plant instead.

45. To save water and time, consider washing your face or brushing your teeth while in the shower.

46. For hanging baskets, planters and pots, place ice cubes under the moss or dirt to give your plants a cool drink of water and help eliminate water overflow.

47. Throw trimmings and peelings from fruits and vegetables into your yard compost to prevent from using the garbage disposal.

48. Keep a bucket in the shower to catch water as it warms up or runs. Use this water to flush toilets or water plants.

49. When you are washing your hands, don't let the water run while you lather.

50. Pre-treat stains before washing clothes to avoid re-washing.

51. Use the shortest wash cycle for lightly soil cloths.

52. Check washing machine hoses regularly for leaks.

53. Do not pre-rinse dishes except in cases of sticky or burn-on food.

54. Scrape off food with a utensil or used paper napkin when pre-cleaning for dishwasher.

LANDSCAPE BEHAVIORS

1. Check your sprinkler system frequently and adjust sprinklers so only your lawn is watered and not the house, sidewalk, or street.

2. Avoid planting turf in areas that are hard to water such as steep inclines and isolated strips along sidewalks and driveways.

3. Plant during the spring or fall when the watering requirements are lower.

4. Minimize evaporation by watering during the early morning hours, when temperatures are cooler and winds are lighter.

5. Use a layer of organic mulch around plants to reduce evaporation and save hundreds of gallons of water a year.

6. Divide your watering cycle into shorter periods to reduce runoff and allow for better absorption every time you water.

7. Only water your lawn when needed. You can tell this by simply walking across your lawn. If you leave footprints, it's time to water.

8. Adjust your lawn mower to a higher setting. Longer grass shades root systems and holds soil moisture better than a closely clipped lawn.

9. Use the sprinkler for larger areas of grass. Water small patches by hand to avoid waste.

10. Use porous materials for walkways and patios to keep water in your yard and prevent wasteful runoff.

11. Direct downspouts and other runoff towards shrubs and trees, or collect and use for your garden.

12. Install a rain shut-off device on your automatic sprinklers to eliminate unnecessary watering.

13. Choose a water-efficient drip irrigation system for trees, shrubs and flowers. Watering at the roots is very effective, be careful not to over water.

14. Reduce the amount of grass in your yard by planting shrubs and ground cover with rock and granite mulching.

15. Remember to check your sprinkler system valves periodically for leaks and keep the heads in good shape.

16. Don't water your lawn on windy days. After all, sidewalks and driveways don't need water.

17. Water your plants deeply but less frequently to create healthier and stronger landscapes.

18. When watering grass on steep slopes, use a soaker hose to prevent wasteful runoff.

19. Group plants with the same watering needs together to get the most out of your watering time.

20. Remember to weed your lawn and garden regularly. Weeds compete with other plants for nutrients, light, and water.

21. While fertilizers promote plant growth, they also increase water consumption. Apply the minimum amount of fertilizer needed.

22. Avoid installing ornamental water features and fountains that spray water into the air. Trickling or cascading fountains lose less water to evaporation.

23. Buy a rain gauge to track how much rain or irrigation your yard receives. Check with your local water agency to see how much rain is needed to skip an irrigation cycle.

24. Teach your family how to shut off your automatic watering systems. Turn sprinklers off if the system is malfunctioning or when a storm is approaching.

25. Set a kitchen timer when watering your lawn or garden with a hose.

26. Next time you add or replace a flower or shrub, choose a low water use plant for year-round landscape color and save up to 550 gallons each year.

27. Use a screwdriver as a soil probe to test soil moisture. If it goes in easily, don't water. Proper lawn watering can save thousands of gallons of water annually.

28. Avoid over-seeding your lawn with winter grass. Once established, ryegrass needs water every three to five days, whereas dormant Bermuda grass needs water only once a month.

29. Landscape with Xeriscape trees, plants and groundcovers. Call your local conservation office for more information about these water thrifty plants.

30. If you have an evaporative cooler, direct the water drain to a flowerbed, tree, or your lawn.

31. Leave lower branches on trees and shrubs and allow leaf litter to accumulate on top of the soil. This keeps the soil cooler and reduces evaporation.

32. Start a compost pile. Using compost when you plant adds water-holding organic matter to the soil.

33. Use sprinklers that throw big drops of water close to the ground. Smaller drops of water and mist often evaporate before they hit the ground.

34. More plants die from over-watering than from under-watering. Be sure only to water plants when necessary.

35. Water only as rapidly as the soil can absorb the water.

36. Aerate your lawn. Punch holes in your lawn about six inches apart so water will reach the roots rather than run off the surface.

37. When you give your pet fresh water, don't throw the old water down the drain. Use it to water your trees or shrubs.

COMMUNITY BEHAVIORS

1. Encourage your school system and local government to help develop and promote a water conservation ethic among children and adults.

2. Make suggestions to your employer to save water (and dollars) at work.

3. Support projects that use reclaimed wastewater for irrigation and other uses.

4. Encourage your friends and neighbors to be part of a water-conscious community.

5. Pick-up the phone and report significant water losses from broken pipes, open hydrants and errant sprinklers to the property owner or your water management district.

MISCELLANEOUS BEHAVIORS

1. Install covers on pools and spas and check for leaks around your pumps.
2. Periodically check your pool for leaks if you have an automatic refilling device.
3. Use a commercial car wash that recycles water.
4. Don't buy recreational water toys that require a constant flow of water.
5. Use a grease pencil to mark the water level of your pool at the skimmer. Check the mark 24 hours later. Your pool should lose no more than ¼ inch each day.
6. When the kids want to cool off, use the sprinkler in an area where your lawn needs it the most.
7. Make sure your swimming pools, fountains, and ponds are equipped with re-circulating pumps.
8. Wash your car on the grass. This will water your lawn at the same time.
9. Bathe your pets outdoors in an area in need of water.
10. While staying in a hotel or even at home, consider reusing your towels.
11. When backwashing your pool, consider using the water on your landscaping.
12. When you have ice left in your cup from a take-out restaurant, don't throw it in the trash, dump it on a plant.

APPENDIX C – LANDSCAPE CODE

WATER

- www.amsa-cleanwater.org
- www.energystar.gov

DROUGHT

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- DroughtMonitor@ndmc.unl.edu

LANDSCAPE

- http://www.usda.gov/news/garden.htm

EDUCATION

- www.wateruseitwisely.com
- http://www.washoeet.dri.edu/

INSTITUTIONAL

- www.lvvwd.com
- www.snwa.com
- www.co.washoe.nv.us/water_dept/rwpc/regionalplm
- www.tmh20.com
- http://www.cabq.gov
- www.ci.phoenix.az.us/WATER/wtrteach.html
- http://www.owue.water.ca.gov/leak/faq/faq.cfm

LEAK DETECTION

- http://www.who.int/docstore/water_sanitation_health/leakage/begin.html