

February 17, 2016

**Indian Hills General Improvement District  
(IHGID)  
Water Conservation Plan  
February 17, 2016**



**Prepared for:**

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**TABLE OF CONTENTS**

**Introduction** .....

**Statutory Requirements** .....

**System Description** .....

**Plan Provisions** .....

**Public Education** .....

**Conservation Measures** .....

**Water Management** .....

**Contingency Plan** .....

**Schedule** .....

**Evaluation Measurements** .....

**Conservation Estimates** .....

**Rate Analysis** .....

**Appendices**

**A – Conservation Measures** .....

**B – Public Education Materials** .....

**C – End-User Water Savings** .....

## **Introduction**

The water supply in Nevada is a precious commodity and plays an important role in determining Nevada's future. Nevada is the one of the driest states in the nation as well as one of the fastest growing ones. Nevada's future, both from an economic and a quality of life view, depends heavily upon the wise management of the water supply.

Groundwater, in general, provides about 40 percent of the total water supply used in Nevada. In some areas, groundwater provides the entire water supply. Groundwater usage may vary considerably from year-to-year as it is sometimes pumped to supplement surface water sources.

Water use in Nevada can be classified as:

- Domestic (household, both indoor and outdoor) – Met by public supply or private supply (e.g. wells).
- Commercial (businesses) – Met by public supply or private supply (e.g. non-community systems).
- Industrial (manufacturing/construction) – Met by public supply or private supply (e.g. non-community systems).
- Thermoelectric (electric/fossil fuel/geothermal power generation) – Met by public supply in a minor fraction.
- Mining (mining processes) – Supply source varies widely from operation to operation and is dependent upon the mineral being recovered and the recovery process employed.
- Irrigation (land use) – Met by self-supplied or supplied by irrigation companies or districts.
- Livestock (farm needs) – Supply source varies.

While all classifications of water usages have shown an increase over the years, it has historically been irrigation water use which has accounted for the majority of the water use in Nevada.

It has been estimated that the domestic water use accounts for less than 15 percent of the water used in Nevada, but this is expected to rise to nearly 25 percent as the population increases (based upon existing water use patterns and conservation measures). It is expected that Nevada's population will become increasingly concentrated in its primary urban areas of Las Vegas (Clark County), Reno/Sparks (Washoe County) and Carson City, with varied spillover effects on neighboring counties.

It is vitally important that all residents understand the fundamental science of water, how it is managed in the state, and the issues affecting its management. Water education must become a priority and must include education of children as they are our future.

Because Nevada does not have a comprehensive state-wide conservation program, it is reliant upon the individual water suppliers for developing their own conservation programs. In 1991,

February 17, 2016

Nevada enacted a law requiring adoption of conservations plans by water suppliers. Minimum standards for plumbing fixtures were adopted in 1991 (Assembly Bill 359) by Nevada and in 1992 minimum flow standards for plumbing fixtures were adopted by the federal government (National Energy and Policy Conservation Act).

Conservation is an essential part of ensuring adequate water supply as it is no longer feasible to develop new sources. It has proven to be a cost-effective way to reduce demands and/or to extend a given water supply. It can easily be pursued by all water users regardless of the water system type. Key to evaluating the program's effectiveness is the water use measurement (through meters and other measurement devices). Various conservation measures can be put into place and the achievement of the goals set with these measures is vital to combating the expected increase in water usage.

## **Statutory Requirements**

This water conservation plan was prepared for the Indian Hills General Improvement District (hereafter referred to as IHGID) in accordance with Nevada Revised Statute (NRS) 540. As outlined in NRS 540.141, the provisions of this plan must include:

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

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

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

This plan is available for inspection during normal business hours at 3394 James Lee Park Road, Carson City, Nevada 89705 as well as on the IHGID website at [www.indianhillsnevada.com](http://www.indianhillsnevada.com).

This plan will conform to all public notice requirements as found in NRS 540, NRS 318.

The original Water Conservation Plan for IHGID was developed in March 2008.

In accordance with NRS 540.131, this plan will be reviewed from time-to-time to reflect changes and must be updated every five (5) years to comply with NRS 540.131 and NRS 540.141. The next update of this plan is to be on, or before, February 17, 2021.

February 17, 2016

## **System Description**

IHGID is a publically-owned residential/commercial Non-Transient Community water system PWS# NV0000355. IHGID serves water to 1,810 fully metered connections of which 1,736 are residential and 74 are commercial in the distribution system located in Douglas County.

IHGID is a purchased water system, supplemented by three (3) Ground Water Wells. The primary source of water is the intertie with Douglas County Utilities who provides water supplied by the Town of Minden. IHGID supplements this with three (3) ground water wells. Well# 0355-11 located at Vista Grande and Princeton Ave., Well #0355-9 located ¼ mile South West of the end of Arcadia Road, Well #0355-10 is 100 yards south of the North School Well. All wells have submersible pumps (size unknown). The system practices disinfection utilizing a 12.5% Sodium Hypochlorite (NSF STD 60 approved Sierra Chemical) with a normal Free Chlorine Residual of approximately 0.40 to 1.00 mg/L throughout the distribution system. The IHGID water system is fully metered. The IHGID water system consists of three pressure zones.

The service area boundaries are within the general improvement district and covers approximately five (5) square miles. The service area's terrain is sloping.

The estimated population served in 2013 was 5900 people served. The State of Nevada, through its State Water Plan, estimates the population growth for Douglas County through 2020 to be 2.02% annually.

The water supply is a combination of purchased groundwater from Douglas County Utilities, and three (3) wells located within the district. Storage is provided by five (5) storage tanks located within the district. IHGID water sources are located within the Middle Carson Basin #16050202 of the Central Lahontan Hydrographic Region, Carson Valley Hydrographic area 105. IHGID wells and tanks are identified in the tables below (Table 1 and Table 2).

**Table 1 – Source of Supply**

<b>Well Name</b>	<b>Depth (feet)</b>	<b>Production (gpm)</b>
Ridgeview Well #5	275	100
North School Well	300	100
South School Well	300	100

February 17, 2016

**Table 2 – Storage Tanks**

<b>Tank Name</b>	<b>Volume (gallons)</b>
North Tank	188,000
South Tank	188,000
Green Tank	420,000
Ridgeview Tank	420,000
School Tank	600,000

Water that is supplied by Town of Minden is conveyed via transmission lines of Douglas County Utilities. The purchased water is pumped from the Hobo pump station to the storage tanks, supplemented by water pumped from the three (3) GID wells to the storage tanks. Water is then distributed to the customers through PVC pipe 4"-14", system pressure provided by gravity.

The IHGID water system requires, at a minimum, a Distribution Grade 3 operator. IHGID employs a full time staff of two (2) operators who are certified at Distribution grades 1 and 3.

The plant operator is required to perform all monitoring and testing of water quality. IHGID does not currently have any outstanding water quality issues.

The last sanitary survey performed by the Nevada Department of Environmental Protection (NDEP) was completed on July 31, 2014 and shows two (2) deficiencies with the system. These deficiencies were:

1. Target level on Ridgeview Tank broken and may be point of contamination. Hole sealed to prevent contamination.
2. Sodium hypochlorite leak at Hobo pump station. Leak has since been corrected.

IHGID charges a flat charge and quantity fee that are determined by the meter size. It does have a tiered rate usage fee. A breakdown of the customer type, number, and charge is found in the tables below.

Customers are billed a monthly service charge in addition to a quantity charge. The fees are detailed in the table below (Table 3).

February 17, 2016

**Table 3 – Residential/Commercial Customers and Usage Charges**

Service Size	Existing	Year 1 Base Rate	Year 2 Base Rate	Year 3 Base Rate	Year 4 Base Rate	Year 5 Base Rate
3/4" (approved 7/16/2014)	\$24.16	\$26.34	\$28.64	\$31.04	\$33.57	\$36.22
1"	\$37.75	\$41.16	\$44.74	\$48.50	\$52.45	\$56.60
1.5"	\$78.89	\$86.02	\$93.50	\$101.36	\$109.61	\$118.26
2"	\$115.97	\$126.45	\$137.45	\$149.00	\$161.13	\$173.67
3"	\$193.67	\$211.17	\$229.54	\$248.84	\$269.09	\$290.36
4"	\$391.21	\$426.56	\$463.67	\$502.65	\$543.56	\$586.53
6"	\$571.17	\$622.78	\$676.97	\$733.67	\$793.61	\$856.34
8"	\$862.25	\$940.16	\$1,021.96	\$1,107.86	\$1,196.05	\$1,292.75

0-10,000 gal = \$1.95 per 1,000 gal, 10,000 and over = \$2.30 per 1,000 gal.  
Current water rates were established on July 16, 2014.

Wastewater collected from the service area is handled by IHGID who treats the wastewater and provides effluent to the golf course for irrigation purposes.

## Plan Provisions

In accordance with NRS 540.131, this plan will be reviewed from time-to-time to reflect changes and must be updated every five (5) years to comply with NRS 540.131 and NRS 540.141. The next update of this plan is to be on, or before, February 17, 2021.

IHGID will appoint a staff member, if economically feasible, to oversee the conservation efforts. This staff member will be responsible for implementation of conservation programs, monitoring of water use, and will review /revise the conservation plan when needed.

In an effort to promote voluntary conservation and aid in Nevada's future, IHGID may enact the voluntary conservation measures found in the *Conservation Measures* section. When more stringent measures are needed, IHGID may enact the measures found in the *Contingency Measures* section. All measures can be found in Appendix A.

February 17, 2016

As required by NRS 540.141, the water conservation plan must include the following provisions:

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

Each provision is discussed below.

### **Public Education**

Public education is a key for cooperation with conservation efforts, so funding for public education is crucial. IHGID recognizes this and will establish a conservation education program and corresponding budget, if economically feasible.

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

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

IHGID could also establish a water conservation advisory committee that would involve the public in the conservation process and provide feedback to the system concerning its efforts, thus fostering support for conservation in the community.

### **Conservation Measures**

In an effort to promote conservation and voluntarily conserve water, IHGID is adopting water-use ideas to promote voluntary water conservation during non-emergency situations. These voluntary ideas include the following non-essential water use:

February 17, 2016

- 1) Use of water through any connection when IHGID has notified the customer in writing to repair a broken or defective plumbing, sprinkler, watering or irrigation system and the customer has failed to make such repairs within 5 days after receipt of such notice.
- 2) Use of water for washing aircraft, cars, buses, boats, trailers or other vehicles without a positive shut-off nozzle on the outlet end of the hose. Exceptions include washing vehicles at commercial or fleet vehicle washing facilities operated at fixed locations where equipment using water is properly maintained to avoid wasteful use.
- 3) Use of water for watering streets with trucks, except for initial wash-down for construction purposes (if street sweeping is not feasible), or to protect the health and safety of the public.
- 4) Use of water for construction purposes, such as consolidation of backfill, dust control, or other uses unless no other source of water or other method can be used.
- 5) Use of water for more than minimal landscaping in connection with any new construction.
- 6) Use of water for watering outside plants and turf areas using a hand-held hose without a positive shut-off valve.
- 7) Use of water for decorative fountains or the filling or topping off of decorative lakes or ponds. Exceptions are made for those decorative fountains, lakes, or ponds which utilize recycled water.
- 8) Use of water for the filling or refilling of swimming pools.
- 9) Service of water by any restaurant except upon the request of the patron.

In the event these conservation measures are insufficient to control the water shortage, IHGID may wish to implement the mandatory measures discussed in the *Contingency Plan* section below.

IHGID also promotes the development of water conserving principles into the planning, development, and management of new landscape projects such as public parks, building grounds, and golf course. Customers are encouraged to consult with the local nursery or perform an internet search on the availability of water conservation plants and how to renovate existing landscapes. Customers are also encouraged to evaluate irrigation management systems using metering, timing, and water sensing devices.

IHGID provides the following incentives for conservation:

At present, IHGID offers water conservation incentives through a tiered rate usage fee.  
0-10,000 gal = \$1.95 per 1,000 gal, 10,000 and over = \$2.30 per 1,000 gal.

## **Water Management**

IHGID monitors and records water levels at all well and tank sites via SCADA system. Since IHGID is a consecutive water system that receives most of its water from the Town of Minden water system via transmission by Douglas County Utilities the greater concern is to monitor the supply within the consecutive systems. The multiple agencies involved in this consecutive water

February 17, 2016

system arrangement maintain regular communication with one another via regular meetings and have SCADA access that enables them to view conditions in the supplying systems.

IHGID does actively monitor unaccounted for water losses. Production versus sales and authorized usage allows the determination of unaccounted for water losses. Current-to-historical comparisons are examined and evaluation methods are examined to locate leaks, if significant differences are found.

IHGID does not have a formal leak detection program. All large leaks are repaired immediately and small leaks (less than 1 gallon per minute) are repaired within the soonest time operational conditions permit.

IHGID has 3 pressure zones that are separated by pressure reducing valve regulation stations.

IHGID does have a formal well head protection program. Hazards have been identified and activity is monitored within the areas of the system wells.

IHGID does not have a meter replacement program for all meters that are not registering properly. Meters that have been identified as unregistering are replaced in a timely manner.

A capital improvement plan is not in place. Water facilities are replaced when necessary.

IHGID does have a system for reusing of wastewater effluent. Wastewater is treated via an intermittent cycle extended aeration system and its effluent is reused for golf course irrigation purposes.

Douglas County has adopted a Plumbing Water Conservation Ordinance which applies to structures which are renovated as well as all new construction. This ordinance is furnished to local suppliers and contractors. Douglas County Building Division checks new construction, renovation, and expansions within Douglas County to ensure compliance with this ordinance.

## **Contingency Plan**

The objective of the contingency plan would be to manage the available resources to ensure continued supply of potable water during periods of drought or extended drought.

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

IHGID plans for drought response would be four (4) stages of drought response: (1) warning stage, (2) alert stage, (3) emergency stage, and (4) extreme emergency stage. Declaration of a need for Drought response would be made by the IHGID Board of Trustees based on the condition of the water supply. The actions taken during the stages are describes as follows:

February 17, 2016

In Stage 1, the warning stage, IHGID would increase monitoring of its water supplies and would begin creating public awareness of the water supply situation and the need to conserve. Conservation measures at this stage would be voluntary.

In Stage 2, the alert stage, IHGID would call for wide-based community support to achieve conservation, limit the use of fire hydrants to fire protection uses (by requiring effluent for construction and dust control purposes), implement water use restrictions, and impose penalties for ignoring the restrictions. Conservation measures at this stage would be mandatory and violations would incur fines.

In Stage 3, the emergency stage, IHGID would declare a drought and water shortage emergency, would enforce water use restrictions and impose fines for violations. Media relations would be activated to inform the customers and monetary assistance may need to be secured in an effort to mitigate the effects of the drought (e.g. federal funding assistance). Conservation measures at this stage would be mandatory and violations would incur fines.

In Stage 4, the extreme emergency stage, IHGID would declare an extreme drought and water shortage emergency, would enforce water use restrictions and impose fines for violations, outdoor water use would be prohibited. Media relations would be activated in order to inform the customers and monetary assistance may need to be secured in an effort to mitigate the effects of the drought (e.g. federal funding assistance). Conservation measures at this stage would be mandatory and violations would incur fines.

When a drought is declared over, voluntary conservation measures (see *Conservation Measures* section) will be reinstated and water supplies would continue to be monitored.

## **Schedule**

All of the provisions listed are currently in place and are actively working to achieve results.

## **Evaluation Measurements**

An audit comparing water production with metered amounts will be performed prior to the implementation of measures/incentives. Additional audits will then be done every year thereafter. Results from the initial audit will be compared with those of the subsequent annual audits in order to determine the effectiveness of the measures/incentives.

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

February 17, 2016

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

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

### **Conservation Estimates**

During the Stage 1 phase of the conservation plan, it is estimated that conservation measures could be expected to provide a 10% reduction in water use.

During the Stage 2 phase of the conservation plan, it is estimated that conservation measures could be expected to provide a 15 to 18% reduction in water use.

During the Stage 3 phase of the conservation plan, it is estimated that conservation measures could be expected to provide a 25 to 30% reduction in water use.

During the Stage 4 phase of the conservation plan, it is estimated that conservation measures could be expected to provide a 50% or more reduction in water use.

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

### **Rate Analysis**

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

IHGID has opted to use a tiered rate structure in the interest of encouraging water conservation.

**Appendices**

**APPENDIX A  
CONSERVATION MEASURES**

February 17, 2016

**Stage 1 – Warning Stage**

1. IHGID would increase monitoring of water supplies.
2. IHGID would begin creating public awareness of the water supply situation and the need to conserve.
3. IHGID would inform customers of voluntary conservation measures (non-essential water uses, listed below).
4. Watering of plants, lawn, landscape, and turf areas are prohibited between the hours of 12pm and 4pm.
5. **WASTE OF ANY KIND:** Such as allowing water to run down gutters, into the street, alley or sidewalk, is **PROHIBITED AT ALL TIMES.**

1<sup>st</sup> violation    An oral or written warning

2<sup>nd</sup> violation    Warning by certified mail to all on file

3<sup>rd</sup> violation    Shut-off water service and a \$50.00 fine

To reestablish water service a customer must pay the fine and have a IHGID employee verify the situation has been corrected.

Non-essential water uses are:

- 1) Use of water through any connection when IHGID has notified the customer in writing to repair a broken or defective plumbing, sprinkler, watering or irrigation system and the customer has failed to make such repairs within 5 days after receipt of such notice.
- 2) Use of water for washing aircraft, cars, buses, boats, trailers or other vehicles without a positive shut-off nozzle on the outlet end of the hose. Exceptions include washing vehicles at commercial or fleet vehicle washing facilities operated at fixed locations where equipment using water is properly maintained to avoid wasteful use.
- 3) Use of water for watering streets with trucks, except for initial wash-down for construction purposes (if street sweeping is not feasible), or to protect the health and safety of the public.
- 4) Use of water for construction purposes, such as consolidation of backfill, dust control, or other uses unless no other source of water or other method can be used.
- 5) Use of water for more than minimal landscaping in connection with any new construction.
- 6) Use of water for watering outside plants and turf areas using a hand-held hose without a positive shut-off valve.
- 7) Use of water for decorative fountains or the filling or topping off of decorative lakes or ponds. Exceptions are made for those decorative fountains, lakes, or ponds which utilize recycled water.
- 8) Use of water for the filling or refilling of swimming pools.
- 9) Service of water by any restaurant except upon the request of the patron.

February 17, 2016

**Stage 2 – Alert Stage**

1. IHGID would set conservation goals and call for wide-based community support to achieve those goals.
2. IHGID would inform customers of prohibited conservation measures (non-essential water uses, listed in Stage 1 are now prohibited).
3. IHGID limit the use of fire hydrants to fire protection uses only.

Penalties for violation of mandatory conservation measures are:

- 1<sup>st</sup> violation An oral or written warning
- 2<sup>nd</sup> violation Warning by certified mail to all on file
- 3<sup>rd</sup> violation Shut-off water service and a \$50.00 fine

To reestablish water service a customer must pay the fine and have a IHGID employee verify the situation has been corrected.

Offenses for separate water use restriction violations will each start at the warning stage (1<sup>st</sup> violation) and the penalties for the offenses are in addition to the regular rate schedule charges.

If any customer seeks a variance from the provisions of Stage 2, then that customer shall notify IHGID in writing, explaining in detail the reason for such a variation. IHGID shall respond to each request.

February 17, 2016

### **Stage 3 – Emergency Stage**

1. IHGID would declare a drought and water shortage emergency and use media relations to supplement efforts to keep customers informed.
2. IHGID would inform customers of prohibited water uses (non-essential water uses, listed in Stage 1 are now prohibited).
3. IHGID would inform customers of penalties if prohibited measures are not observed (penalties are listed below).
4. IHGID would implement assigned watering days with even numbered addresses watering on Tuesday, Thursday and Saturday, odd numbered addresses watering on Sunday, Wednesday and Friday. No one is allowed to water on Monday which becomes a day off for the watering system. Watering on assigned days is allowed at any time except between 12:00 pm and 4:00 pm.
5. IHGID would limit the use of fire hydrants to fire protection uses only.
6. IHGID would seek monetary assistance in an effort to mitigate the drought (e.g. federal funding).

Penalties for violation of mandatory conservation measures are:

- 1<sup>st</sup> violation    An oral or written warning
- 2<sup>nd</sup> violation    Warning by certified mail to all on file
- 3<sup>rd</sup> violation    Shut-off water service and a \$50.00 fine

To reestablish water service a customer must pay the fine and have a IHGID employee verify the situation has been corrected.

Offenses for separate water use restriction violations will each start at the warning stage (1<sup>st</sup> violation) and the penalties for the offenses are in addition to the regular rate schedule charges.

If any customer seeks a variance from the provisions of Stage 3, then that customer shall notify IHGID in writing, explaining in detail the reason for such a variation. IHGID shall respond to each request.

**Stage 4 – Extreme Emergency Stage**

1. IHGID would declare an extreme drought and water shortage emergency and use media relations to supplement efforts to keep customers informed.
2. IHGID would inform customers of prohibited all outdoor water use.
3. IHGID would inform customers of penalties if prohibited measures are not observed (penalties are listed below).
4. IHGID would limit the use of fire hydrants to fire protection uses only.
5. IHGID would seek monetary assistance in an effort to mitigate the drought (e.g. federal funding).

Penalties for violation of mandatory conservation measures are:

- 1<sup>st</sup> violation An oral or written warning
- 2<sup>nd</sup> violation Warning by certified mail to all on file
- 3<sup>rd</sup> violation Shut-off water service and a \$50.00 fine

To reestablish water service a customer must pay the fine and have a IHGID employee verify the situation has been corrected.

Offenses for separate water use restriction violations will each start at the warning stage (1<sup>st</sup> violation) and the penalties for the offenses are in addition to the regular rate schedule charges.

If any customer seeks a variance from the provisions of Stage 4, then that customer shall notify IHGID in writing, explaining in detail the reason for such a variation. IHGID shall respond to each request.

**APPENDIX B**  
**PUBLIC EDUCATION MATERIALS**

February 17, 2016

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

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

These publications can be utilized until IHGID develops system-specific publications.

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

February 17, 2016

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

## **Tips for Landscaping**

### **Watering:**

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

### **Planting:**

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

### **Maintaining:**

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

### **Ornamental Water Features:**

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

**APPENDIX C**  
**END-USER WATER SAVINGS**

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

### **Leaky Faucets**

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

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

### **Leaky Toilets**

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

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

### **Showering**

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

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

### **Brushing Teeth Wisely**

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

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

### **Watering Wisely**

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

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

### **Washing Wisely**

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

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

### **Flushing Wisely**

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

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

### **Dish Washing Wisely**

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

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

IHGID Water Conservation Plan

February 17, 2016

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

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

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

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

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