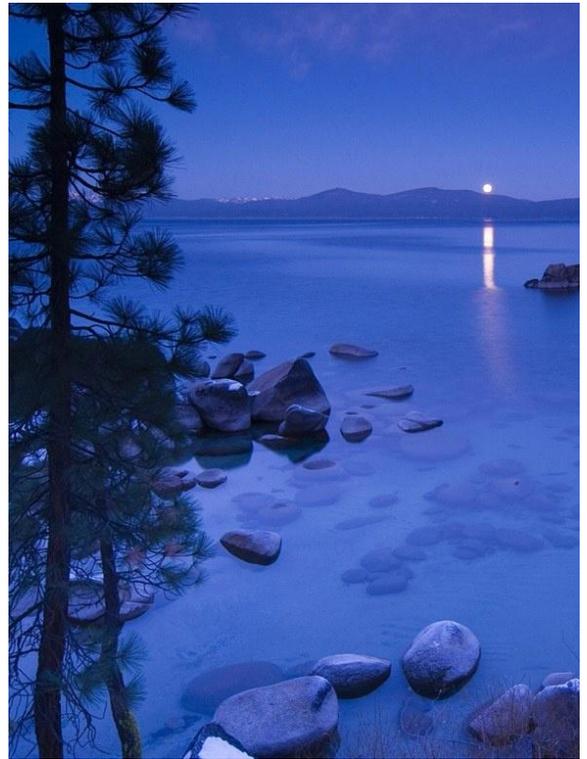


Water Management Plan 2013-14

Prepared by
Joseph Pomroy



WATER MANAGEMENT PLAN 2013-14

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Prepared By
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Executive Summary

Introduction

The Incline Village General Improvement District currently serves 8065 water users which include single family, multi-family, commercial, irrigation, and snowmaking user accounts. IVGID produces its water at the Burnt Cedar Water Disinfection Plant and pumps it into the distribution system that supplies customers in Incline Village and Crystal Bay. The water source is Lake Tahoe and IVGID holds a filtration exemption certificate for this water source. Water management is an area of moderate concern for IVGID because the average water production rate for the last five years is 70 percent of the existing water right.

In 1997, Incline Village General Improvement District (IVGID) prepared a Water Management Plan to address the District's ability to meet current and projected water demands. The plan indicated that IVGID could meet short-term demand projections by implementing diligent consumption monitoring, a leak detection program, and a water conservation program. This annual report on the water management plan presents the water use figures for the last ten years and it also updates future water demand projections for the IVGID service area and provides other pertinent water use information.

Water Year Summary

IVGID pumped a total of 3186 acre-feet (af) for the 2013-14 water year and remained below our permitted water right of 4273 af (Oct. 2013 – Sept. 2014). This was a decrease of 126 acre-feet in water pumped compared to 2012-13. This is a negligible change from the previous year. The IVGID water use numbers for the last ten years are presented below in **Table 1**. Consumptive use was 3085 af and is the water pumped minus the snowmaking credit.

Table 1- Water Production, Use and Water Rights

Year	Water Pumped (AF)	Consumptive Use	Permitted Water Rights (AF)	% of Water Right
2004/05	3,160	3,093	4,174	74%
2005/06	3,324	3,265	4,174	78%
2006/07	3,578	3,481	4,174	83%
2007/08	3,392	3,318	4,273	78%
2008/09	3,108	3,034	4,273	71%
2009/10	2,873	2,818	4,273	66%
2010/11	2,741	2,696	4,273	63%
2011/12	3,260	3,163	4,273	74%
2012/13	3,312	3,232	4,273	76%
2013/14	3,186	3,085	4,273	72%
5 Year Average	3,059	2,988	Avg % of Allotment	70%

The percent of IVGID water rights being consumed has averaged just 70% over the last five years. Using 70% of our permitted water right is a moderate level of concern for IVGID in our ability to stay below the water right while meeting future projected demands, meeting increases in water consumption and the need for drought contingency water. Under future growth

scenarios analyzed in this Water Management Plan, IVGID could utilize 87% of the permitted water right in an average year. This may not provide sufficient reserves of water during peak water use years like the one that occurred in 2000-01 (3997 af). IVGID is required to stay below the permitted water right. There has been only one year in the last ten years that we have used more than 80% of our water right and we have added close to 100 acre-feet of water rights since 2007.

IVGID needs to continue existing water conservation measures, monitor available Lake Tahoe water rights and align consumptive use with water pumped by continuing to reduce water losses. The current water management policy requires new commercial and multi-unit developments to assign water rights to IVGID prior to development. IVGID is also developing and implementing water conservation programs to decrease water use but at the same time demographic changes in the IVGID service area has at times resulted in increasing residential water use. This may still require IVGID to pursue available water rights for purchase. This is not a current priority with the use pattern over the last six years. IVGID has also reduced its leak rate in the distribution system to 8.1% on a 5-year average but IVGID will continue to further minimize water loss by replacing aging water mains and performing twice annual leak detection inspections.

Water management efforts provide the necessary planning and coordination for IVGID to meet its goal to provide a reliable source of water for its customers for current and future uses. IVGID keeps a critical watch on water use patterns and changes in population to maintain its consumptive use under the water right while also trying to further reduce the leakage rate to increase the water supply for consumptive use. The year 2030 build-out scenario for IVGID shows that future water use projections can be met with a margin of 12% reserve supply. On high water demand years it will be necessary to keep an eye on consumption trends and to enact provisions in the water ordinance to restrict non-essential water uses such as irrigation and preserve it for in-building uses.

Action Plan - Recommendations

The 1997 Water Management Plan outlined three core areas for IVGID to concentrate efforts in to meet the demands of supplying water to customers; water rights, water conservation and water management procedures. IVGID will perform the following key activities as part of its 2014-15 water management plan.

Water Rights

Snowmaking Water Rights, TROA – The approval of Water Rights Permit No. 62768 provided a credit for the non-consumptive use portion of water used for snowmaking. This increased IVGID's available water right for consumptive uses. The Truckee River Operating Agreement has been approved and when it takes affect it will provide additional consumptive water rights under PL101-618 by accounting water use as the sum of metered sales and additional snowmaking credits. Water lost in the system is considered to enter the groundwater and flow back to the lake and would be non-consumptive. The District and Heavenly Valley are working on an agreement to utilize the 350 acre-feet in snowmaking water rights made available to Nevada through TROA. A final agreement has been finalized with Heavenly Valley and application is being made to the State Engineer.

Purchase Additional Water Rights – In the last ten years IVGID has purchased 90 acre-feet from the Incline Lake Corporation and several other small water rights have been purchased and transferred to the District. The Boulder Bay Project has been granted a TRPA permit for the large casino redevelopment in Crystal Bay. This project will require dedication of water rights for it to be served by IVGID. The District is not actively pursuing the purchase of additional water rights.

Water Conservation

Rate Structure – IVGID has an increasing block-rate structure that charges a higher unit price for water as consumption increases. This type of structure will aid in conservation of water because of higher costs of water to the customer for excessive use. With the 2013 rate increase approved by the Board of Trustees, we have also reduced the threshold for when the tiers take effect. The tier 1 water rates start at 20,000 gallons of monthly use and tier 2 water rates will start at 60,000 gallons of monthly use. The tiers are in place to encourage conservation and to aid the District in keeping within our water rights allotment.

Water Loss – IVGID continues its water main replacement program to reduce water leaks in the system. Water leaks are down to 8.1% for the last five water years and additional reductions will be difficult. Continued deterioration of the system will necessitate an annual replacement program just to maintain the current leak rate and additional monies will need to be spent to reduce the leak rate. Detected leaks are also smaller and do not provide as good of a rate of return compared to earlier efforts. The Capital Improvement Program is currently on a program to replace the remaining six miles of old steel water line. This type of water main is prone to failure and exhibits the majority of leaks. The District also has a meter testing program and continues to replace water meters as they age and their accuracy deteriorates. This deteriorating accuracy will under account for metered water.

Water Conservation/Public Education – IVGID conducts public outreach to our water customers and residents and visitors of the Tahoe Basin. The communication stresses “Protect the Source” and “Drink Tahoe Tap”. The messages are delivered in the monthly newsletter to all District Customers, Tabling at special events including Earth Day, Red White and Tahoe Blue, Children’s Science Day, Living Green at Tahoe, Business Association meetings, etc and at school and civic group presentations. Advertising is also included in the North Lake Tahoe Bonanza, and the Tahoe Summer and Winter Supplements in the regional newspapers. Special attention is paid to summertime irrigation use.

Water Management Procedures

The following policies are in place to keep abreast of our critical water supply and demand issues.

Water Management Policy – Continue the Water Management Policy requiring new multi-family and commercial customers to dedicate water rights to IVGID. Other policies will be modified as needed.

Water Use Tracking - IVGID will continue to track water consumption and water production closely to insure that we do not exceed our permitted water right. Water use will also be compared from year to year to look at growth and climate effects on water production.

Population – IVGID will continue to track customer growth and also occupancy rates of residential units to estimate future water demands. Trash pickup counts and sewer flows will be used to help estimate these occupancy rates.

Water Metering – IVGID currently has water meters for all of its customers. A water meter testing program is in place to insure the accuracy of reporting metered flows and proper billing.

Introduction

The Incline Village General Improvement District currently serves 8065 water users which include single family, multi-family, commercial, irrigation, and snowmaking user accounts. IVGID produces its water at the Burnt Cedar Water Disinfection Plant and pumps it into the distribution system that supplies customers in Incline Village and Crystal Bay. The water source is Lake Tahoe and IVGID holds a filtration exemption certificate for this water source. Water management has become an area of concern for IVGID because the average water production rate for the last five years is 70 percent of the existing water right.

In 1997, a Water Management Plan was prepared that determined that IVGID can meet short-term demand projections given a continuing vigilance to leak detection and pipeline repair within the District's water distribution system. The Management Plan also recommended conservation measures and made changes to the IVGID Water Management Policy to help keep the water use below IVGID's water rights allocation. The Water Management Policy specified that new commercial and multi-family developments are required to assign additional water rights to IVGID to meet those development's water needs. An additional 254 acre-feet of water rights have been assigned to IVGID because of this policy and from the District purchasing water rights, bringing the total water rights to 4273 acre-feet per year.

In addition the approval of Water Rights Permit 67268 allows a portion of the water used for snowmaking to be counted as non-consumptive. As a result, 80% of the water used for snowmaking can be subtracted from the District's total water use.

The IVGID service area is close to build-out with an expected total growth of four percent over the next 20 years (2010-2030). This means water demands should not change drastically over the next 20 years but challenges do exist. The first area of moderate concern is that IVGID has been using 70 percent of its water right over the last five years and any increase in growth reduces this margin. An area that is closely monitored is water use for single family units. Single family unit flow factors have varied over the last 10 years from 0.30 to 0.42 acre-feet per unit. Since single family units represent about 50% of the water use, changes in water use for this group have a significant impact on water consumption. A third factor that can affect water use is if current part-time residents change to full-time residents and therefore increase overall use. The fourth factor which cannot be controlled is the climate. Dry and hot years can result in heavy irrigation and snowmaking that result in peak water use years. Enough water rights need to be maintained to supply water in these peak years or the emergency water use provisions is put in place to curb excessive use in these periods. IVGID must not exceed its permitted water right during a peak year.

This Water Management Plan Update shows that IVGID continues to fulfill its responsibilities of supplying customers with water while keeping diversions under the District's allocated water rights.

This plan discusses current water rights, presents IVGID historical water use for the past ten years, calculates new water demand projections, reports on conservation measures, provides the

latest data on water loss in the distribution system and summarizes key activities for continuing water management.

Water Rights

In 1996, IVGID held control of 4,018.16 AF, which included original IVGID water rights and water rights acquired from the Crystal Bay General Improvement District and former Washoe 1 diversions. Since requiring dedication of water rights for new multi-family and commercial development in December 1996 plus purchases by the District from Glenbrook and Incline Lake LLC, the District has acquired an additional 254.6 AF of water rights. There are currently 4272.83 acre-feet of water rights assigned to the District. A number of recent permits are held by IVGID for developers for their planned and completed development projects.

Water Use

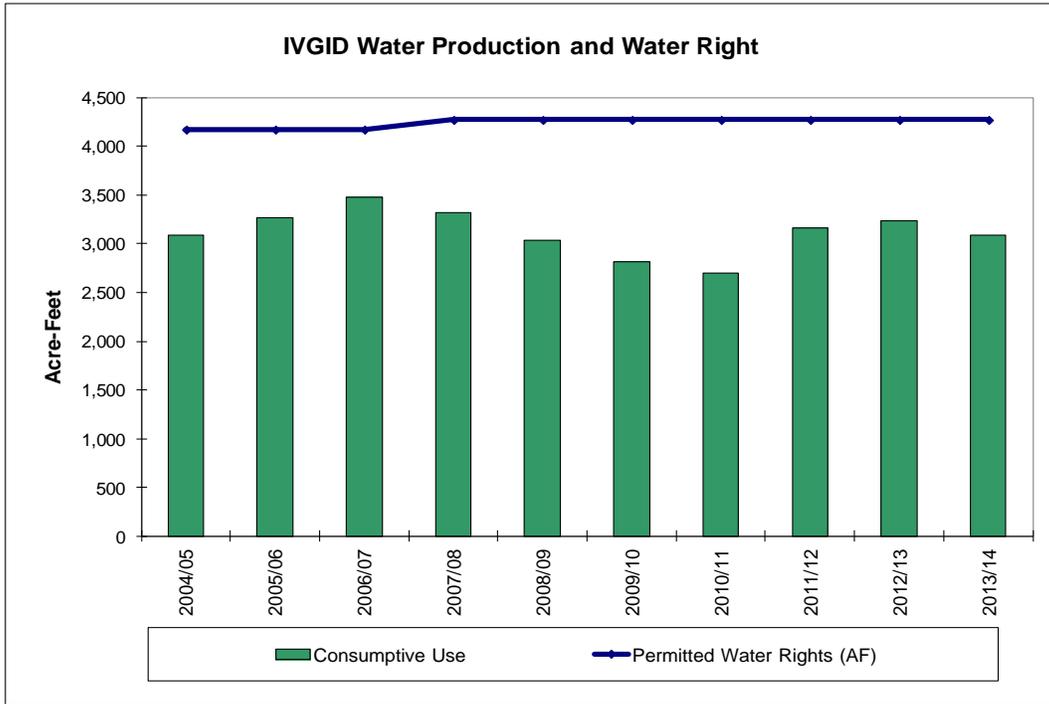
Water production is measured at the IVGID Burnt Cedar Water Disinfection Plant. The metered water also includes snowmaking water use at the Diamond Peak Ski Resort. As was stated earlier, Water Rights Permit 67268 allows for an 80% credit on water used for snowmaking. Only 20% of the water used for snowmaking is considered consumptive. **Table 2** presents the last ten years of water production data. The consumptive use values are the water produced minus the 80 percent credit for snowmaking. The table also shows the permitted water right and the percent of that water right that was used. The last six years have had use below 80% of the permitted water right.

Table 2 – Water Production, Use and Water Rights

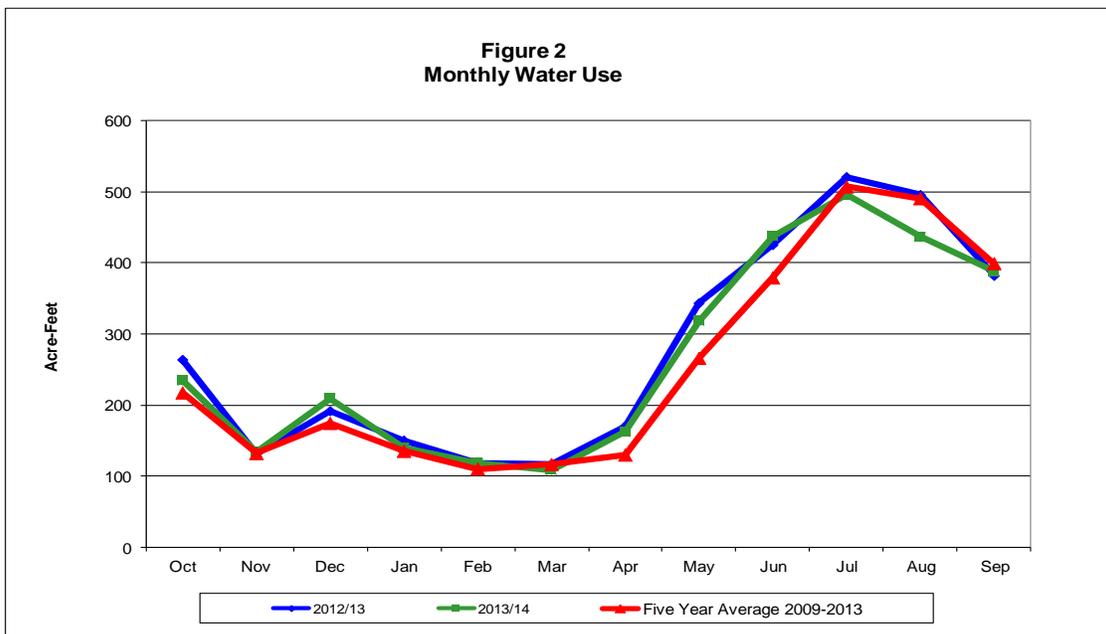
Year	Water Pumped (AF)	Consumptive Use	Permitted Water Rights (AF)	% of Water Right
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2012/13	3,312	3,232	4,273	76%
2013/14	3,186	3,085	4,273	72%
5 Year Average	3,059	2,988	Avg % of Allotment	70%

The values in **Table 2** are shown below graphically in **Figure 1**. The 2013-14 water year was an average consumptive use year in the last ten years while 2006-07 was the highest when we used 83% of the water right.

Figure 1 – Consumptive Use



The trend in monthly water production is shown below in **Figure 2**. This chart shows the monthly total water produced for 2012-13, 2013-14 and the five year average. The chart demonstrates the increased water production in the summer from irrigation demands and an increase in residents and tourism. The past two years trend close to the five year average with a slight increase in irrigation in early spring.



Customer Use

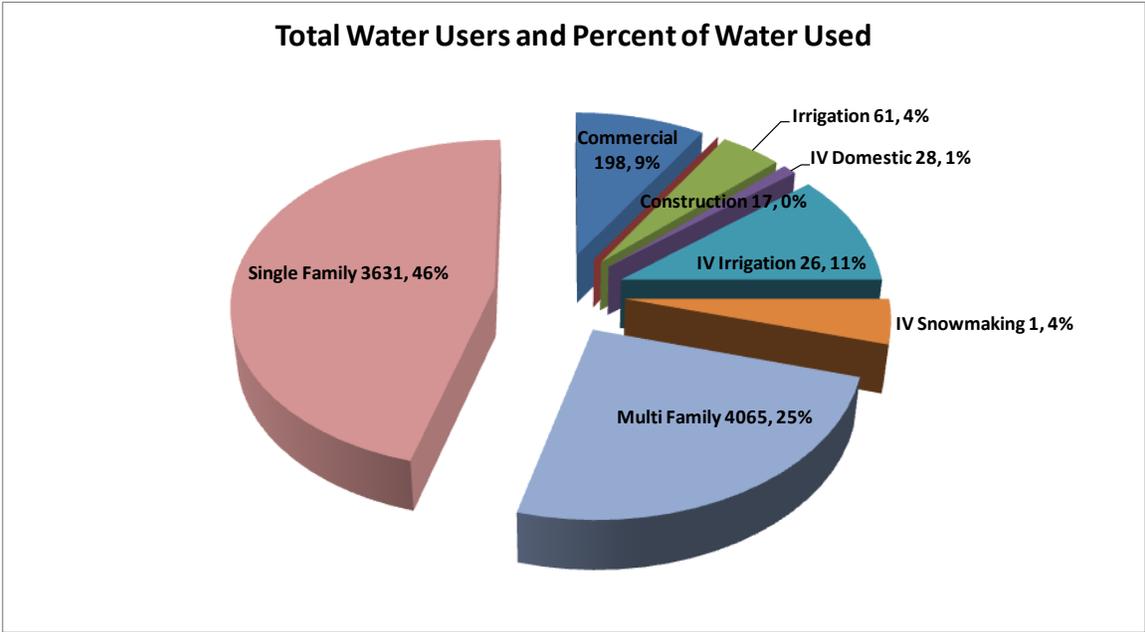
Looking at water use by customer user type provides information on which sectors are using the most water and have there been increases or decreases in those areas. **Table 3** presents the water use by customer category for the last two years and the percent change from last year. Water years 2012-13 and 2013-14 are very similar. Construction has been reclassified into the customer category that it pertains to. The single family and multi-family unit flow factors are very consistent over these two years.

Table 3 – Customer Water Use

Use Category	2013-14	2012-13	Percent Change
	Unit Flow Factors	Unit Flow Factors	%
Commercial - AF/Unit	1.28	1.46	-12.3%
Construction - Gallons	19	2,998,933	-100.0%
Irrigation - Gallons	39,870,750	46,104,563	-13.5%
IV Domestic - Gallons	9,322,668	8,212,701	13.5%
IV Irrigation - Gallons	102,596,756	107,862,286	-4.9%
IV Snowmaking - Gallons	41,209,574	32,487,298	26.8%
Multi Family - AF/Unit	0.177	0.180	-1.6%
Single Family - AF/Unit	0.363	0.372	-2.2%

Figure 3 presents the total metered water used by each customer group and expresses it as a percent of the total water metered use. These numbers do not present the water losses in the distribution system. That is discussed later in the report. Single family and multifamily users represent 71% of the consumptive use followed by, IVGID irrigation at 11%, commercial accounts at 9%, irrigation meters at 5% and snowmaking at 4%. Changes in residential water usage have had the greatest impact on the overall consumptive water use for IVGID. Recently a decrease in occupancy has lowered the average water usage per household.

Figure 3 – Metered Use



There is an increasing trend in the IVGID service area towards more elaborate irrigation systems and landscaping for single family residences. Because of the low availability of buildable lots, the number of single family residences is increasing slowly but more homes are being remodeled and expanded. Many of these remodels also include extensive landscaping which results in an increase in summer water use which is seen in single family accounts. In 2003, the IVGID Board passed revisions to the Water Ordinance to include new plan checking for irrigation systems.

This has been put into place to try and control water use by working with homeowners to install water wise landscaping and minimize the use of turf in their landscaping plans. Builders and developers are now reflecting this in their new construction that utilizes existing native plants and low water use landscaping and customers are asking for this. Like irrigation water use, snowmaking water use depends largely on weather conditions but its overall percent of water use is low when the snowmaking credit is taken into account. The District also performs a number of detailed water and irrigation audits to customers to help them use water wisely and to make good landscaping and irrigation systems decisions.

Snowmaking

The State of Nevada has recognized the non-consumptive portion of water used for snowmaking. Studies have shown that almost all of the water returns to Lake Tahoe as run-off or in increased ground water flows. The approved water rights permit number 62768 credits back 80% of the total amount of water used for snowmaking purposes. In 2013-14 year the District used 126.5 acre-feet for snowmaking and 80%, or 101.2 acre-feet, has been subtracted from the year’s total diversion. The net consumptive use for the District this year is reported as 3,085 acre-feet (3,186 AF produced minus 101 AF non-consumptive snowmaking use).

Water use for snowmaking varies depending on total snowfall and what time of year the snow falls. Even with a high snow fall total for a year, IVGID could see high snowmaking demands if the fall is dry and the snow falls late in the season. **Table 4**, below, shows the last ten years metered use and consumptive use for snowmaking at Diamond Peak Ski Resort.

Table 4 – Historical Snowmaking Water Use

Snowmaking	Snowmaking Metered Use	80% non-Consumptive	20% consumptive
2004/05	83.6	66.9	16.7
2005/06	73.2	58.6	14.6
2006/07	120.9	96.7	24.2
2007/08	92.5	74.0	18.5
2008/09	93.1	74.5	18.6
2009/10	68.84	55.1	13.8
2010/11	56.85	45.5	11.4
2011/12	121.13	96.9	24.2
2012/13	99.7	79.8	19.9
2013/14	126.47	101.2	25.3
5 Year Average	87.9	70.3	17.6

Public Law 101-618 and the Truckee River Operating Agreement (TROA) also address the issue of non-consumptive water use in snowmaking. With the approval of TROA, IVGID and Heavenly Valley have finalized an agreement to split 350 AF of snowmaking water right available for Nevada. After snowmaking water demands reach 350 AF, remaining water used for snowmaking is considered only 16% consumptive, and will be charged at that rate. IVGID and Heavenly Valley will be submitting to the State Engineer an application to put to beneficial use the 350 acre-feet for snowmaking.

Population and Water Use Projections

Water use projections are an important part of managing water supply needs. Water use projections are based on predicted water use trends and expected population changes. The last five years has seen IVGID utilize just 70% of our water right. IVGID water rights for Lake Tahoe have not been subjected to mandatory rationing or cutbacks and this policy would be expected to continue in the future.

Population Growth Projections

IVGID has received a summary of the parcels in 2010 for our service area from Washoe County Community Development. The District also has all parcel data from Washoe County as part of our GIS mapping database and I have prepared a detailed analysis on the vacant parcels in the service area. The population projections in this section will be based on a 20-year period to reach ultimate build-out. The IVGID service area is already substantially built-out so this is not an unreasonable projection.

The parcel data information from Community Development for Incline Village and Crystal Bay is listed as follows:

Total parcels	8920
Private Lots	7838
Public Lots	1082

The public lots are owned by the United States and the State of Nevada and are non-buildable. The following list details the vacant private lots and their zoning. I have counted the number of units instead of parcels to account for multiple units on the multi-family parcels.

Vacant Single family	185 units (151 parcels)
Vacant Multi-Family	51 units (48 parcels)
Vacant Commercial	26 units (26 parcels)

All of the single family parcels have the potential for construction of a residence. The majority of the vacant multi-family units are vacant parcels in existing subdivisions. There is only one multi-family lot that does not have a filed subdivision map but based on the small size of the parcel there would only be up to four units on that parcel. There are several vacant multi-family lots that have a filed subdivision map but no units have been constructed so the number of units has been determined. The size of the vacant commercial lots varies but averages will be applied in the analyses for water demands.

The District currently serves all developed parcels and has the projected water demands from those users. The future water demands are based on the vacant residential and vacant commercial parcels utilizing the established unit flow factors that are calculated from the existing users. The growth projections will be based on a straight line over 20 years starting in 2010. All of these unit flow factors are higher than the 3-year average and the 2013-14 unit flow factors presented in Table 3. The unit flow factors are the total use divided by the number of users in that category. The water use data will be based on following factors; single family unit is 0.45 AF/year, multi-family is 0.20 AF/year and commercial is 1.9 AF/year.

As the communities of Incline Village and Crystal Bay continue to shift to a second home community, the flow factors decrease because there is less use for the same number of users. The projected flow factors will continue to be used in the projections because population and tourism may rebound following an economic recovery. The unit flow factor is inclusive of all uses at a property. Some of those uses continue even when the property is unoccupied such as irrigation.

The other accounts (construction, IVGID Domestic) would be expected to average their current use since there will be minimal to no-growth in those categories. The accounts such as IVGID snowmaking, IVGID irrigation and irrigation will fluctuate based on precipitation and temperature but will average in the long run. Water loss in the system will be projected at 8% of water use.

Using these assumptions, **Table 5** below was prepared that shows the anticipated growth projections for single family, multi-family and commercial customers for the 20-year planning horizon. The last column, 1997 projected build-out, provides the ultimate growth projection from the 1997 Water Management Plan. The projections for build-out for the IVGID service area have been decreased slightly for single family and commercial customers and increased slightly for multi-family customers.

The Boulder Bay project in Crystal Bay is an example in the difficulties of projecting future water demands. The project will increase hotel and condominium units but will reduce gaming and irrigation demands. The project will also be required to provide water rights to balance increase in demand from the existing use. So although the project may increase water demand, it will not push IVGID closer to its water rights limit. All new commercial projects must dedicate water rights to IVGID that match their demands.

Table 5 – Residential and Commercial Growth Projections (Units)

Customer User Category	Year 2010	Year 2015	Year 2020	Year 2025	Year 2030	1997 Projected Build-out*
Single Family	3628	3674	3721	3767	3813	3867
Multi-Family	4061	4074	4087	4099	4112	4076
Commercial	203	210	216	223	229	250

*The build-out is the previous 1997 predicted build-out for the IVGID Service area. Compare to 2030.

Water Use Projections

The metered water use projections are calculated in **Table 6** for all of the customer categories based on their growth projections and unit flow. The irrigation and snowmaking accounts are anticipated to be constant over the next fifteen years because there should be little growth or expansion in those areas. Metered water use is predicted to increase by about four percent over the twenty years time frame analyzed.

Table 6 – Metered Water Use Projections (Acre-feet/year)

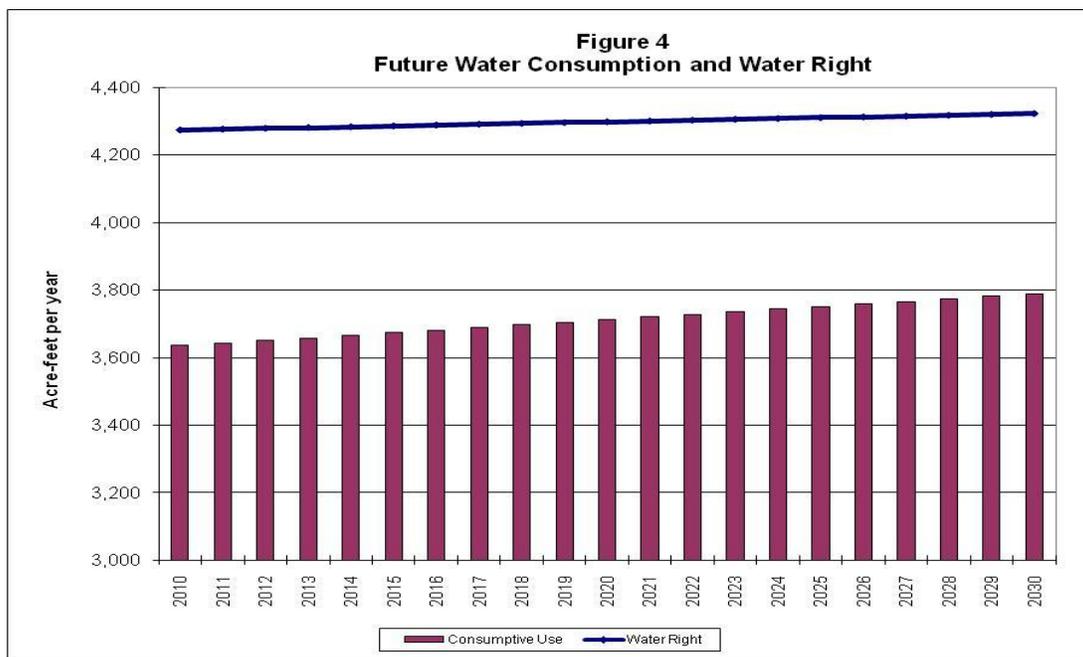
	Year 2010	Year 2015	Year 2020	Year 2025	Year 2030
Single Family	1632	1653	1674	1695	1716
Multi-family	812	815	817	820	822
Commercial	386	399	410	424	435
Construction	12	12	12	12	12
Irrigation	138	138	138	138	138
IVGID Domestic	28	28	28	28	28
IVGID Snowmaking	77	77	77	77	77
IVGID Irrigation	338	338	338	338	338
Total Use	3423	3460	3494	3532	3566

Table 7 calculates the total water use of all customer categories for several different scenarios over the 20-year planning horizon. The metered use is the sum of all customer categories for each planning year and is the Total Use number in **Table 6**. The water loss is the amount of water lost in the distribution and is calculated as 8 percent. Water production is the predicted total water produced and is the sum of the metered use and the water loss. Consumptive use follows IVGID current consumptive use definition which is the sum of all uses plus an 80 percent credit on the water right for snowmaking use. The average credit of 62 acre-feet per year for snowmaking is subtracted from the Water Production. The last column is labeled Public Law 101-618. Public Law 101-618, allows water consumption to be accounted for by the total metered sales, and also provides for a non-consumptive water use credit for snowmaking. The Public Law 101-618 column is calculated as the metered use minus the snowmaking credit. The provisions of Public Law 101-618 will not be enacted until the Truckee River Operating Agreement (TROA) takes effect.

Table 7 – Water Use Projection Scenarios (Acre-feet/year)

Water Year	Metered Use	Water Loss	Water Production	Consumptive Use	Public Law 101-618
2010	3423	274	3697	3635	3346
2015	3460	277	3735	3674	3383
2020	3494	280	3774	3712	3417
2025	3532	282	3812	3751	3458
2030	3566	285	3851	3790	3489

Consumptive Use is the average use in the IVGID service area for the 20-year planning horizon. The future predicted consumptive use is less than the future predicted water right of 4322 acre-feet per year water right, but the margin of safety between water use and water right dwindles from 15% to 12% over 20 years. The following **Figure 4** shows the consumptive use and increase in water rights over a 20-year planning horizon (starting in 2010) and assumes the mix of part time and full time residents remains constant. The water rights increase past the current 4273 acre-feet because the current water management policy requires new multi-family and commercial customers to dedicate water rights to IVGID upon connection. IVGID should continue to meet its future water demands with the policy requiring commercial and multi-family units to assign water rights to IVGID prior to connection. An unusually high irrigation season could push the water use close to our water rights limit but IVGID does have irrigation restriction Ordinances that can be implemented to reduce usage and stay below our water right.



Future Water Use Concerns

Two areas of concern are: 1.) Changing unit flow factors for residential customers and 2.) Increase in residential occupancy rates. The average single family residence uses 0.38 af/year of water. The value changes (+/- 0.05 af/yr) as a response to seasonal variation in irrigation use from a wet year to dry year. Irrigation impacts are shown in the high summer month water use numbers in **Figure 2**.

The second area of concern is increased residential occupancy which can have a much more dramatic impact on the future IVGID water use. The average unit flow factors for multi-family and single family residences are based on water used divided by the total number of units. A portion of these units are occupied on a part time basis by vacationers, renters, or part-time residents. If all of the units were occupied all of the time, a significant amount of additional water would be used. An analysis has been done of the water records to determine occupancy

rates for the IVGID service area and is presented in **Table 8**. Off-season is considered to last 9 months per year and peak season is 3 months per year.

Table 8 - Full Time Equivalents

<i>Customer Type</i>	<i>Off Season Occupancy</i>	Peak Season Occupancy
Residential – Single Family	68%	84%
Residential – Multiple Family	66%	83%

What this table tells us is that there are a substantial amount of existing properties being underutilized. If Incline Village became an all year residential community then water use would increase tremendously. **Table 9** calculates this increase in water use. The additional off season units column is the number of residential units that are available for full time occupancy based on the percentage of full time equivalents in **Table 9**. The same is done for peak season units. These units are multiplied by the appropriate flow factor to get an annual increase in flow. The increase in water use is limited to base water use since it is currently assumed that unoccupied houses utilize irrigation in the summer months already.

Table 9 – Full Time Equivalent Water Use Increase

Customer Type	Additional Off Season Units	Additional Peak Season Units	Unit Flow Factors	Increased Water Use
Single Family	1160	580	250 gpd	285 af/year
Multi-Family	1380	690	225 gpd	305 af/year

The total increase in water use for the residential single and multi-family would be close to 590 acre-feet per year. Adding this amount to the average annual water use for 2014 would still be below IVGID’s water right. Future year’s water use would be even greater because of additional growth in the service area and the water right could be exceeded. It is unlikely that IVGID would become a full-time resident only community. The preliminary trends show the opposite is happening and this is confirmed in the Washoe County report mentioned earlier and in the 2010 Census. They are reporting that full time residency may have dropped to 50%. The service area is becoming more of a second home community and the school population is decreasing. The occupancy will be tracked in the future to determine if IVGID is having an increase or decrease in full time population because of the ramifications this has on the future water supply.

Water Conservation

IVGID adopted its Water Conservation Plan in 1990 that specified the long term water conservation measures to be enacted by IVGID. The primary goal was to avoid exceeding our permitted water right. WASTE NOT, the IVGID Conservation Effort, continues implementation of this conservation plan.

The purpose of the Incline Village Water Conservation Plan is to reduce water consumption by focusing on demand management techniques. This includes initiating changes in behavior

through education, incentive programs, and ordinance and water rate changes. The primary objectives developed include:

- Increased awareness of water rights allocation, water conservation ordinance, and national water resource limitations.
- Increased understanding of the implications with non-compliance of the water conservation ordinance and Nevada State Water Management plan requirements.
- Provide information to allow customers to make informed decisions with water use in and around their homes.
- Encourage participation offered by IVGID and WASTE NOT to improve efficiency of water use by all user types in the service area.

The mechanisms for accomplishing the objectives include: establishing education and outreach programs, developing a water conservation team and irrigation audit program, implementing a landscape ordinance, shaping future rebate programs and establishing benchmark and tracking programs. An IVGID staff member is certified as an AWWA Water Conservation Expert staff to provide complimentary water audits.

In summary, water conservation outreach and awareness will continue to play a major role in the overall reduction of the community's water use. This will be accomplished with continued irrigation auditing, water waste patrolling and advertising to decrease the water consumption rate.

Water Loss

Water loss is the amount of water that is lost in the distribution system from leaks, breaks, and unauthorized use. The water loss for IVGID is the difference between the water production meter at the water disinfection plant and the total meter and authorized unmetered use such as hydrant testing, sewer cleaning water etc. The approach used to determine water loss is outlined by the AWWA in the Water Audits and Leak Detection Manual of Water Supply Practices. These water loss numbers are presented below in **Table 10** for the last twenty six years.

Table 10 - District Water Production, Use and Loss (AF/year)

Year	Total Produced	Total Metered and Authorized Unmetered Use	Total Losses	Percent Loss
FY 89-90	3,871	2,607	1,264	32.7%
FY 90-91	3,893	2,703	1,190	30.6%
FY 91-92	4,116	2,760	1,356	33.0%
FY 92-93	4,170	2,686	1,484	35.6%
FY 93-94	4,311	3,153	1,158	26.9%
CY 1994	4,061	3,242	819	20.2%
CY 1995	3,899	3,211	688	17.6%
CY 1996	4,007	3,324	683	17.0%
WY 96-97	3,692	3,378	314	8.5%
WY 97-98*	3,152	2,983*	169	5.4%
WY 98-99*	3,633	3,149*	484	13.3%
WY 99-00	3,847	3,592	255	6.6%
WY 00-01	3,997	3,623	371	9.3%
WY 01-02	3,670	3,435	234	6.4%
WY 02-03	3,285	3,137	147	4.5%
WY 03-04	3,688	3,593	95	2.6%
WY 04-05	3,160	3,017	143	4.5%
WY 05-06	3,324	3,162	162	4.9%
WY 06-07	3,577	3,310	267	7.5%
WY 07-08	3,392	3,176	216	6.4%
WY 08-09	3,108	2,931	177	5.7%
WY 09-10	2,873	2,609	174	6.1%
WY 10-11	2,741	2,472	269	9.8%
WY 11-12	3,260	3,013	247	7.6%
WY 12-13	3,312	3,011	301	9.1%
WY 13-14	3,185	2,937	248	7.8%

Metered and authorized unmetered use estimated for WY 97-98 and WY 98-99 due to billing software errors.

The District has worked hard to reduce the amount of unaccounted water. Twice per year, IVGID employs a professional leak detection service utilizing computerized sonic leak detection monitoring equipment. Once leaks are found, they are immediately repaired. Additionally, the water main replacement project replaces the older water lines in the District which are more prone to leakage. The amount of recoverable water from the leak survey was calculated as 2.1

million gallons for the entire year. These leaks were repaired immediately after discovery. As the system leaks are repaired each year with the water main replacement project, new “weakest spots” are revealed. This year’s leakage rate is 7.8% and has averaged 8.1 % over the last five years. District staff put in extra effort to determine why the leakage amount appears to have gone up in recent years. This includes checking every hydrant, investigating around water tanks, inspecting watermains near creeks, and other detailed system inspections. The District has also begun a sub-metering program to try and determine if a certain water zone is exhibiting high leakage rates.

The annual leak detection of the watermains found no major leaks and meter testing has confirmed accuracy of the meters tested to be within AWWA standards. Tanks, hydrants and other system components have been inspected to look for leaking water with nothing found.

The District has a meter testing program to verify accuracy of our billing and to schedule replacement of meters as they age and performance deteriorates. See **Appendix A** for a more detailed analysis of the 2013-14 Water Audit. Industry standards maintain that an average system would expect 10% leakage. With the average District leakage rate below 10% over the last five years, Staff is confident that the system leakage rate is being controlled at an exceptional level.

APPENDIX A

Water Audit 2013-14

Water Audit 2013-14

TO: File

FROM: JOE POMROY

SUBJECT: 2013-14 WATER AUDIT

I have gone through the water use data for the 2013-14 water year and have prepared a water audit for the IVGID water system. The water audit worksheet follows the AWWA Manual M36, Water Audits and Leak Detection procedure and is attached as Table 1. The water audit follows the logical progression of accounting for water produced and comparing it to the water used and determining the unaccounted water, or water loss.

Table 1 shows that the production meter for the period of October 1, 2013 to September 30, 2014 read a total of 1038.1 million gallons (mg). The measured metered use for a similar time period totaled 945.4 mg. The term similar time period is used because meters are read in three groups for the water year with read dates near the end of the month a practical, but not perfectly on the last day of the month to match the production meter.

There are also some authorized unmetered uses such as firefighting, hydrant testing and main and tank flushing. Additional metered use includes the construction meters and sewer main flushing water. These uses total approximately 11.8 mg. Therefore the total system loss is approximately 80.9 mg ($1038.1 \text{ mg} - 945.4 \text{ mg} - 11.8 \text{ mg}$).

IVGID water loss is estimated at 80.9 mg or 7.8% of the total water produced. The water loss is assumed to leak out of the distribution system. Recovering system leaks can increase the available water for customers. The AWWA manual assumes that not all leaks can be detected and repaired and therefore the recoverable leakage is calculated as 75% of the total leakage. The total estimated recoverable leakage is 61 million gallons.

The overall leakage number also includes general meter accuracy errors and is probably not reflective of actual leakage in the system. The most important part of leak detection is that early identification of leaks makes them easier and cheaper to repair than ignored leaks that can cause significant damage. The water system assets are maintained and replaced to exceed industry standards.

TABLE 1				
IVGID Water Audit Worksheet				
Water Year 2013-14				
Line	Item	Subtotal	Units*	Percent
Task 1- Measured Supply				
1	Burnt Cedar Water Production	1038.10	MG	100.0%
2A	Source meter error (+ or -)	0.00	MG	
4	Adjusted water supply to the distribution system (add lines 1 and 2A)	1038.10	MG	
Task 2- Measured Metered Use				
5	Uncorrected total metered use	945.42	MG	91.1%
6	Adjustments due to meter reading			
7	Metered deliveries (add lines 5 and 6)	945.42	MG	91.1%
8A-C	Sales meter error and system-service meter error (+ or -)			
8A	Residential meter error	0.00	MG	
8B	Large meter error	0.00	MG	
8C	Total (add lines 8A and 8B)	0.00	MG	0.0%
9	Corrected total metered water deliveries (add lines 7 and 8C)	945.42	MG	91.1%
10	Corrected total unmetered water (Subtract line 9 from line 4)	92.68	MG	8.9%
11A-M	Authorized unmetered water uses			
11A	Firefighting, training, and hydrant testing	5.00	MG	
11B	Main and Tank flushing	2.00	MG	
11C	Storm drain flushing	0.00	MG	
11D	Sewer cleaning	0.30	MG	
11J	Construction sites	1.32	MG	
11K	Water quality and other testing (pressure testing pipe, water quality, etc.)	0.00	MG	
11M	Other unmetered uses	3.18	MG	
12	Total authorized unmetered water (Add lines 11A through 11M)	11.80	MG	1.1%
13	Total water losses (Subtract line 12 from line 10)	80.88	MG	7.8%
14A-G	Identified water losses			
14A	Accounting procedure errors	0.00	MG	
14C	Malfunctioning distribution system controls	0.00	MG	
14F	Reservoir overflows	0.00	MG	
14G	Discovered leaks	2.10	MG	
15	Total identified water losses (Add lines 14A through 14G)	2.10	MG	0.2%
16	Potential water system leakage (Subtract line 15 from 13)	78.78	MG	7.6%