

Roark Estates Homeowner's Association

Water Conservation Plan

April 2011

Prepared for:

**Roark Estates HOA
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Sloan, NV 89504
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Statutory Requirements

This water conservation plan was prepared for **Roark Estates Homeowner's Association (HOA)** in accordance with Nevada Revised Statute (NRS) 540. As outlined in NRS 540.141, the provisions of this plan must include:

- a. Public Education
- b. Conservation Measures
- c. Water Management
- d. Contingency Plan
- e. Schedule
- f. Evaluation Measurements
- g. Conservation Estimates

In addition to the provisions of the water conservation plan, listed above, NRS 540.141 also requires a rate analysis to be performed and included with the submittal.

This plan is being submitted to the Nevada Department of Conservation and Natural Resources (DCNR), Division of Water Resources (DWR) for review and approval prior to its adoption by **Roark Estates HOA** as required by NRS 540.131.

This plan is available for inspection during normal business hours at **4499 Roark Ave. Sloan, NV 89504**.

The original Water Conservation Plan for **Roark Estates HOA** was developed in the fall of **2010** and modified in March 2011.

In accordance with NRS 540.131, this plan will be reviewed from time-to-time to reflect changes and must be updated every five (5) years to comply with NRS 540.131 and NRS 540.141. The next update of this plan is to be on, or before, **March 2016 (five years from submittal)**.

Background / System Information

The Roark Estates Homeowner's Association (HOA) public water system is a publicly-owned residential, community water system and has a current water operation permit NV 000309. **Roark Estates HOA** serves water to 27 metered, yet flat-rate customers within its service area located in Sloan, NV in Clark County. The total service area is approximately one square mile and is bordered to the north by Roark Avenue, to the east by Arville Street, to the south by Ray Way, and to the west by Cameron Street. The terrain is flat. Residential customers are billed at a uniform rate on a flat rate basis.

The estimated population served in 2010 was 62. **Roark Estates HOA** estimates that its customer base will increase by zero% because all 27 lots are developed and there is no further room for expansion. The State of Nevada, through its State Water Plan, estimates the population growth for Clark County through 2020 to be 2.91 % annually.

The water supply is from groundwater located within the Las Vegas Valley Basin (Administrative Groundwater Basin #212) within the Colorado River Basin (Hydrographic Basin #13). There is a total of one well supplying the system and a total of two above ground storage tanks which each holds 20,000 gallons for a total of 40,000 gallons of storage. Each of these is identified in the tables below (Table 1 and Table 2). Wastewater is managed through individual septic systems. There is no reclaimed water system within the Roark Estates service area.

Table 1 – Source of Supply

Well No.	Depth (feet)	Production (gpm)
1	1000	35

Table 2 – Storage Tanks

Tank No.	Volume (gallons)
1	20,000
2	20,000

Roark Estates HOA has been granted water rights in the total amount of 10.07 acre feet per year (original applicant Ray W. Roark). The current water rights are listed in the table below (Table 3).

Table 3 – Water Rights

Permit No.	Well No. & Name	Rate of Diversion (max, CFS)	Annual Use (MGA)
35475	1	0.08355	3.285

Roark Estates HOA Well #1 was drilled in **July 1979** by **Vernon Dimick** (Address: 4375 N Tioga Las Vegas, NV; Contractor’s Lic. No.10062 Driller’s Lic. No. 552). The well was drilled to a depth of 1015 feet, below ground surface (ft, bgs), cement sealed down to 55 ft, bgs and cased with 6 5/8 and 8 5/8 casing to 1015 ft, bgs. The casing is perforated from 800 to 1000 ft, bgs. The static water level at the time of well completion was 490 ft, bgs. Well #1 pumps water into two 20,000 gallon steel storage tanks located beside the well. The pump is turned on automatically when the level in the tank reaches 18.5 feet and turns off when the level in the tank reaches 23.5 feet. The system is equipped with four pressure tanks located inside the pump house. The pressure tanks turn at 48 psi and turn off at 65 psi. Water is pumped from the well into the storage tanks and then booster pumps boost water into the four pressure tanks which pressurize the water system. Water is then distributed to the customers through 3-inch mains and 3-inch laterals.

(Note: Starting in February 2011 a new well was being drilled to replace the original well.)

Roark Estates HOA requires, at a minimum, a D1 operator. Water Utility Services is responsible for monitoring the **Roark Estates HOA** public water system. Shanon Daines is the Distribution Operator (D1, T1) who oversees the system and collects monthly samples for Coliform bacteria and complies with the required sampling protocol according to the Nevada Department of Environmental Protection ‘Attachment A Nine Year Monitoring Schedule’ for other contaminants derived from the Vulnerability Assessment Program.

The plant operator is required to perform monthly monitoring and testing of water quality. **Roark Estates** currently has an outstanding water quality issue due to a casing

collapse in August 2010 that left the community without a functioning well and placed the HOA under a continuous Boil Water Notice. Roark Estates tried to rehabilitate the existing well from August through November 2010. A well professional was contracted to reopen the portion of the casing that had collapsed and when this proved unsuccessful a new driller was contracted to drill a replacement well. Drilling for a new well began in late February 2011 and is currently underway. In the meantime **Roark Estates HOA** has been trucking in water to provide the community with water during certain time periods in the morning and evening daily. During this emergency period routine manual disinfection/treatment has been practiced. Currently the system is using Clorox bleach which is fed into a pressurized line directly into the bottom of both storage tanks. Once the new well is developed Roark Estates will be using an automatic disinfection system to chlorinate the water.

The last sanitary survey performed by the Nevada Department of Environmental Protection (NDEP) was completed on 03/17/2009 and shows four (4) deficiencies with the system. Leak in piping between pump and pressure tank, hose bib needs an AVB, replace green garden hose at well with a hose labeled “food or drinking water safe”, security measures at tank ladder need improvement. Leak has been fixed, new hose will be purchased and placed at well with correct labeling when well project is complete, hose bib will be updated with improvements being done to pump house, and security measures at tank ladder will be solved with new fence upon well project completion. As of 04/12/2011 well is still under construction and inoperable. Water continues to be hauled in.

Roark Estates HOA charges a \$50.00 flat rate to all residential customers and has no commercial customers. It does not have a tiered rate usage fee. A breakdown of the customer type, number, and charge is found in the tables below.

Table 4 – Residential Customers and Usage Charges

Meter Size	Number	Monthly Fee	Quantity Fee (\$/gallon)
Residential			
3-inch	27	\$50.00	

Current water rates were established on January 1, 2011. Water rates are reviewed annually and will be reviewed again in the spring of 2011 to establish a sustainable rate

to cover the cost of operation and maintenance, emergencies, and depreciation of the system.

Plan Elements

This plan describes the drinking water conservation and drought management efforts in Roark Estates, along with implementation schedules. The plan components conform to Nevada regulations as outlined by the Nevada Department of Conservation and Natural Resource, Division of Water Resources. Plan elements address the following areas:

- Increase public awareness of the need to conserve water;
- Encourage reduction in lawn sizes and use of arid and semiarid plants;
- Identify specific water conservation measures;
- Propose plan to identify and reduce leakage;
- Provide a drought contingency plan;
- Implementation schedule;
- Evaluation Measures;
- Conservation Estimates and;
- A Rate Analysis.

Public Awareness

It is the goal of **Roark Estates HOA** to increase public awareness to conserve water, encourage reduction in lawn sizes, encourage the use of climate-appropriate plants, encourage the use of drip irrigation, and encourage conscientious decisions for water use.

The conservation education program includes education materials such as bill inserts, pamphlets, flyers, and posters. New customers will be provided these materials when service is established, while existing customers will receive these materials periodically through bill inserts or direct mail. Educational pamphlets will be provided to all customers upon request and should include an explanation of all costs involved in supplying drinking water and demonstrate how the water conservation practices will provide water users with long-term savings. Education materials should also encourage reduction of lawn sizes, use of drip irrigation, use of climate-appropriate plants, and conservation tips and techniques (see Appendix A).

Examples of education materials include information from the Environmental Protection Agency, Turf Institute, American Waterworks Association, and USDA Agricultural Extension.

The Roark Estates Water Association encourages the public to practice scientific turf management and makes literature and resources, such as the Turf Institute, available to customers. System-owned and public turf areas are scientifically managed. Local nurseries are encouraged to promote the use of drip irrigation and climate-appropriate plant materials.

Water Management: Specific Water Conservation Measures

Clark County has adopted a Plumbing-Water Conservation Ordinance. The Ordinance applies to structures which are renovated as well as all new construction.

- a. Copies of the Plumbing- Water Conservation Ordinance are furnished to local suppliers and contractors.
- b. The Clark County Building Department checks new construction, renovation, and expansions within the Clark County to insure compliance with the ordinance.

All residential meters are tested every ten years, and replaced if under-registering by more than 5%.

The plumbing code, which specifies low-flow fixtures, is enforced.

The By-Law code includes a provision that water service can be shut off for wasting water. This is enforced by visual inspection for runoff, following-up on citizen reports, and review of use at metered services. Typically a verbal or written warning is issued, followed by a shut-off when cooperation is not forthcoming.

A residential metering program has been implemented, requiring water meters to be installed on all connections, and all customers are currently meters. These meters are read monthly to obtain usage information.

Water Management: Plan to Identify and Reduce Leakage

The **Roark Estates HOA** has in place a capital improvement plan to replace distribution lines at the end of the anticipated life-cycle.

Monthly we audit production vs. sales to determine the amount of unaccounted water and infrastructure leakage index. We also compare current to historical same-month production. When production increases unexpectedly, we initiate a leak survey.

It is our written policy to repair leaks in a timely manner. All large leaks are repaired immediately and small leaks (less than 1 gallon per minute) within 48 hours.

Drought Contingency Plan

Nevada is an arid state and Clark County is continuing to grow and water requirements are increasing. The area is subject to drought cycles; therefore, it is necessary to have a drought contingency plan. The objective of our plan is to manage the available resources to insure a continued supply of potable water during periods of drought. We monitor water levels at our Well Site and record the information.

It is envisioned that voluntary conservation will be sufficient to ensure an adequate supply of water and reduce water usage. However, if a sustained drought (lack of precipitation) is encountered, it may be necessary to implement mandatory restrictions in order to ensure an adequate supply of water to meet essential needs.

Roark Estates HOA plans for drought response would be three (3) stages of drought response including a year round portion, (1) warning stage, (2) alert stage, and (3) emergency stage. These stages are based upon the State of Nevada Drought Response. The stages are describes as follows:

Year-round measures are realized by all customers daily.

In **Stage 1**, the warning stage, **Roark Estates HOA** would increase monitoring of its water supplies and would begin creating public awareness of the water supply situation and the need to conserve. Conservation measures at this stage would be voluntary. Retrofit kits (low-flow faucet aerators, low-flow showerheads, leak detection tables, and replacement flapper valves) can be made available, or at cost, and can be actively distributed, if needed.

In **Stage 2**, the alert stage, **Roark Estates HOA** would call for wide-based community support to achieve conservation, limit the use of fire hydrants to fire protection uses, implement water use restrictions, and impose penalties for ignoring the restrictions. Conservation measures at this stage would be mandatory.

In **Stage 3**, the emergency stage, **Roark Estates HOA** would declare a drought and water shortage emergency, would enforce water use restrictions, impose fines for violations, implement allocation of water (rationing) and impose higher fees for water usage. Media relations would be activated in order to inform the customers and monetary assistance may need to be secured in an effort to mitigate the effects of the drought (e.g. federal funding assistance). Conservation measures at this stage would be mandatory, rationing would be imposed, and over-use would be penalized by higher rates.

When a drought is declared over, year-round conservation measures will be reinstated and water supplies would continue to be monitored.

When the **Roark Estates HOA** has found that a water scarcity condition exists or is likely to exist and has proclaimed the existence of a drought or emergency condition, it shall declare an appropriate drought or emergency stage for its service area which may be Stage 1, Stage 2, or Stage 3 further detailed as follows:

Year Round

1. Water from the Roark Estates water system allowed to pool, pond, or run-off of applied areas is considered a waste of water and as such is not permitted.
2. Leaks occurring on the customer side of each meter in the Roark Estates water system are considered a waste of water and as such are not permitted.
3. Water from the Roark Estates water system which runs down the street due to excessive watering or poorly maintained sprinklers is considered a waste of water and as such, is not permitted. If a sprinkler system is broken and left on for more than two (2) hours, the water will be shut off by the HOA until it is fixed.
4. During a Stage 1 Drought or Emergency, lawn watering, including landscaping and the watering of a garden, will NOT be permitted between the hours of 1:00

pm and 5:00 pm.

Stage 1 Warning

1. Water from the Roark Estates HOA water system allowed to pool, pond, or runoff of applied areas is considered a waste of water and as such is not permitted.
2. Leaks occurring on the customer side of each meter in the Roark Estates HOA water system are considered a waste of water and as such are not permitted.
3. No hard surfaces including sidewalks, driveways, parking areas, or decks may be washed or hosed down with water supplied through the Roark Estates HOA potable water system unless required by health and safety requirements.
4. No washing of vehicles with hoses is permitted using water from the Roark Estates' HOA water system except with hoses equipped with automatic shut-off device.
5. Water used for watering vegetation, including lawns, landscaping, and gardens is limited as follows:
 - a. Residences with **even** numbered addresses: Monday, Wednesday, & Saturday;
 - b. Residences with **odd** numbered addresses: Tuesday, Thursday & Sunday;
 - c. All watering of lawns, landscaping, and gardens is prohibited between the hours of 1:00 pm and 5:00 pm.
6. No use of water for and decorative purpose is permitted (e.g. fountains).

Stage 2 Alert

1. Water from the Roark Estates HOA water system allowed to pool, pond, or runoff of applied areas is considered a waste of water and as such is not permitted.

2. Leaks occurring on the customer side of each meter in the Roark Estates HOA water system are considered a waste of water and as such are not permitted.
3. No hard surfaces including sidewalks, driveways, parking areas, or decks may be washed or hosed down with water supplied through the Roark Estates HOA potable water system unless required by health and safety requirements.
4. No washing of vehicles with hoses is permitted with the Roark Estates with water supplied through the Roark Estates potable water system, except with hoses equipped with automatic shut off device or at facilities designated on the Roark Estates HOA billing records as a commercial vehicle wash.
5. Water used for watering vegetation, including lawns, landscaping, and gardens is limited as follows:
 - a. Residences with **even** numbered addresses: Wednesday & Saturday;
 - b. Residences with **odd** numbered addresses: Tuesday & Sunday;
 - c. All watering of lawns, landscaping, and gardens is prohibited between the hours of 1:00 pm and 5:00 pm.
6. No use of water for and decorative purpose is permitted (e.g. fountains).
7. Water from the Roark Estates HOA's potable water system used for general construction or maintenance activities, including dust control, compaction and concrete curing, is considered a waste of water and as such is not permitted.

Stage 3 Drought or Emergency

1. Water from the Roark Estates HOA water system allowed to pool, pond, or runoff of applied areas is considered a waste of water and as such is not permitted.
2. Leaks occurring on the customer side of each meter in the Roark Estates HOA water system are considered a waste of water and as such are not permitted.
3. No hard surfaces including sidewalks, driveways, parking areas, or decks may be washed or hosed down with water supplied through the Roark Estates HOA potable water system unless required by health and safety requirements.

4. No washing of vehicles with hoses is permitted with the Roark Estates HOA water supplied through the Roark Estates HOA potable water system, except with hoses equipped with automatic shut off device or at facilities designated on the Roark Estates billing records as a commercial vehicle wash.
5. Water used for watering vegetation, including lawns, landscaping, and gardens is limited as follows:
 - a. No watering from December through February;
 - b. Watering will only be allowed one day per week during March, April & May.
 - c. Watering will be allowed two days per week from June 1st through August 15th:
 1. Residences with **even** numbered addresses: Wednesday & Saturday;
 2. Residences with **odd** numbered addresses: Tuesday & Sunday;
 - d. One day per week August 16th through September;
 - e. All watering of lawns, landscaping, and gardens is prohibited between the hours of 1:00 pm and 5:00 pm.
6. No use of water for any decorative purpose is permitted (e.g. fountains).
7. Water from the Roark Estates HOA's potable water system used for general construction or maintenance activities, including dust control, compaction and concrete curing, is considered a waste of water and as such is not permitted.
8. During a Stage 4 Drought or Emergency, the planting or installing of new lawns is prohibited from July through September.

Implementation schedule

All of the plan elements listed will be in place once this plan has been approved. The plan is to be reviewed every five years and updated as system needs change.

One hundred (100%) percent of residential services are now metered. Residential meters in place are now being read monthly. (Will be when well project is completed)

Meters will be replaced on an as needed basis.

Evaluation Measurements

An audit comparing water production with metered amounts will be performed prior to the implementation of measures/incentives. Additional audits will then be done every year thereafter. Results from the initial audit will be compared with those of the subsequent annual audits in order to determine the effectiveness of the measures/incentives. Once this plan is accepted 2011 will serve as the baseline usage to which conservation savings can be measured.

As a plan element is activated (e.g. mailing literature or declaring a drought stage), production figures will be compared to same-month historical data to estimate the plan element's effectiveness. This information will be utilized as a basis for any future water conservation plan revision and plan elements.

Usage amounts measured will include summer use, average use per connection, and per capita use. If there is a decrease in usage as a result of a particular measure/incentive, that measure/incentive can be expanded or improved upon, if possible. If it is discovered that a particular measure/incentive is ineffective, it will be discontinued and a new one can then be implemented to take its place.

In addition to changes resulting from audits, updates, and modifications to conservation measures/incentives there will be changes made to meet changing conditions (e.g. customer growth and demand, changing use, new technologies, etc.).

Conservation Estimates

During the Stage 1 phase of the conservation plan, it is estimated that conservation measures could be expected to provide a 5% reduction in water use.

During the Stage 2 phase of the conservation plan, it is estimated that conservation measures could be expected to provide a 10 % reduction in water use.

During the Stage 3 phase of the conservation plan, it is estimated that conservation measures could be expected to provide a 15% reduction in water use.

The estimated water savings for various end-user efforts can be found in Appendix B.

Rate Analysis

[[THE OBJECTIVE OF THIS SECTION IS TO PROVIDE AN ANALYSIS OF THE FEASIBILITY OF CHARGING VARIABLE RATES AND TO DESCRIBE HOW THOSE PROPOSED RATES WILL MAXIMIZE CONSERVATION AND AFFECT CONSUMPTION.]]

The charging of variable rates for the use of water has sometimes been shown to encourage conservation of water, but not in all systems. Oftentimes the end-user will continue to pay increasing block rates out of necessity for the water used. The use of variable water rates needs to be evaluated on a case-by-case basis.

At this time **Roark Estates HOA** does not anticipate any further water conservation savings due to a change in rate structure. The HOA currently has only 3281319.57 allocated gallons per year and water use remains inside this allotment. **Roark Estates HOA** will continue to monitor the water usage and will re-visit this issue each time rates are reviewed. If so warranted, a change in rates will occur and this conservation plan will be updated to reflect the new rates.

APPENDIX A: PUBLIC EDUCATION MATERIALS

There are several publications available for use at U.S. EPA website for general distribution (currently located at <http://epa.gov/watersense/pubs/index.htm#ideas>). These publications include such topics as:

- Simple Steps to Save Water,
- Ideas for Residences,
- Ideas for Commercial,
- Using Water Wisely In the Home,
- Outdoor Water Use in the US,
- Toilet Flush Facts,
- Watering Can Be Efficient,
- Irrigation Timers for the Homeowner, and
- Water Efficient Landscaping,

These publications can be utilized until **Roark Estates HOA** develops system-specific publications.

There are also numerous website that provide tips for conserving water. One of these is: <http://www.wateruseitwisely.com/100-ways-to-conserve/index.php>. Customers can be directed to this website for tips to conserve water.

Specific tips for landscaping that can be provided to the customers are listed below. During drought conditions outdoor watering restrictions may be imposed, and therefore some of the following tips will not apply.

Tips for Landscaping

Watering:

- Detect and repair all leaks in irrigation systems.
- Use properly treated wastewater for irrigation where available.
- Water the lawn or garden during the coolest part of the day (early morning is best). Do not water on windy days.
- Water trees and shrubs, which have deep root systems, longer and less frequently than shallow-rooted plants which require smaller amounts of water more often. Check with the local nursery for advice on the amount and frequency of watering needed in your area.
- Set sprinklers to water the lawn or garden only—not the street or sidewalk.
- Use soaker hoses and trickle irrigation systems.
- Install moisture sensors on sprinkler systems.

Planting:

- Have your soil tested for nutrient content and add organic matter if needed. Good soil absorbs and retains water better.
- Minimize turf areas and use native grasses.
- Use native plants in your landscape—they require less care and water than ornamental varieties.
- Add compost or peat moss to soil to improve its water-holding capacity.

Maintaining:

- Use mulch around shrubs and garden plants to reduce evaporation from the soil surface and cut down on weed growth.
- Remove thatch and aerate turf to encourage movement of water to the root zone.
- Raise your lawn mower cutting height to cut grass no shorter than three inches—longer grass blades encourages deeper roots, help shade soil, cut down on evaporation, and inhibit weed growth.
- Minimize or eliminate fertilizing which requires additional watering, and promotes new growth which will also need additional watering.

Ornamental Water Features:

- Do not install or use ornamental water features unless they recycle the water. Use signs to indicate that water is recycled. Do not operate during a drought.

APPENDIX B: END-USER WATER SAVINGS

Here are just a few of the end-user water savings that could be realized:

Leaky Faucets

Issue: Leaky faucets that drip at the rate of one drip per second can waste more than 3,000 gallons of water each year.

Fix: If you're unsure whether you have a leak, read your water meter before and after a two-hour period when no water is being used. If the meter does not read exactly the same, you probably have a leak.

Leaky Toilets

Issue: A leaky toilet can waste about 200 gallons of water every day.

Fix: To tell if your toilet has a leak, place a drop of food coloring in the tank; if the color shows in the bowl without flushing, you have a leak.

Showering

Issue: A full bath tub requires about 70 gallons of water, while taking a five-minute shower uses 10 to 25 gallons.

Fix: If you take a bath, stopper the drain immediately and adjust the temperature as you fill the tub.

Brushing Teeth Wisely

Issue: The average bathroom faucet flows at a rate of two gallons per minute.

Fix: Turning off the tap while brushing your teeth in the morning and at bedtime can save up to 8 gallons of water per day, which equals 240 gallons a month!

Watering Wisely

Issue: The typical single-family suburban household uses at least 30 percent of their water outdoors for irrigation. Some experts estimate that more than 50 percent of landscape water use goes to waste due to evaporation or runoff caused by overwatering.

Fix: Drip irrigation systems use between 20 to 50 percent less water than conventional in-ground sprinkler systems. They are also much more efficient than conventional sprinklers because no water is lost to wind, runoff, and evaporation. If the in-ground system uses 100,000 gallons annually, you could potentially save more than 200,000 gallons over the lifetime of a drip irrigation system should you choose to install it. That adds up to savings of at least \$1,150!

Washing Wisely

Issue: The average washing machine uses about 41 gallons of water per load.

Fix: High-efficiency washing machines use less than 28 gallons of water per load. To achieve even greater savings, wash only full loads of laundry or use the appropriate load size selection on the washing machine.

Flushing Wisely

Issue: If your toilet is from 1992 or earlier, you probably have an inefficient model that uses at least 3.5 gallons per flush.

Fix: New and improved high-efficiency models use less than 1.3 gallons per flush—that's at least 60 percent less than their older, less efficient counterparts. Compared to a 3.5 gallons per flush toilet, a WaterSense labeled toilet could save a family of four more than \$90 annually on their water bill, and \$2,000 over the lifetime of the toilet.

Dish Washing Wisely

Issue: Running dishwasher partial full and pre-rinsing dishes before loading the dishwasher.

Fix: Run the dishwasher only when it's full and use the rinse-and-hold dishwasher feature until you're ready to run a full load. Pre-rinsing dishes does not improve cleaning and skipping this step can save you as much as 20 gallons per load, or 6,500 gallons per year. New water-saver dishwashers use only about 4 gallons per wash.

Estimated water savings from EPA Water Conservation Guidelines 1998 (Appendix B, Table B-1):

Type	Estimated Usage (gpcpd)	Conservation Usage (gpcpd)	Savings (gpcpd)	Savings (%)
Toilet	18.3	10.4	7.9	43 %
Clothes Washers	14.9	10.5	4.4	30 %
Showers	12.2	10.0	2.2	18 %
Faucets	10.3	10.0	.3	3 %
Leaks	6.6	1.5	5.1	77 %

Benchmarks from selected conservation measures from EPA Water Conservation Guidelines 1998 (Appendix B, Table B-4):

Category	Measure	Reduction of End Use (% or gpcpd)
Universal metering	Connection metering	20 %
	Sub metering	20 – 40 %
Costing and pricing	10% increase in residential prices	2 – 4 %
	10% increase in non-residential prices	5 – 8 %
	Increasing-block rate	5 %
Information and education	Public education and behavior changes	2 – 5 %
End-use audits	General industrial water conservation	10 – 20 %
	Outdoor residential use	5 – 10 %
	Large landscape water audit	10 – 20 %
Retrofits	Toilet tank displacement devices (for toilets using > 3.5 gallons/flush)	2 – 3 gpcpd
	Toilet retrofit	8 – 14 gpcpd
	Showerhead retrofit (aerator)	4 gpcpd
	Faucet retrofit (aerator)	5 gpcpd
	Fixture leak repair	0.5 gpcpd
	Governmental building (indoors)	5 %
Pressure management	Pressure reduction, system	3 – 6 % of total production
	Pressure-reducing valves, residential	5 – 30%
Outdoor water use efficiency	Low water-use plants	7.5 %
	Lawn watering guides	15 – 20 %
	Large landscape management	10 – 25%
	Irrigation timer	10 gpcpd
Replacements and promotions	Toilet replacement, residential	16 – 20 gpcpd
	Toilet replacement, commercial	16 – 20 gpcpd
	Showerhead replacement	8.1 gpcpd
	Faucet replacement	6.4 gpcpd
	Clothes washers, residential	4 – 12 gpcpd
	Dishwashers, residential	1 gpcpd
Water-use regulation	Hot water demand units	10 gpcpd
	Landscape requirements for new developments	10 – 20 % in sector
	Greywater reuse, residential	20 – 30 gpcpd