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NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
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STATE OF NEVADA

Department of Conservation & Natural Resources

DIVISION OF ENVIRONMENTAL PROTECTION

Jim Gibbons, Governor
Allen Biaggi, Director
Leo M. Drozdoff, P.E., Administrator

June 25, 2008

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K.G.I.D.

Kingsbury General Improvement District
Cameron McKay, General Manager
PO Box 2220
Stateline, Nevada 89449

Subject: Board for Financing Water Projects – Extension of Funding Agreement

Dear Mr. McKay:

At their June 19, 2008, quarterly meeting, the Board for Financing Water Projects (State) approved a 2-year extension to the existing grant Funding Agreement, "08-06-E4b," for the Kingsbury General Improvement District (Grantee). The extension of the term of the Funding Agreement is contingent on the receipt by the State of a final metering plan approved by the Grantee's Board that includes phases, costs, and funding sources. This plan needs to be submitted by August 14, 2008, for inclusion in the next Board for Financing Water Projects meeting on September 25, 2008. The funding agreement between the Grantee and the State will continue to be administered as long as the Grantee continues to make reasonable progress on the project. Your project needs to be completed no later than August 23, 2010. This grant extension is subject to the provisions of Nevada Administrative Code (NAC) 349.549 – 349.574 (http://ndep.nv.gov/bffwp/docs/nac349_updated_sept2006.pdf).

Please note that the Division of Water Resources reported that the Kingsbury General Improvement District does not have an approved Water Conservation Plan. A Water Conservation Plan, adopted pursuant to NRS 540.131, must be approved and on file with the Water Planning Section of the Division of Water Resources prior to any further disbursement of funds from this grant. Feel free to contact me at (775) 687-9331 if you have any questions.

Sincerely,

Michelle Stamates

Michelle Stamates
Engineer to the Board for Financing Water Projects

KINGSBURY
GENERAL IMPROVEMENT DISTRICT
WATER CONSERVATION PLAN
January, 2009

OWNER:
Kingsbury General Improvement District
P.O. Box 2220
Stateline, Nevada
(775) 588-3548

ENGINEER:

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STATE ENGINEER'S OFFICE

This Plan is mandated by NRS 540.131 and is compliant with NRS sections 540.121 through 540.151

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I. Executive Summary

1.0 Purpose and Scope

Kingsbury General Improvement District has prepared this water conservation plan with purpose of managing the existing water system and implementing programs to implement the use of practices, techniques and technologies that will reduce the consumption of water, reduce water loss, and improve the efficiency of the use of water to ensure that the current water supply will be available for future use. The WCP is designed to meet all State requirements to comply with the Nevada Revised Statutes. It is also intended to be a living document that is assessed and updated over time. Public comment and input is necessary to ensure the success of the WCP therefore the plan is available for review during business hours at the KGID office:

Kingsbury General Improvement District
160 Pineridge Drive
Stateline, NV 89449
(775) 588-3548

The scope of this WCP is to identify the current demand and uses of the water system, select conservation measures that will cost effectively reduce water loss and water waste, determine a budget and necessary management for the plan to be successful, and develop a schedule of implementation of the chosen conservation measures.

1.1 Plan Requirements

This WCP is compliant with the Nevada Revised Statutes (NRS) sections 540.121 through 540.151. These sections of the NRS are included in Appendix A.

The WCP is designed to specifically address the needs and goals of KGID. A comprehensive WCP has not previously been in place for KGID, therefore it is anticipated that as certain aspects of the plan are implemented and later reviewed the overall plan will require updating.

1.2 Plan Development and Public Participation

The WCP has been approved during a public meeting which allows any member of the public to comment on the plan and request any changes of further investigation be completed. In addition to the approval of the plan being completed during a public meeting, the plan is available for review and comment by the public at any time.

The WCP includes specific measures which require interaction with the public, including surveys, education programs, and overall public involvement in the efforts to conserve water. Future updates to the WCP will reflect feedback from the public and will take into consideration which conservation measures have been generally accepted and those which may either need changes or need to be dropped from the plan entirely due to negative results and public opinion. In order for the WCP to be successful public participation and input are necessary.

1.3 Plan Elements and Goals

The main focus of the WCP is to identify specific measures which can be implemented to cost effectively conserve water within the water system. The measures include apparent water loss

reduction, water auditing, water waste reduction, public education, encouraging customers to consider the updating of outdated water fixtures within homes, and leak reduction and repair. Each of these proposed measures is further detailed to include incentives for participation, a cost/benefit analysis, expected water savings, expected O&M savings, and what steps will be necessary to implement the measure over time. The measures were chosen based on overall water system goals.

The goals of the WCP through various measures and incentives are;

1) Install water meters for all customers
2) Perform water audit
3) Reduce real water losses by 30% within 10 years after performing water audit
4) Monitor apparent water losses on an annual basis
5) Reduce water use above 20,000 gallons by 15% within 10 years after performing water audit
6) Reduce water use between 5,000 and 20,000 gallons by 10% within 10 years after performing water audit

Other elements of the plan identify the water sources available to the system, current infrastructure status, water use forecasts that may be affected by a growing population, a drought plan, and an implementation schedule for the recommended water conservation measures.

Each of the elements of the WCP is further detailed in its specific section of this plan.

1.4 Anticipated Water Savings

Each recommended conservation measure has an anticipated effect on water savings. The implantation of the recommended water conservation measures and their anticipated water savings are outlined in the following table.

Table 1 – Conservation Measures and Water Savings

Conservation Measure	Goal	Projected Water Savings
Install Water Meters	Complete by Nov. 2011	
Conservation Oriented Rates	Reduce Water Use in Upper Tiers (by 2020)	
(require annual review)	>20,000 gallons	567,000
	5,000-20,000 gallons	15,000,000
Water Audit	Account for all water within 6 months completing meter installation	
Leak Reduction/Repair	Reduce Water Losses by 30% (by 2020)	Unknown
Informative Monthly Bills	Encourage Public Participation in Conservation	
Public Education	Inform public	
Low Flow Fixtures	Reduce in-home water use	Review after installation of meters
Lawn Size and Native Plants	Outdoor water conservation	Unknown
Total (Current) Projected Water Savings		**15,567,000**

All water savings is based on estimates utilizing the current data that is available for KGID water use. That data is limited to pumping data, therefore the water savings will have to be reviewed as new data from the customer meters is made available.

1.5 Adoption of Plan

The plan was adopted by the KGID Board of Trustees during a public meeting on November 18, 2008. The plan has been submitted to the Nevada Division of Water Resources for acceptance.

II. Water Service Area

2.0 History of Water System

Kingsbury General Improvement District (KGID) provides potable water to customers within a service area that includes Stateline, NV. The service area is generally centered at Kingsbury Grade (SR 207) from the shore of Lake Tahoe to the top of the Grade. This service area is one contiguous water system that is divided into 6 different pressure zones due to the elevation differences from one end of the system to the other.

According to 2000 U.S. Census data, the KGID service area had a population of approximately 3,900. Since that time, it is assumed that the growth within the service area has been low. There are limited undeveloped lots in the KGID service area, and the number of new connections has not significantly increased in the past 8 years. The construction of new water facilities to support growth is not anticipated; however significant infrastructure replacements will be necessary in the coming years to replace old water lines and pumps within the system.

The KGID system currently meters only a small percentage of their customers. Planned system improvements will provide newly installed water meters for some customers, bringing the total number of metered connections to approximately 300, or about 15% of the total customers (approximately 2,500). This number is expected to increase in the future as water meters are installed for all customers. KGID has prepared a water metering plan outlining a cost estimate and schedule to have all customers metered by November of 2011. The number of customer accounts may change depending on the actual number of meters installed. This number will be affected by the number of multi-family buildings that will be master metered instead of installing individual meters for each unit. Please refer to the approved KGID Metering Plan for further details regarding the cost, schedule and other specifics regarding system metering.

2.1 Existing Facilities

KGID's existing facilities consist of water transmission mains, pumping stations, storage tanks, water intake station and disinfection treatment facility. These facilities vary in age and condition and are being upgraded or replaced as necessary when funds allow.

2.1.1 Water Sources

The water source for KGID is Lake Tahoe. A deep water intake is installed in the lake near the treatment facility. Due to the high water quality of Lake Tahoe, only disinfection treatment is currently necessary. Additional preventative treatment, as required by the US EPA for cryptosporidium will be necessary by 2014 and is often referred to as LT2.

2.1.2 Storage Facilities

KGID has 7 storage tanks placed throughout the system. One of the tanks, T-10A, is scheduled to be replaced during the 2009 construction season. Table 2 shows the system tanks and their capacities.

Table 2 – Storage Tanks

NO.	TANK NAME	CAPACITY
1	T-2A	450,000
2	T-2B	450,000
3	T-3	1,200,000
4	T-4	200,000
5	T-5	120,000
6	T-6	800,000
7	T-10A	1,200,000
Total		**4,420,000**

2.2 Demographic Forecast

KGID is mainly comprised of residential customers, however there is a high concentration of second home owners and vacation rentals within the water system. According to the US Census data currently available KGID has a population (located within their block group for the 89449 zip code) of 3,900 people. However, also according to the US Census, approximately 30% of the residential units within that same zip code are not primary residential units. KGID estimates that the service area population fluctuates from approximately 5,000 to 9,000 throughout the year.

The population and demographic makeup of the water system is not anticipated to change significantly in the coming years due to the fact that there are relatively few lots available for development within the water system. This lack of available lots coupled with the fact that development within the Tahoe Basin is expensive and sometimes complicated leads KGID to believe that the demand for water due to growth or a changing demographic makeup is unlikely in the coming years. Water use has remained relatively steady over the past 10 years and very few permits for development are granted on an annual basis.

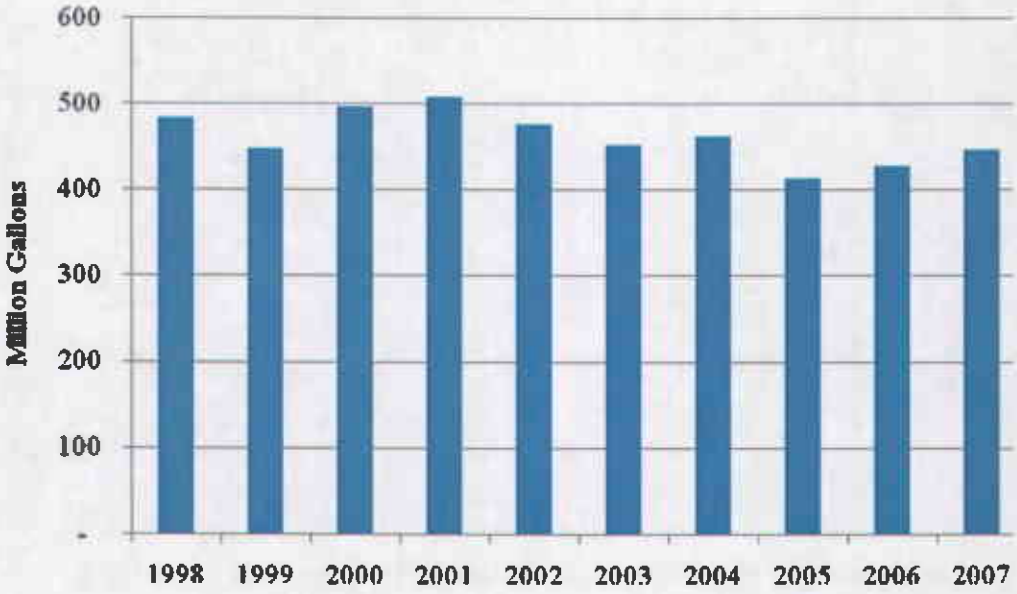
III. Water Use Profile and Forecast

3.0 Historical Water Use

Water use within the KGID water system is primarily residential water use. KGID also serves commercial customers, most notable Heavenly Ski Resort snow making, however commercial water use generally accounts for approximately 15% of the total water use within the system.

The total amount of water pumped on an annual basis for the past 10 years is shown in Figure 1.

Figure 1 – Historical Water Demand



The figures show that water demand has not significantly increased in the KGID water system over the past decade. It is not expected to increase in coming years due to limited growth possibilities. The increase and decrease in the total amount of water used is also greatly affected by Heavenly Ski Resort snow making. Their water use is weather dependent and can range anywhere from 8 million gallons to 46 million gallons.

3.1 Water Use by Customer Group

KGID provides water for the following types of water consumers:

- Residential Single Family
- Residential Multi-Family
- Time Shares
- Mobile Home Parks
- Commercial
- Hydrants, including construction use
- Miscellaneous

Metered customers are classified as follows:

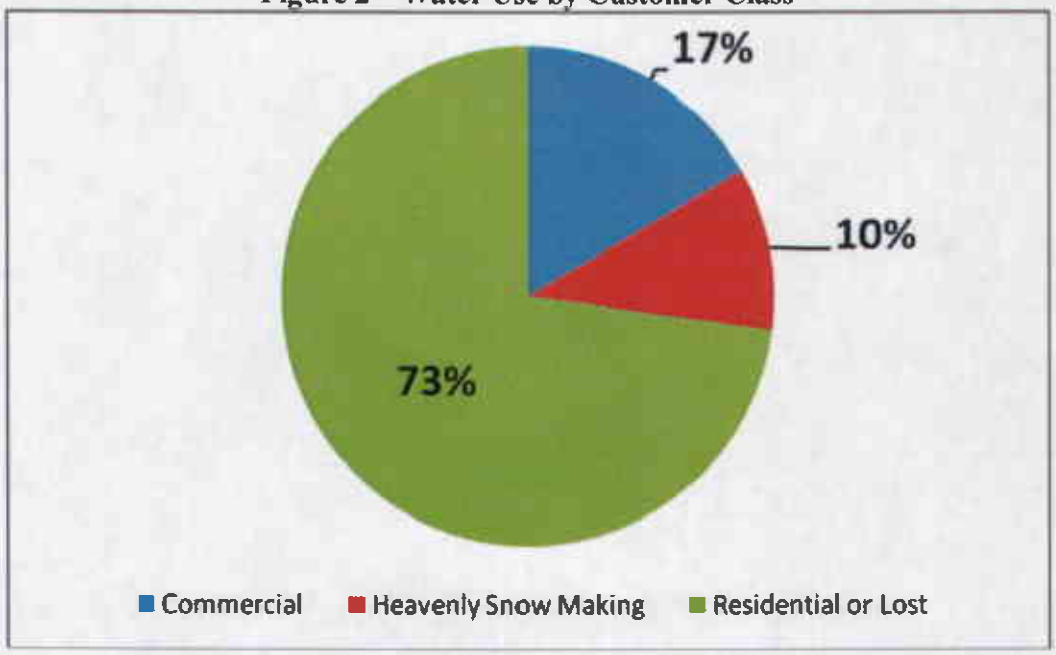
- Residential – Class 1 or 2
  - Class 1 – This service classification shall include single family residences with individual service lines and multiple residential units with dedicated service lines for each unit.
  - Class 2 – This service classification shall include master-metered residential units in single family dwellings, condominiums, townhouses, mobile home parks, time shares and vacation clubs and all other residential units not included in Class 1.
- Commercial
- Hydrant Use

Not all customer connections are metered. This makes it impossible to accurately determine how much of the total water pumped is actually used by customers and how much is lost. However, data from 2007 indicates that commercial customers (including Heavenly Ski Resort) accounted for approximately 27% of total water use. Therefore it can be assumed that residential customers (single family, multi-family, mobile home parks, time shares) and losses accounted for the remaining 73% of the total water pumped. Table 3 shows the estimated 2007 consumption including commercial, residential and loss amounts. Figure 2 illustrates the same information.

Table 3 – 2007 Water Use

Class	KGID
Commercial	74,403,000
Heavenly Snow Making	46,859,000
Residential or Lost	325,000,000
Total	**446,473,000**

Figure 2 – Water Use by Customer Class



The use of water is generally stated in terms of gallons per capita per day (gpcd) for water conservation plans. Due to the large number of second homes and vacation rentals within the KGID service area it is difficult to express the water use within KGID in the terms of gpcd. The US Census data for the service area (based on the zip code) states that the population is approximately 3,900. The Census data also states that there is an estimated 2.28 people per household. Utilizing these numbers, the following table illustrates the different gpcd that can be calculated for the service area.

Table 4 – Gallons Per Capita Per Day

Customer Accounts	US Census Population	US Census Household	Total Population	gpcd
2,475	3,900		3,900	**229**
2,475		2.28	5,643	**158**

As can be seen in the above table, the two numbers are very different. If the gpcd is 229, the KGID water system is using more water per capita than the state average. However, if the gpcd is only 158, the KGID is using significantly less water per capita than the state average and the assumption could be made that water conservation is already taking place within the water system. Due to the lack of data, it is not possible to say with one hundred percent certainty which number is correct. However, due to the known demographics of the service area, i.e. nearly half of the customers live in condos or other multi-family units, it can be assumed the gpcd usage for the service area is likely below the state average of 200 gpcd, but perhaps not as low as 158 gpcd. This number will be reviewed once proper data is available. It must also be noted that due to this lack of data, the statement of any water savings as gpcd due to conservation measures would be inaccurate. Therefore, all water savings in this WCP are stated in total annual gallons.

Table 5 illustrates the wide range of water usage that is seen on a per capita basis based on information from the US EPA. The table illustrates that significant quantities of water are used outdoors and this water usage can have a great affect on the gpcd of a water system.

Table 5 – Low and High Water Usage per Capita per Day

Use	Per Person (Low)	Per Person (High)
Toilets	6.4	48.00
Showers	7.50	75.00
Baths	6.00	10.00
Washing Machine	9.00	25.00
Dish Washer	1.00	4.50
Kitchen Faucet	1.00	15.00
Bathroom Faucet	1.00	9.00
Landscape	12.2	162.6
Total	**44.1**	**349.1**

3.2 Supply and Demand Balance

As previously stated, only a small percentage of KGID customers are metered which makes it impossible to accurately state the amount of water that is being used or wasted versus the amount of water that is being taken from Lake Tahoe and treated. Causes for water being unaccounted-

for are numerous. Leaking mains, dead meters, under-registering meters, record keeping practices, un-metered uses, and multiple users on meters all contribute to the problem. When all meters are installed within the KGID system these causes can be further examined and solutions to them can be formulated. Until that time, performing a supply and demand balance is not feasible.

3.3 Projected Water Use

KGID currently owns 1,747 acre-ft of water rights (according to the 2006 Lake Tahoe Basin Water Use Inventory created by the Nevada Division of Water Resources). All or a portion of this amount can be diverted from Lake Tahoe. 290.3 acre-feet can also be diverted from the district's one active well provided the total Lake and well diversions do not exceed 1,747 acre-feet.

The current demand for water, utilizing pumping records from 2007, show that the annual demand for water, not including Heavenly Ski Resort snow making, is 400 million gallons – or 1,227 acre-ft. KGID is therefore utilizing approximately 70% of their total water rights for general residential and commercial purposes.

An additional 46 million gallons were used by Heavenly Ski Resort snow making during 2007. However, the use of this water does not count against the total water rights available in the same manner as other uses. An agreement with the Division of Water Resources allows KGID to count a maximum of 20% of Heavenly's water use against their water rights. This is due to the fact that the water remains within the basin and is assumed to return to Lake Tahoe. Therefore, while Heavenly used 46 million gallons of water in 2007 only 9.2 million gallons is counted in terms of available water rights.

Between general uses and Heavenly Ski Resort snow making, KGID used 409 million gallons of water in 2007, or 72% of their total available water rights. All of the water is currently taken from Lake Tahoe as the one well within the system is currently not active.

The following table illustrates the average monthly demand and the peak monthly demand for the water system.

Table 6 – Monthly Demand – 2007

Name	Average Monthly Demand (gal)	Peak Demand (gal)	Month of Peak Demand
Lake Tahoe	37,229,000	64,398,000	August

The KGID water system is not anticipated to see any significant growth in the coming years. Due to this lack of population increase, KGID anticipated that water demand will remain the same or decrease in the coming years. It is possible that the demand will decrease due to the replacement of old and leaking water lines that currently contribute to the amount of lost water in the system. In the event that number of connections begins to increase, or available lots are developed at a faster pace than historically has been seen, KGID will monitor their available water rights and the demand for water closely. Over allocation of water will be avoided.

IV. Water Conservation Measures, Incentives and Water Savings

4.0 Water Conservation

Water conservation is achieved through public education and water use reduction. Various measures can be implemented in order to achieve the goals of conservation as outlined by KGID. Each measure must be evaluated to determine what water savings can reasonably be expected from the measure as well as what the overall cost of implementation will be. KGID's goals for conservation are as follows;

1) Install water meters for all customers
2) Perform water audit
3) Reduce real water losses by 30% within 10 years after performing water audit
4) Monitor apparent water losses on an annual basis
5) Reduce water use above 20,000 gallons by 15% within 10 years after performing water audit
6) Reduce water use between 5,000 and 20,000 gallons by 10% within 10 years after performing water audit

In order to achieve these goals, various measures of conservation – ranging from rate increases and leak reduction to public education and participation – have been explored and analyzed to recommend which measures should be adopted immediately, and those which may need to be considered during future revisions of the WCP.

4.1 Measures, Incentives, Water Savings and Cost Benefit Analysis

In this section, each measure that is considered to be a feasible water conservation measure for KGID will be outlined and analyzed. Each measure will include information regarding what the anticipated water savings are estimated to be, what incentives there are for the public to participate in the measure, and a cost benefit analysis to determine whether or not the measure is currently financially feasible. The measures that are ultimately recommended and chosen to be implemented by KGID will be based on their overall effectiveness for water conservation and the ability of KGID to properly implement the measure with the funding available.

4.1.1 Installation of Water Meters

Measure

The proposed measure is to install a water meter at every connection to the KGID water system. KGID has prepared a metering plan and is in the process of securing funding to begin the installation of meters to all customers who do not currently have one. It is hoped that the project will be completed by November of 2011.

Incentive

The installation of water meters is essential to the implementation of an effective WCP for KGID. Meters at every connection to the water system will allow KGID to determine what the actual water loss for any given time period is. Without access to the information that meters can provide there will be no way for KGID to gauge the success of the water conservation measures that are implemented.

In addition to the incentives stated above that will benefit the water system, there are also customer incentives for the installation of water meters. A customer with a water meter will pay only for the water that they use. They will also be able to decide if the conservation of water within their home is in their best interest or if they believe they have water leaks within their homes (toilets, showers, etc.)

Water Savings

The amount of water that could potentially be saved by the installation of water meters is 0 gallons per capita per day (gpcd). The actual installation of the meters will not assist with saving actual gallons of water, instead it will allow for KGID to begin other measures such as leak repair that will have a direct affect on water savings.

Cost Benefit Analysis

The estimated cost of the metering project as outlined in the metering plan is $4.1 million. While this project is not "cost effective" as a standalone project, it is the first step in implementing other conservation measures and will be the only way for the success of any of the measures to be evaluated.

4.1.2 Conservation Oriented Water Rates

Measure

The adoption of new water rates can be an effective manner to encourage water conservation. KGID has recently adopted conservation oriented water rates that became effective for all metered customers on October 1, 2008. The water rates which were adopted are outlined in Table 7.

Table 7 – Current Water Rates

Base Rates

Meter Size	Flow Rate	Meter Ratio	Base Rate
3/4	30	1.00	$ 47.00
1	50	1.67	$ 78.00
1-1/2	100	3.33	$ 157.00
2	160	5.33	$ 251.00
3	320	10.67	$ 501.00
4	500	16.67	$ 783.00
6	1000	33.33	$ 1,567.00

Commodity Rates (Residential Class 1)

Rate Class	Tier	Usage	Cost per 1,000 gal
Residential 1	1	0-5,000	$ 1.50
	2	5,001-20,000	$ 3.00
	3	>20,000	$ 5.00

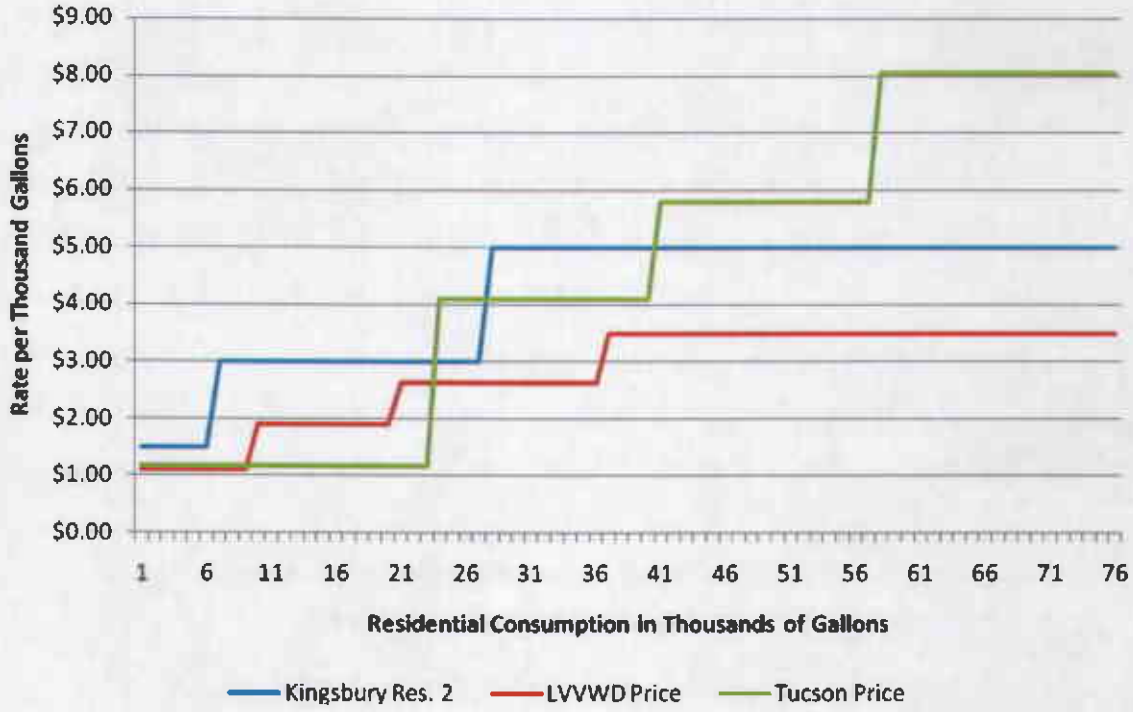
Incentive

The incentive for customers to utilize less water is clearly illustrated in the adopted water rates, the less water that a home uses – the lower the water bill will be. By implementing an inclining block rate, the water necessary for essential house hold needs is provided at the

lowest commodity rate. In contrast, the water utilized above 20,000 gallons is charged at the highest commodity rate to discourage excessive water use. Generally speaking, customers who utilize over 20,000 gallons of water are using large amounts of water outdoors. By charging a higher commodity rate for that usage, it is hoped that those customers may reassess their water use and landscaping necessities.

The water rates that have been adopted by KGID have been compared to other communities, Las Vegas Valley Water District and Tucson, to illustrate the cost per thousand gallons of water. Figure 3 shows the comparison of the three rate structures.

Figure 3 – Water Rate Comparison



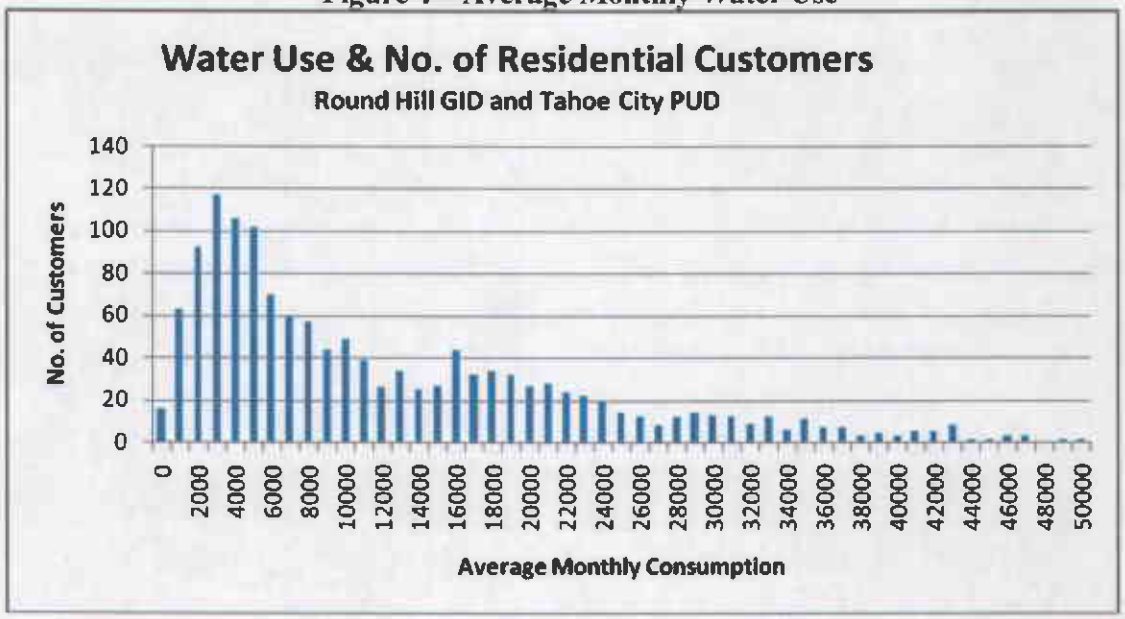
As can be, KGID has adopted a conservation oriented rate that is slightly higher than the other two systems for the first two tiers. However, the Tucson water rate increases significantly at higher consumption rates. Therefore, while the KGID water rates can be considered a significant increase from their previous flat rate they are comparable to LVVWD, Tucson, and other water system in the area and should promote restraint of excessive use of water.

Water Savings

The water savings associated with this measure are difficult to quantify due to the lack of information available regarding residential water use. Very few residential customers currently have water meters, and data analysis is therefore not possible. However, data from other water systems around Lake Tahoe was gathered and it was determined that only 3% of customers from the systems analyzed utilized more than 50,000 gallons per month. Figure 4

shows the distribution of the number of meters versus number of average number of gallons of water used per month.

Figure 4 – Average Monthly Water Use



As can be seen in the previous figure, based on data from other systems, the majority of customers utilize less than 10,000 gallons of water per month. Significantly fewer customers utilize over 20,000 gallons of water per month. It is these customers that will see the greatest incentive to reduce their water consumption due to the higher cost associated with the water that they are utilizing.

It is the goal of KGID to reduce water use above 20,000 gallons/month/customer by 15%. This will require specific targeting of the customers which typically consume large amounts of water. In addition, KGID hopes to reduce water use in the second tier (5,000 to 20,000 gallons per month) by 10%. While water rates will not be the only measure implemented to realize this goal, it is an important one. The actual number of gallons that will be saved by realizing these goals will be determined once data is available showing the water consumption patterns in the two areas of concern.

An estimated number of gallons that will be saved can be calculated by using the pumping data available from 2007. At a minimum, 3.78 million gallons of water were used in the 3rd tier (above 20,000 gallons) and an estimated 150 million gallons were used in the second tier (5,000 to 20,000 gallons). If the goals for conservation are realized, it will result in a savings of 567,000 gallons per year in the third tier of water usage and 15 million gallons per year in the second tier of usage. Again, this must be achieved through the implementation of more than one conservation measure and over a period of years.

Cost Benefit Analysis
The cost associated with rates may actually be seen as a decrease in revenues once all water meters are installed. However, the metering plan is expected to be carried out over a 3 year period which will allow KGID time to begin gather significant amounts of data as the meters are installed and adjust rates as necessary. This measure is not seen to be cost prohibitive in any way.

4.1.3 Water Audits

Measure
Performing a water audit to determine the amount of water pumped, sold and unaccounted for is necessary to determine which areas of the water system need to be targeted for repairs, increased conservation measures, or monitoring. A water audit will be completed as soon as all water meters are installed

Incentive
The water audit will provide KGID with the necessary data to make further steps with their WCP. The information will provide insight on how soon repairs need to be made, if water meters need to be inspected to ensure that they are functioning properly and may ultimately reduce pumping costs and increase revenues.

Water Savings
Future water savings through repairs may be seen, but there will be no water savings realized through the water audit itself.

Cost Benefit Analysis
The benefits are difficult to quantify in the case of the water audit due to the current situation. However, the water audit is an essential item not only for the WCP but for the management of the system in general.

4.1.4 Leak Reduction and Repair

Measure
This measure is intended to eliminate as many leaks as possible in the water system. This measure is currently being implemented to some extent by KGID as the replacement of old and leaking water lines and transmission mains is on-going.

Incentive
The incentives for this measure relate to both the water system and the customers. By reducing water loss, less water will require treatment and pumping into the distribution system. This in turn means decreased costs for treatment and decreased energy costs for pumping less water. These two items directly affect the annual expenses of KGID and therefore the water rates of the customers.

In addition to lowering treatment and pumping costs, general O&M costs will eventually decrease as water lines are replaced and leaks are properly repaired as staff will not be required to spend as much time in the field repairing leaks.

Finally, there is an environmental incentive to be realized. By reducing leaks thereby the amount of water to be used from Lake Tahoe, an increased amount of water will be left in its natural environment. This can benefit the lake itself, the Truckee River, and wildlife in the surrounding areas.

Water Savings

KGID has set a goal of reducing real water losses by 30%. The resulting amount of water that is saved is unknown. Once a water audit is performed, it will be possible to quantify this amount.

Cost Benefit Analysis

A cost benefit analysis will have to be performed for each leak repair project. KGID will have to determine if a temporary fix is sufficient, or if full line replacement is necessary and affordable. Variables that can affect this decision include: the frequency of the leak, the amount of water estimated to be lost through the leak, the length of water line that would be affected by replacement of a section of the line, the cost to repair the leak, and the availability of funds.

4.1.5 Information on Monthly Water Bills

Measure

The inclusion of information on monthly water bills regarding the amount of water used during the month, the amount of water used in the same month the previous year, and the percentage reduction or increase in water used. Other information can be included in the monthly bills, such as suggestions for increased water conservation to further lower the customer's water bill.

Incentive

By providing the customers with increased information regarding their consumption levels, they can make informed decisions regarding their water use habits. Customers will also be able to see whether or not any in-home conservation measures they have implemented are effective. The information may also help detect leaks; an unusual increase in consumption may alert the customer to a problem within their home with their plumbing.

Water Savings

Water savings from this measure will be reanalyzed once water meters are installed and savings can be quantified. The goal for the measure will eventually be to have 30% of residential customers in single family homes conserve 5% of their water. The customer group will be targeted with public education in order to realize this goal.

Cost Benefit Analysis

The additional information on the customer bills will require a certain amount of administrative time, however the benefits of the information provided to the customers will outweigh the one time task of setting up a new bill format.

4.1.6 Public Education

Measure

Educating the public about water conservation is an essential element to the success of the WCP. Public education can occur through a variety of measures including seminars for employees, various forms of media (internet, TV, newspapers and fliers), and the coordination of various agencies, groups and public interest groups to promote various conservation measures and their benefits. Public education is necessary to promote other conservation measures and educate the customers of the service area regarding how they can directly affect the overall conservation goals of KGID.

The public education measures that will be utilized within the next two years will include the following:

1. Promote and encourage input on the WCP
2. Provide educational material regarding the pros and cons of meter installation
3. Prepare to conduct surveys to determine what information customers need to be properly informed about water conservation
4. Research and obtain information from various sources (AWWA, UNR Extension Office, etc.) that can aid in public education and can be distributed to customers
5. Design bills for metered customers to illustrate important information regarding water consumption

Additional information regarding public education and tools that can be utilized is outlined in Appendix B.

Incentive

The incentives for KGID to perform public education are linked to the success of the WCP. Without proper public education regarding the other measures, the opportunities for success with the plan are limited.

Water Savings

There is not a specific quantity of saved water that can be linked to public education itself. However, without public education the likelihood of being able to meet conservation goals and gain public support and participation are limited.

Cost Benefit Analysis

The costs of the various public education activities will be closely monitored and weighed against the benefits of the measure. During the first phases of implementation of the WCP, less expensive education measures will be implemented. This is due to the fact that the benefits of water conservation will be difficult to quantify until the installation of meters to all customers is complete. Once meters have been installed for all customers, education measures and programs will be reviewed and updated as KGID feels necessary.

A budget for public education will be designed and reviewed on an annual basis to determine if the programs being implemented are successful, ineffective, or too costly.

4.1.7 Encourage Low Flow Fixtures for Homes

Measure

This measure is intended to encourage customers to install low flow fixtures within their homes to aid in the water conservation effort as well as to possibly lower their monthly water bills. The fixtures that can easily be replaced or upgraded in homes include showerheads and faucets.

Incentive

The measure will be promoted as a means for the customer to lower their water consumption and in turn – their water bills.

Water Savings

Water savings from low flow fixtures are illustrated in the following table.

Table 8 – Low Flow Fixtures

		WATER USE (gpd)		WATER SAVINGS (gpd)	
Fixture*	**Fixture Capacity**	**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

It is unknown how many households will be able to participate in the installation of low flow fixtures, however it is known that there are multiple single family residences within the service area that were constructed in the 1970's. These homes likely have some high flow fixtures due to their age. The replacement of the high flow fixtures will affect water demand, however to determine the amount of water that will be saved surveys of customers must be conducted to evaluate how many homes can participate.

Cost Benefit Analysis

The cost of this measure on the part of KGID will be limited to public education regarding the benefits of replacing old, high flow fixtures. While some water systems offer rebate programs for the replacement of certain fixtures, KGID has determined that size of the system would not support the financial requirements of a rebate program. Therefore KGID will rely on customer education and volunteer participation.

4.1.8 Pressure Regulation and Reduction

Measure

High or excessive pressure in water mains can directly affect the amount of water used in a home. Even with the installation of low flow fixtures in a home, water savings are seen only when the pressure of the water coming into the home is controlled – generally around 60 psi. KGID is located in an area of steep terrain, and therefore pressure regulation is of concern and an area where conservation can be promoted through the installation of Pressure Regulating Devices (prvs) at appropriate locations.

Incentive

Reducing the pressure in water mains also reduces the occurrence of pipe bursts and leaks. This is a direct incentive for KGID to control pressure in the water lines. This is already done, however improvements can be made.

Customers enjoy having adequate water pressure, however excessive pressure results in more water being used for everyday tasks and higher water bills may be seen as a result. Reducing the pressure in the water mains, or installing a PRV on their service line, can directly benefit the customer.

Water Savings

The water savings from this measure would vary from connection to connection depending on the pressure of water at each location. A water model reflecting the pressure seen in various areas of the system is necessary in order to determine where additional pressure regulation may benefit the system. The cost of large PRVs can be excessive, therefore the water savings would have to be adequate to warrant pressure regulation.

Cost Benefit Analysis

The cost of small, service line PRVs is limited. In the event that a home is currently has excessive water pressure, the purchase and installation of a PRV may be warranted. However in the case of high pressure in a large water main, the benefits of the installation of a PRV would need to be examined on a case by case basis in order to determine if the purchase of PRV would be cost effective. Large PRVs are expensive and require maintenance. All costs should be considered prior to determining the best solution.

4.1.9 Encouraging Reduction in Lawn Size and Use of Native Plants

Measure

KGID does not have jurisdiction over lawn size or outdoor landscaping in general. However, with the cost of water increasing KGID will encourage customers with large lawns to reduce their lawn size or consider replacing plants with drought tolerant or native plants.

Incentive

A significant portion of the water used in the summer months is for outdoor water use. By educating customers on alternative landscaping opportunities it is hoped that summer water use will decrease. It will allow KGID to treat and deliver less water and will decrease the water bills of customers who employ restraint in their outdoor water use.

Water Savings
The water savings associated with this measure will be quantified once water meters are installed and the actual amount of water being utilized by customers on landscaping can be quantified.

Cost Benefit Analysis
The cost of the measure is insignificant in comparison with the possible benefits. The cost to KGID will be for public education, while the benefits can be resulting gallons of water that will not require treatment and delivery. This will reduce peak demands and costs associated with those demands.

4.1.10 Regulatory Conservation

Measure
KGID may consider revising Ordinance #1, the water system ordinance, to reflect conservation measures that may be put into place in the future. The water ordinance includes conditions under which service may be terminated for reasons of waste. It also establishes the District's right to restrict and apportion water during times of drought or any other emergency that threatens the water supply.

Incentive
The current ordinance has been updated to reflect the new water rates and rate classes. As stated above, it also includes fines for water wasting. However, future conservation measures may warrant changing of Ordinance #1, and the water wasting fines may need to be updated in the future if they prove to be ineffective when enforced.

Water Savings
There is no direct water savings associated with this measure at this time.

Cost Benefit Analysis
There is no cost associated with this measure at this time.

V. Drought Plan

Trigger points and the associated measures have been identified for each stage of drought. When water system operators and managers determine that a trigger point has been reached, they will bring the appropriate information and data to the KGID Board of Trustees (Board) for action. The Board will weigh the information and decide what stage of drought should be declared. Once a drought stage has been declared, all measures pertaining to that stage will be implemented and enforced.

The different drought stages will be determined based upon the level of water in Lake Tahoe. Many water systems around the Lake receive their water from the Lake itself, therefore the level of the water is constantly monitored. The KGID water system has a deep intake which provides water to the lake pump station via gravity flow. If the Lake level falls below an elevation of 6,216, water will no longer flow by gravity into the pump station. It is this elevation that is monitored to determine what stage of drought must be declared.

In the event of a drought declaration, the following restrictions will be imposed upon all water users within the KGID. In addition, if the restrictions are not followed and violations are documented customers will be fined for water wasting as outlined in the KGID Water Ordinance #1.

Stage 1: Normal Conditions

Situation

During Stage 1, when conditions are normal and there is an adequate water supply, property owners and their tenants shall not waste water and shall comply with the following:

Measures

a. Water shall not be allowed to flow from the property onto impervious surfaces or adjacent property.

b. Property owners shall repair all leaks in plumbing and irrigation systems in a timely manner.

c. Hoses shall not be used for washing vehicles without the use of a shut-off nozzle attached to the hose. Continuous discharge from a hose nozzle is prohibited.

d. Water users are encouraged to report to the District all signs of water leaks or water waste.

Stage 2: Moderate Water Supply Shortage

Situation
During Stage 2, when the District has determined there is a moderate water supply shortage, State 1 restrictions apply, plus the following additional restrictions:

Measures
These measures shall be in addition to or supersede those included in the Drought Warning Stage.

a. Designated irrigation days shall be established which require a property whose street address ends with an even number to water on even-numbered calendar days and a property whose street address ends with an odd number to water on odd-numbered calendar days. No irrigation is allowed on the 31st of the month. An exemption shall exist under Stage 2 restrictions for new lawn planted within thirty (30) days of the commencement of Stage 2, or to comply with the Tahoe Regional Planning Agency's re-vegetation requirements on new construction or remodels. Irrigation of lawns, gardens, landscaped areas, trees, shrubs or other plants is permitted at anytime if: 1) a hand-held hose is used, or 2) a hand-held, faucet filled bucket of five (5) gallons or less is used, or 3) a drip or soaker-type irrigation system is used.

b. Water shall not be used to wash sidewalks, driveways, parking areas, tennis courts, decks, patios or other improved areas, except in conjunction with driveway repair and sealing or to alleviate immediate fire or sanitation hazards.

c. All commercial establishments where food or beverages are provided shall serve water to their customers only when specifically requested by the customer.

Stage 3: Severe Water Supply Shortage

Situation
During Stage 3, when the District has determined there is a severe water supply shortage, Stage 1 and Stage 2 restrictions shall apply, plus the following restrictions:

Measures

a. There shall be no new lawn or landscape installation.

b. There shall be no washing of vehicles or other motorized equipment except at commercial washing facilities that recycle wash water.

c. Irrigation of lawns, gardens, landscaped areas, trees, shrubs or other plants is permitted only once per week except irrigation may be done at anytime only if: 1) a hand-held hose is used, or 2) a hand-held, faucet filled bucket of five (5) gallons or less is used, or 3) a drip or soaker-type irrigation system is used. The Board may permit an exception for commercial and public facilities.

d. The operation of any ornamental fountain or similar decorative water structure is prohibited unless a recycling system is used and a notice to the public of such recycling system is prominently displayed.

e. The filling of outdoor swimming pools is permitted only if they are covered during periods of non-use.

Stage 4: Emergency Water Supply Shortage

Situation

During Stage 4, when the Board has determined there is an emergency water supply shortage, or the General Manager has determined there is a temporary emergency water supply shortage due to failure of a major supply line or pumping facility, Stage 1, 2 and 3 restrictions shall apply, plus the following restrictions:

Measures

a. The use of water for other than domestic and commercial use is prohibited except that the Board (or General Manager in the case of a temporary emergency) may grant discretionary exemptions for individual water users or specific facilities or impose reasonable conditions in lieu of compliance with this Section.

b. The use of water for dust or dirt control, grading and construction purposes is prohibited.

c. The flushing of fire hydrants, except for emergency purposes, is prohibited.

VI. Recommended Conservation Plan

6.0 Selection of Conservation Measures

The conservation measures that have been selected by KGID to be implemented as soon as possible are those that are felt to be practical, cost effective, and can be supported by the GID and the public in general. The measures that are outlined in Section 4 are those that are believed to be well suited for the water system as it currently exists. There are numerous other conservation measures that may be considered in the future depending on the changing demographics of the water system or on financial feasibility.

The conservation measures that will be implemented within the next 5 years include the following;

1. Installation of water meters for all customers.
2. Billing all customers according to the metered rate structure.
3. Performance of a water audit.
4. Begin reduction of real water losses through leak repair.
5. Begin public education programs, including general information regarding water conservation, informative billing and information at KGID board meetings.

6.1 Description of Recommended Plan

The recommended conservation plan for the KGID service area includes the implementation of the measures outlined in Section 4. In order to properly implement the measures as outlined, KGID will create a water conservation budget as well as appoint the necessary staff to carry out the conservation plan.

Due to the current status of KGID in regard to the installation of water meters, it will be necessary to update the WCP upon completing the installation of all of the water meters. The progress that is made in regard to public education, and a full assessment of the water audit that is performed will need to be completed in order to evaluate the potential of the conservation measures and goals that are part of the current recommended plan.

6.2 Projected Water Savings

The projected water savings can only be estimated at this time due to the lack of data available to quantify water use on a per customer basis, or to quantify the total amount of water that may be lost on an annual basis due to leaks.

Each measure is designed to either conserve a total number of gallons of water, or to assist a separate measure in conserving water. Table 9 outlines each measure and its goal of water conservation. The total number of gallons projected to be saved by the implementation of these measures is shown in the table.

Table 9 – Conservation Measures and Water Savings

Conservation Measure	Goal	Projected Water Savings
Install Water Meters	Complete by Nov. 2011	
Conservation Oriented Rates	Reduce Water Use in Upper Tiers	
	>20,000 gallons	567,000
	5,000-20,000 gallons	15,000,000
Water Audit	Account for all water	
Leak Reduction/Repair	Reduce Water Losses by 30%	Unknown
Informative Monthly Bills	Encourage Public Participation in Conservation	
Public Education	Inform public	
Low Flow Fixtures	Reduce in-home water use	Review after installation of meters
Lawn Size and Native Plants	Outdoor water conservation	Unknown
Total (Current) Projected Water Savings		**15,567,000**

Each conservation measure and its projected savings will need to be reviewed once a water audit is completed to ensure that the goals and projected water savings are achievable. Based on the current information available about water use within the KGID system, it is anticipated that these goals and water savings are practical.

6.3 Overall Water System Benefits

The overall benefits to the water system will be both monetary and environmental. By utilizing less water, lower costs will be seen for O&M and customer water bills. In addition, this will allow for a greater amount of water to remain in its natural environment and help prevent water shortages not only for KGID but surrounding communities that also utilize Lake Tahoe for their water source.

The installation of water meters will be the key task in fully implementing this WCP. The information that the meters will supply will aid KGID in assessing their water conservation goals as well as determine the overall cost benefits of reducing leaks and continuing to effectively conserve water based on the needs of the water system.

6.4 Implementation Schedule

The implementation of this WCP is such that there will be a necessity to review the goals and implementation schedule again once all of the water meters are installed. It is anticipated that it will take at least 3 years to install the water meters, therefore the anticipated implementation schedule for this WCP is currently only through 2011. During the 2010/2011 fiscal year, KGID will complete a comprehensive review of the WCP and future schedule to ensure that the plan can be carried out as intended. Table 10 includes the implementation schedule for the next 3 years.

Table 10 – Implementation Schedule of Conservation Measures

	2009	2010	2011
Measures			
Install Water Meters	Ongoing		
Conservation Oriented Rates	Implement as Meters are installed		
Perform Water Audit			Complete
Leak Reduction and Repair	Ongoing		
Design Informative Water Bills	Complete		
Public Education	Ongoing		
Low Flow Fixtures	Ongoing with Education		
Lawn Size and Native Plants	Ongoing with Education		

As can be seen in the implementation schedule, many of the tasks are "ongoing". It is anticipated that many of the measures will continue beyond 2011. Each fiscal year as a budget for water conservation is determined, specific sub-measures will be decided upon within the Public Education Measure – which will directly affect other measures that are dependent upon public education. Also, as the WCP progresses new measures will be added to the plan to suit the community needs and acceptance of the plan.

6.5 Plan Effectiveness

The effectiveness of this current WCP and implementation schedule will be measured based on the completion of meter installation, a water audit, an informative bill structure, and the collection of data that will help evaluate the stated and future goals of the WCP. As stated previously, upon completion of the meter installation project a review of the goals, conservation measures and schedule of the WCP will be necessary.

Measures relating to water use reduction will be measured based on what percentage of the goal has been met. For example, it is the goal to reduce real water losses by 30% by 2020. The effectiveness of the measures to meet this goal will be determined based on what percentage real water losses have actually decreased. If the losses have only been reduced by 5% by 2015, KGID will consider implementing new measures or reinforcing existing measures in order to ensure the reduction of real water losses is increased in order to meet the goal by 2020.

Many of the goals cannot be evaluated until all water meters are installed and data is collected. As data begins to accrue, KGID will begin to set benchmarks for their goals. These benchmarks will be dependent on what the new data reveals about water use within the system.

6.6 Budget and Staffing

The budget and staffing of the WCP will be limited during the first years of implementation. This is due to the fact that the majority of the water conservation measures that will need staff time and budget will not be in full effect until the installation of water meters is complete. The installation of the water meters will be completed through a separate contract to an outside firm and is anticipated to be funded through a loan and grant funds.

A member of the KGID staff will be selected to implement and oversee conservation incentives and measures. This person will be responsible for managing a conservation budget, organizing

educational programs, overseeing utility conservation efforts (leak detection, public awareness, water loss accountability, etc.), and supervision of any additional conservation personnel. This conservation specialist will review and update the conservation plan at least every five years and will evaluate the effectiveness of existing conservation measures and incentives. This person will also be the head of a conservation committee and will be a source of conservation information and expertise for committee members.

During the first year of the plan (2009), the appointed staff will be directed to design a "user friendly" water bill. An additional ongoing task for staff is to track water line leaks. This is currently done and will continue in order to maintain a complete record of the areas with the most frequent leak problems that may need to be addressed as part of the Leak Reduction and Repair conservation measure.

Staffing needs and budgets will be reviewed on an annual basis during process of determining the needs and funding for the next fiscal year. A specific budget for water conservation items will be created and funded each year. In addition, if it is warranted, additional staff may be hired to assist with the WCP.

VII. Conclusion

This Water Conservation Plan will be a living document for KGID for years to come. Due to the current condition of the water system, and the necessary updates that will be required to correctly implement the WCP, KGID will review and update the plan as water meters are installed and data is collected. While estimates are given for the projected number of gallons of water that can be saved through water conservation, it is assumed that with correct data that number will change.

The success of the WCP will also depend on the public's perception of water conservation and if they feel that it is necessary. While it is assumed that a certain portion of the customers will want to conserve and reduce their water usage, there may also be a portion of the customers that will want to continue their water use as usual. As customers receive water meters and are made aware of how their water bill can change based on their water use, KGID will begin to see if the conservation oriented rates are effective.

It is felt that the current goals of the WCP are practical and achievable. As the plan progresses, and repairs are made to the water system, new goals will be formulated and new measures can be implemented as necessary. In the near future however, the following goals will be the focus of the KGID conservation effort;

1) Install water meters for all customers
2) Perform water audit
3) Reduce real water losses by 30% within 10 years after performing water audit
4) Monitor apparent water losses on an annual basis
5) Reduce water use above 20,000 gallons by 15% within 10 years after performing water audit
6) Reduce water use between 5,000 and 20,000 gallons by 10% within 10 years after performing water audit

APPENDIX A

NEVADA REVISED STATUTES

WATER CONSERVATION

NRS 540.121 "Supplier of water" defined. As used in NRS 540.121 to 540.151, inclusive, "supplier of water" includes, but is not limited to:

1. Any county, city, town, local improvement district, general improvement district and water conservancy district;

2. Any water district, water system, water project or water planning and advisory board created by a special act of the Legislature; and

3. Any other public or private entity,

➥ that supplies water for municipal, industrial or domestic purposes. The term does not include a public utility required to adopt a plan of water conservation pursuant to NRS 704.662.

(Added to NRS by 1991, 520)

NRS 540.131 Plan of water conservation: Procedure for adoption and updating of plan; review of plan by Section; joint plans permitted by certain suppliers; duties of local governing body.

1. Except as otherwise provided in subsection 5, each supplier of water which supplies water for municipal, industrial or domestic purposes shall, on or before July 1, 1992, adopt a plan of water conservation based on the climate and the living conditions of its service area in accordance with the provisions of NRS 540.141, and shall update the plan pursuant to paragraph (c) of subsection 4. The provisions of the plan must apply only to the supplier's property and its customers. The supplier of water shall submit the plan to the Section for review by the Section pursuant to subsection 3.

2. As part of the procedure of adopting a plan, the supplier of water shall provide an opportunity for any interested person, including, but not limited to, any private or public entity that supplies water for municipal, industrial or domestic purposes, to submit written views and recommendations on the plan.

3. The plan must be reviewed by the Section within 30 days after its submission and approved for compliance with this section and NRS 540.141 before it is adopted by the supplier of water.

4. The plan:

(a) Must be available for inspection by members of the public during office hours at the offices of the supplier of water;

(b) May be revised from time to time to reflect the changing needs and conditions of the service area. Each such revision must be made available for inspection by members of the public; and

(c) Must be updated every 5 years and comply with the requirements of this section and NRS 540.141.

5. Suppliers of water:

(a) Who are required to adopt a plan of water conservation pursuant to this section; and

(b) Whose service areas are located in a common geographical area,

➥ may adopt joint plans of water conservation based on the climate and living conditions of that common geographical area. Such a plan must comply with the requirements of this section and NRS 540.141.

6. The board of county commissioners of a county, the governing body of a city and the town board or board of county commissioners having jurisdiction of the affairs of a town shall:

(a) Adopt any ordinances necessary to carry out a plan of conservation adopted pursuant to this section which applies to property within its jurisdiction;

(b) Establish a schedule of fines for the violation of any ordinances adopted pursuant to this subsection; and

(c) Hire such employees as it deems necessary to enforce the provisions of any ordinances it adopts pursuant to this subsection.

(Added to NRS by 1991, 520; A 2005, 2570; 2007, 1253)

NRS 540.141 Required provisions of plan or joint plan of water conservation; review by Section; posting of plans and joint plans on Internet website.

1. A plan or joint plan of water conservation submitted to the Section for review must include provisions relating to:

(a) Methods of public education to:

(1) Increase public awareness of the limited supply of water in this State and the need to conserve water.

(2) Encourage reduction in the size of lawns and encourage the use of plants that are adapted to arid and semiarid climates.

(b) Specific conservation measures required to meet the needs of the service area, including, but not limited to, any conservation measures required by law.

(c) The management of water to:

(1) Identify and reduce leakage in water supplies, inaccuracies in water meters and high pressure in water supplies; and

(2) Where applicable, increase the reuse of effluent.

(d) A contingency plan for drought conditions that ensures a supply of potable water.

(e) A schedule for carrying out the plan or joint plan.

(f) Measures to evaluate the effectiveness of the plan or joint plan.

(g) For each conservation measure specified in the plan or joint plan, an estimate of the amount of water that will be conserved each year as a result of the adoption of the plan or joint plan, stated in terms of gallons of water per person per day.

2. A plan or joint plan submitted for review must be accompanied by an analysis of:

(a) The feasibility of charging variable rates for the use of water to encourage the conservation of water.

(b) How the rates that are proposed to be charged for the use of water in the plan or joint plan will maximize water conservation, including, without limitation, an estimate of the manner in which the rates will affect consumption of water.

3. The Section shall review any plan or joint plan submitted to it within 30 days after its submission and approve the plan if it is based on the climate and living conditions of the service area and complies with the requirements of this section.

4. The Chief may exempt wholesale water purveyors from the provisions of this section which do not reasonably apply to wholesale supply.

5. To the extent practicable, the State Engineer shall provide on his Internet website a link to the plans and joint plans that are submitted for review. In carrying out the provisions of this subsection, the State Engineer is not responsible for ensuring, and is not liable for failing to ensure, that the plans and joint plans which are provided on his Internet website are accurate and current.

(Added to NRS by 1991, 521; A 2005, 2571; 2007, 1254)

NRS 540.151 Supplier of water required to adopt plan to provide certain incentives; procedure for adoption of plan; adoption of joint plans permitted.

1. Except as otherwise provided in subsection 5, each supplier of water which supplies water for municipal, industrial or domestic purposes shall adopt a plan to provide incentives:

(a) To encourage water conservation in its service area;

(b) To retrofit existing structures with plumbing fixtures designed to conserve the use of water; and

(c) For the installation of landscaping that uses a minimal amount of water.

➥ The supplier of water may request assistance from the Section to develop its plan.

2. As part of the procedure of adopting a plan, the supplier of water shall provide an opportunity for any interested person to submit written views and recommendations on the plan.

3. The supplier of water shall file a copy of the plan with the Section for informational purposes.

4. The plan:

(a) Must be available for inspection by members of the public during office hours at the offices of the supplier of water; and

(b) May be revised from time to time to reflect the changing needs and conditions of the service area. Each such revision must be made available for inspection by members of the public.

5. Suppliers of water:

(a) Who are required to adopt a plan for incentives pursuant to this section; and

(b) Whose service areas are located in a common geographical area,

➥ may adopt joint plans.

(Added to NRS by 1991, 522; A 2005, 2571)

APPENDIX B

PUBLIC EDUCATION MATERIAL

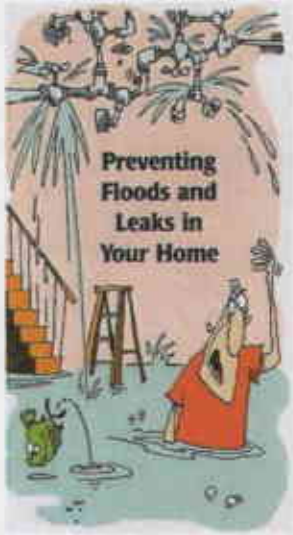
APPENDIX B – EDUCATIONAL MATERIALS

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).

FIGURES 3.1, 3.2, and 3.3

AWWA Conservation Pamphlets

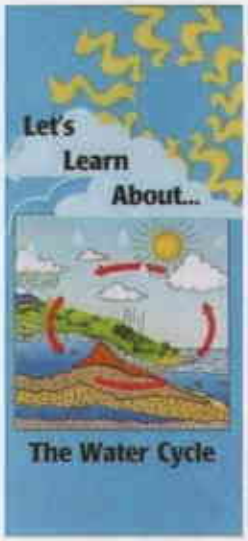


Preventing Floods and Leaks in Your Home emphasizes the importance of locating a master valve and discusses where it might be. It also deals with faucet, toilet, and hose leaks (see figure 3.3).

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).

FIGURES 3.4, 3.5 and 3.6

AWWA Conservation Pamphlets



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

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

FIGURES3.7, 3.8, and 3.9

AWWA Conservation Pamphlets

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

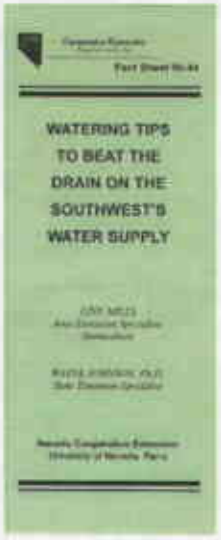
Water Conservation at Home discusses in-home conservation practices for bathroom, kitchen, and outdoor water use (see figure 3.8).

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).

In addition to AWWA publications, The University of Nevada Cooperative Extension publishes Fact Sheets that encourage conservation. 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).

FIGURES 3.10, 3.11, and 3.12

University of Nevada Cooperative Extension Fact Sheets



APPENDIX C

NEVADA REVISED STATUTES WITH COMMENTS

WATER CONSERVATION

NRS 540.121 "Supplier of water" defined. As used in NRS 540.121 to 540.151, inclusive, "supplier of water" includes, but is not limited to:

1. Any county, city, town, local improvement district, general improvement district and water conservancy district;

2. Any water district, water system, water project or water planning and advisory board created by a special act of the Legislature; and

3. Any other public or private entity,

➥ that supplies water for municipal, industrial or domestic purposes. The term does not include a public utility required to adopt a plan of water conservation pursuant to NRS 704.662.

(Added to NRS by 1991, 520)

NRS 540.131 Plan of water conservation: Procedure for adoption and updating of plan; review of plan by Section; joint plans permitted by certain suppliers; duties of local governing body.

1. Except as otherwise provided in subsection 5, each supplier of water which supplies water for municipal, industrial or domestic purposes shall, on or before July 1, 1992, adopt a plan of water conservation based on the climate and the living conditions of its service area in accordance with the provisions of NRS 540.141, and shall update the plan pursuant to paragraph (c) of subsection 4. The provisions of the plan must apply only to the supplier's property and its customers. The supplier of water shall submit the plan to the Section for review by the Section pursuant to subsection 3.

2. As part of the procedure of adopting a plan, the supplier of water shall provide an opportunity for any interested person, including, but not limited to, any private or public entity that supplies water for municipal, industrial or domestic purposes, to submit written views and recommendations on the plan. (Page 1)

3. The plan must be reviewed by the Section within 30 days after its submission and approved for compliance with this section and NRS 540.141 before it is adopted by the supplier of water.

4. The plan:

(a) Must be available for inspection by members of the public during office hours at the offices of the supplier of water; (Page 1)

(b) May be revised from time to time to reflect the changing needs and conditions of the service area. Each such revision must be made available for inspection by members of the public (Page 1); and

(c) Must be updated every 5 years and comply with the requirements of this section and NRS 540.141. (Page 23)

5. Suppliers of water:

(a) Who are required to adopt a plan of water conservation pursuant to this section; and

(b) Whose service areas are located in a common geographical area,

➥ may adopt joint plans of water conservation based on the climate and living conditions of that common geographical area. Such a plan must comply with the requirements of this section and NRS 540.141.

6. The board of county commissioners of a county, the governing body of a city and the town board or board of county commissioners having jurisdiction of the affairs of a town shall:

(a) Adopt any ordinances necessary to carry out a plan of conservation adopted pursuant to this section which applies to property within its jurisdiction; (Ordinance #1 for the water system has been updated to include new water rates, it also includes the drought plan and fines for water wasting. It is stated in the WCP that the ordinance will continue to be updated as necessary, Page 19)

(b) Establish a schedule of fines for the violation of any ordinances adopted pursuant to this subsection; (Included in Ordinance #1) and

(c) Hire such employees as it deems necessary to enforce the provisions of any ordinances it adopts pursuant to this subsection. (Page 25)

(Added to NRS by 1991, 520; A 2005, 2570; 2007, 1253)

NRS 540.141 Required provisions of plan or joint plan of water conservation; review by Section; posting of plans and joint plans on Internet website.

1. A plan or joint plan of water conservation submitted to the Section for review must include provisions relating to:

(a) Methods of public education to:

(1) Increase public awareness of the limited supply of water in this State and the need to conserve water. (Page 16)

(2) Encourage reduction in the size of lawns and encourage the use of plants that are adapted to arid and semiarid climates. (Page 18)

(b) Specific conservation measures required to meet the needs of the service area, including, but not limited to, any conservation measures required by law. (Section 4 in its entirety)

(c) The management of water to:

(1) Identify and reduce leakage in water supplies, inaccuracies in water meters and high pressure in water supplies; and (Page 14)

(2) Where applicable, increase the reuse of effluent. (N/A)

(d) A contingency plan for drought conditions that ensures a supply of potable water. (Section 5 and Ordinance #1)

(e) A schedule for carrying out the plan or joint plan. (Page 24)

(f) Measures to evaluate the effectiveness of the plan or joint plan.(Page 25)

(g) For each conservation measure specified in the plan or joint plan, an estimate of the amount of water that will be conserved each year as a result of the adoption of the plan or joint plan, stated in terms of gallons of water per person per day. (Page 24, statement in gallons per year due to unknown population)

2. A plan or joint plan submitted for review must be accompanied by an analysis of:

(a) The feasibility of charging variable rates for the use of water to encourage the conservation of water. (Page 11)

(b) How the rates that are proposed to be charged for the use of water in the plan or joint plan will maximize water conservation, including, without limitation, an estimate of the manner in which the rates will affect consumption of water. (Page 11-14)

3. The Section shall review any plan or joint plan submitted to it within 30 days after its submission and approve the plan if it is based on the climate and living conditions of the service area and complies with the requirements of this section.

4. The Chief may exempt wholesale water purveyors from the provisions of this section which do not reasonably apply to wholesale supply.

5. To the extent practicable, the State Engineer shall provide on his Internet website a link to the plans and joint plans that are submitted for review. In carrying out the provisions of this subsection, the State Engineer is not responsible for ensuring, and is not liable for failing to ensure, that the plans and joint plans which are provided on his Internet website are accurate and current.

(Added to NRS by 1991, 521; A 2005, 2571; 2007, 1254)

NRS 540.151 Supplier of water required to adopt plan to provide certain incentives; procedure for adoption of plan; adoption of joint plans permitted.

1. Except as otherwise provided in subsection 5, each supplier of water which supplies water for municipal, industrial or domestic purposes shall adopt a plan to provide incentives:

(a) To encourage water conservation in its service area;

(b) To retrofit existing structures with plumbing fixtures designed to conserve the use of water (Page 17); and

(c) For the installation of landscaping that uses a minimal amount of water. (Page 18)

➥ The supplier of water may request assistance from the Section to develop its plan.

2. As part of the procedure of adopting a plan, the supplier of water shall provide an opportunity for any interested person to submit written views and recommendations on the plan. (Page 1)

3. The supplier of water shall file a copy of the plan with the Section for informational purposes.

4. The plan:

(a) Must be available for inspection by members of the public during office hours at the offices of the supplier of water; and (Page 1)

(b) May be revised from time to time to reflect the changing needs and conditions of the service area. Each such revision must be made available for inspection by members of the public. (Page 24)

5. Suppliers of water:

(a) Who are required to adopt a plan for incentives pursuant to this section; and

(b) Whose service areas are located in a common geographical area,

➥ may adopt joint plans.

(Added to NRS by 1991, 522; A 2005, 2571)

APPENDIX D

ADDITIONAL CONSERVATION MEASURES

APPENDIX D – CONSERVATION MEASURES

Conservation measures are divided into two types: (1) Hardware/Equipment and (2) Behavioral/Managerial. Each of these is subdivided into five categories of application: (1) Residential, (2) Landscape, (3) Industrial, Commercial, and Institutional (ICI) (4) Agricultural, and (5) Purveyor. The following conservation measures will be classified first by application and then by type.

D.1 RESIDENTIAL CONSERVATION MEASURES

D.1.1 Behavioral Measures

D.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.

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

D.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

D.2 LANDSCAPE CONSERVATION MEASURES

D.2.1 Behavioral Measures

D.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.

D.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.

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

D.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.

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

D.3.1 Behavioral and Hardware/Equipment Measures

D.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.

D.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.

D.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.

D.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.

D.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.

D.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.

D.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.

- 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.

D.4 GENERAL CONSERVATION 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.

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.	

D.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.

D.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.

D.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.

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

45. 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.

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

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

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

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

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

51. Check washing machine hoses regularly for leaks.

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

53. 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.

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. Bathe your pets outdoors in an area in need of water.

9. While staying in a hotel or even at home, consider reusing your towels.

10. When backwashing your pool, consider using the water on your landscaping.

APPENDIX E

WATER WEBSITES

APPENDIX E – WATER WEBSITES

WATER

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

DROUGHT

- DroughtMonitor@ndmc.unl.edu

LANDSCAPE

- www.usda.gov/news/garden.htm
- www.tmwalandscapeguide.com/landscape_guide/interactive/index.php
- www.unce.unr.edu/publications/files/nr/2006/eb0601.pdf

EDUCATION

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

INSTITUTIONAL

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

LEAK DETECTION

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

APPENDIX F

LANDSCAPE GUIDES

APPENDIX F – LANDSCAPE GUIDES

The following list is taken from the Truckee Meadows Water Authority (TMWA) website. More information on these plants, including color photos can be found at **www.tmwalandscapeguide.com**.

PERENNIAL **FLOWERS**

Artemisia species/Sage or Wormwood (Perennial)—water use: Very Low

Eriogonum umbellatum/Sulfur Flowered Buckwheat (Perennial)—water use: Very Low

Achillea species/Yarrow (Perennial)—water use:Low

Agastache cana/Bubblegum Mint (Perennial)—water use:Low

Aurinia saxatilis/Basket-of-Gold (Perennial)—water use:Low

Coreopsis species/Tickseed (Perennial)—water use:Low

Crocus species/Spring Crocus (Perennial)—water use:Low

Dianthus species/Pinks (Perennial)—water use:Low

Eschscholzia californica/California poppy (Perennial)—water use:Low

Gaillardia grandiflora/Blanket Flower (Perennial)—water use:Low

Iris germanica/Iris germanica (Perennial)—water use:Low

Linum species/Flax (Perennial)—water use:Low

Narcissus species/Daffodil or Narcissus (Perennial)—water use:Low

Nepeta racemosa/Catmint (Perennial)—water use:Low

Oenothera species/Evening Primrose (Perennial)—water use:Low

Perovskia atriplicifolia/Russian Sage (Perennial)—water use:Low

Sedum species/Stonecrop (Perennial)—water use:Low

Senecio Cineraria/Dusty Miller (Perennial)—water use:Low

Stachys byzantina/Lamb's Ears (Perennial)—water use:Low

Thermopsis montana/No Lupine (Perennial)—water use:Low

Tulbaghia violacea/Society Garlic (Perennial)—water use:Low

Alcea rosea/Hollyhock (Perennial)—water use:Moderate

Antirrhinum majus/Snapdragon (Perennial)—water use:Moderate

Armeria maritima/Sea Pinks (Perennial)—water use:Moderate

Aster species/Aster (Perennial)—water use:Moderate

Echinacea purpurea/Coneflower (Perennial)—water use:Moderate

Gaura lindheimeri/Gaura (Perennial)—water use:Moderate

Geranium species/Handy Geranium (Perennial)—water use:Moderate