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2005 Nevada Irrigation District Urban Water Management Plan

20 January 2006

Prepared for

Nevada Irrigation District
1036 W. Main Street
Grass Valley, CA 95945

K/J Project No. 0570016*00

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Nevada Irrigation District
2005 Urban Water Management Plan
Contact Sheet

Date plan submitted to the Department of Water Resources: **12/10/05**

Name of person preparing this plan: **Tim McCall, PE, Chief Engineer**

Phone: **(530) 273-6185**

Fax: **(530) 477-2646**

E-mail address: **mccall@nid.dst.ca.us**

The Water supplier is a: **Irrigation District**

The Water supplier is a: **Retailer and Wholesaler**

Utility services provided by the water supplier include: **Water**

Is This Agency a Bureau of Reclamation Contractor? **No**

Is This Agency a State Water Project Contractor? **No**

Section 1: Public Participation

1.1 Public Participation

> "10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published. After the hearing, the plan shall be adopted as prepared or as modified after the hearing."

Nevada Irrigation District (NID or District) encourages public participation in the development of its urban water management plan updates every five years. NID held a public meeting on November 9, 2005 for review and comments on the draft plan prior to finalization and NID Board of Directors' approval.

In accordance with Section 6066 of the California Government Code, notices of the meeting have been published in the Union and the Auburn Journal newspapers and posted at the Public Library and the offices of City of Grass Valley, City of Nevada City, Placer County, and Nevada County. Copies of the report have been made available for public review at NID's main office and NID's Placer County office. In addition to public comment, NID requested input from the California Department of Water Resources, the City of Grass Valley, the City of Nevada City, and Placer and Nevada Counties. A copy of the Notice for Public meeting is contained in Appendix A.

1.1.1 Plan Adoption

This UWMP was updated and adopted by the NID Board of Directors on January 11, 2006. It is hereby submitted to the California Department of Water Resources. Attached, as Appendix B and endorsed by the Board of Directors, is the Resolution of Plan Adoption. This plan includes the information necessary to meet the requirements of California Water Code Division 6 Part 2.6.

1.2 Agency Coordination

> "10620 (d) (2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable. "

Kennedy/Jenks Consultants coordinated closely with District staff to develop this plan. NID wholesales treated water to the City of Grass Valley for service to a portion of their Broadview Heights area, estimated at 50 single-family residential, 80 multi family residential, and a few commercial customers. NID also wholesales raw water to the City of Grass Valley and City of Nevada City where they treat and deliver the water to their customers. A draft copy of the plan was sent to these two municipalities and the Counties of Nevada and Placer, and their review and comments were requested. Comments received are contained in Appendix C.

1.2.1 Coordination within the District

NID's Engineering Department and Operations Department coordinated with Nevada County and Placer County to determine growth projections for the service area. NID is preparing a Raw Water Master Plan (currently in draft form). Additionally, NID has coordinated with the City of Lincoln to determine growth projections as new developments are planned and built. NID is supplying raw water to the City of Lincoln by wheeling through Placer County Water Agency facilities.

1.2.2 Interagency Coordination

Table 1 summarizes the efforts that NID has taken to include various agencies and citizens in its planning process.

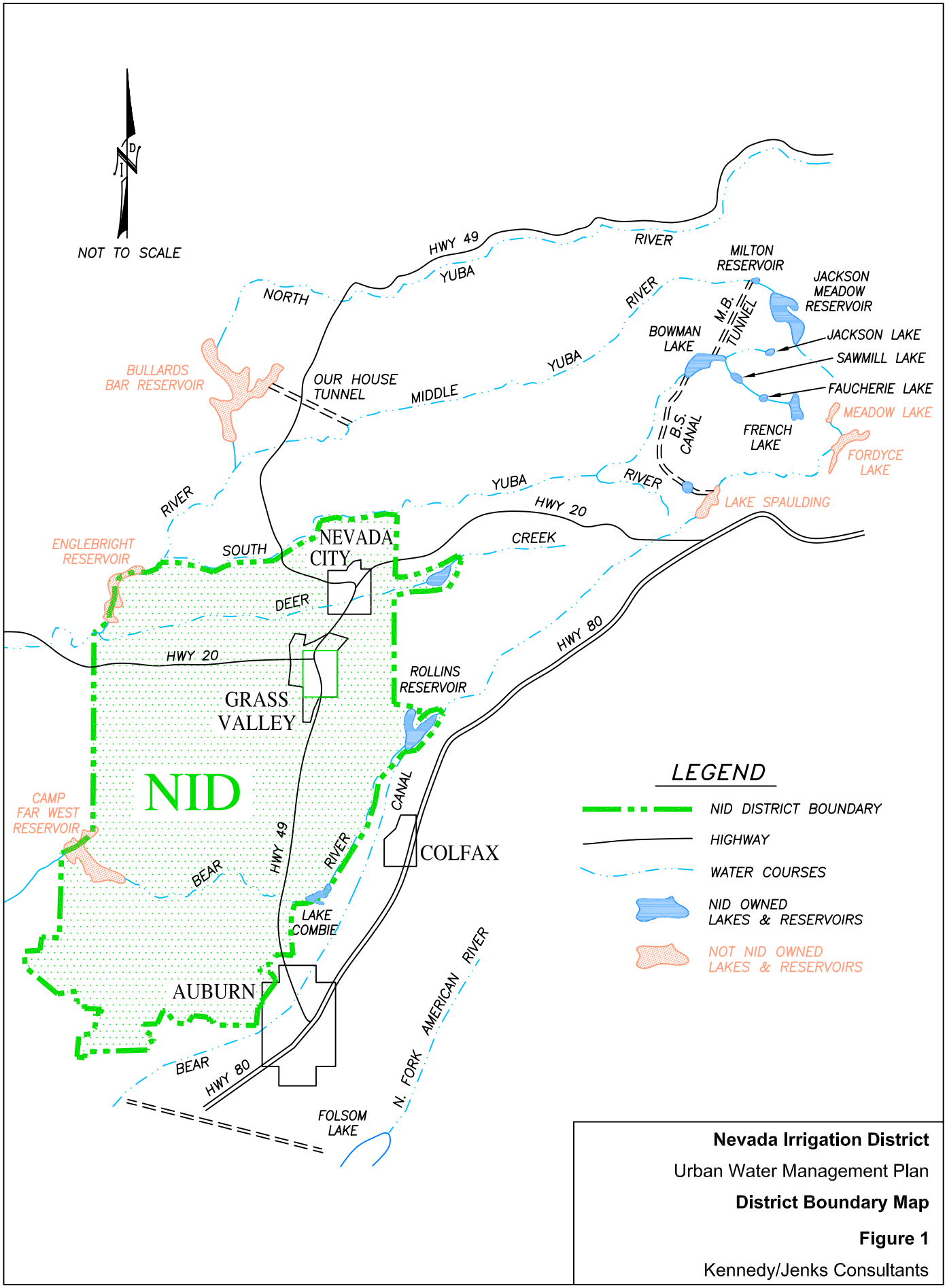
A summary of agencies and individuals participating in the development of this plan is included in Appendix D.

Table 1: Coordination and Public Involvement Actions

	Coordination and Public Involvement Actions			
Entities	**Was sent a copy of the draft**	**Commented on the draft**	**Attended public meetings**	**Was sent a notice of intention to adopt**
Nevada Irrigation District	✓	✓	✓	✓
Nevada County	✓			✓
Placer County	✓			✓
Nevada County Local Agency Formation Commission	✓			✓
City of Grass Valley	✓			✓
City of Nevada City	✓			✓
Pacific Gas and Electric	✓			✓
Placer County Water Agency	✓			✓
General Public	✓			✓
Nevada Joint Union High School	✓			✓
Nevada City Charter School	✓			✓

1.3 Supplier Service Area

The District was organized in 1921 under the California Irrigation District Act of 1897 as a nonprofit water agency, and operates under Division 11 of the State Water Code. Located on the western slope of the Sierra Nevada Mountain Range, NID encompasses 287,000 acres, mainly in Nevada and Placer Counties. Figure 1 is a map showing NID's general location, its watershed and its boundary. NID's mountain watersheds cover 70,000 acres and include the upper portions of the Middle Yuba River above Milton Diversion, Canyon Creek above Bowman



Nevada Irrigation District

Urban Water Management Plan

District Boundary Map

Figure 1

Kennedy/Jenks Consultants

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Reservoir, and Deer Creek. NID water rights include pre-1914 rights acquired from mining interests, along with post-1914 rights filed with the State of California to provide for Domestic, Municipal, Recreational, Power, and Irrigation Uses.

The District was organized for the primary purpose of storing and delivering irrigation water to farmers and ranchers. NID soon acquired additional storage and regulating facilities in the upper reaches of the Middle and South Yuba River. Bowman and Sawmill Reservoirs, together with related water rights were deeded to NID in 1926. French and Faucherie Reservoirs, together with water rights and appurtenances were acquired from the Empire Mines and Investment Company by deed dated February 13, 1926. Other additional water and ditch rights from the Goldfield Consolidated Mines Company were deeded to NID in 1930.

The power potentials of its water led NID to enter into an agreement with Pacific Gas and Electric Company (PG&E) in 1924 for use of a portion of NID's water through PG&E facilities. Over the years, this agreement has been modified to meet the changing conditions and requirements of both organizations.

In 1963, NID and PG&E agreed to develop additional storage capacity on both Deer Creek and the Bear River. Also, additional water was made available by improved and new facilities in the upper Yuba Basin.

NID first started treating water in the late 1950s by injecting gaseous chlorine into open canals at the head of irrigation pipes serving isolated pockets of the area's population. The first conventional water treatment plant (WTP) was built in 1963 at the Forest Knolls subdivision. Today, NID holds permits from the California Department of Health Services, Office of Drinking Water, for seven treatment plants with a combined capacity of 33.4 million gallons (MG); serving over 18,000 connections. Each WTP complies with applicable state and federal regulations including the Surface Water Treatment Rule and the Safe Drinking Water Act. Section 2.3 shows the District water treatment plants and the approximate number of connections served by each plant.

1.3.1 Climate

Elevations within NID's boundaries range from approximately 3,900-feet on Banner Mountain above Nevada City, down to about 200-feet near the town of Lincoln. Summers are generally dry with mild to hot temperatures. Winters are relatively wet, especially in the upper elevations around Nevada City and Grass Valley, with snow levels usually around 3,500-feet and occasionally as low as 1,000-feet. NID's watershed reaches a maximum elevation of 8,373-feet on English Mountain, east of Bowman Reservoir. The normal seasonal precipitation and temperatures for various areas in and around NID and its watershed are shown in Table 2.

Table 2: NID Service Area Monthly Climate Summary

Location	Elev. (feet)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Auburn (040383)	1,300	Period of Record: 1/1/1914 to 3/31/2005												
Avg. Max Temp		53.9	58.4	62.0	68.0	76.2	85.2	92.5	91.4	86.2	76.5	62.8	54.7	72.3
Avg. Min Temp		36.3	39.2	41.2	44.7	50.1	56.5	61.9	60.9	57.3	50.8	42.6	37.0	48.1
Avg. Total Precip. (in)		6.4	6.03	5.2	2.8	1.21	0.35	0.05	0.08	0.46	1.83	4.16	5.86	34.45
Avg. Total Snowfall (in)		0.4	0.1	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	1.2
Grass Valley (043573)	2,400	Period of Record: 10/1/1966 to 3/31/2005												
Avg. Max Temp		53.5	55.4	58.0	62.4	71.1	79.7	87.3	86.9	82.1	72.6	59.5	53.4	68.5
Avg. Min Temp		32.0	33.7	36.2	38.8	45.2	51.3	55.8	54.5	50.1	42.8	36.1	31.6	42.1
Avg. Total Precip. (in)		10.3	8.64	7.9	3.74	1.74	0.61	0.14	0.26	0.9	2.58	7.11	9.16	53.07
Avg. Total Snowfall (in)		2.3	2.1	1.8	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.8	9.3
Nevada City (046136)	2,780	Period of Record: 1/1/1914 to 3/31/2005												
Avg. Max Temp		50.4	53.2	57.0	63.2	71.4	80.1	88.7	87.7	82.1	71.2	58.3	51.1	67.9
Avg. Min Temp		30.0	31.4	33.5	36.7	42.4	48.2	52.4	51.1	46.8	40.9	34.1	30.7	39.9
Avg. Total Precip. (in)		10.1	9.68	7.82	4.31	2.05	0.6	0.05	0.17	0.7	2.75	6.44	9.5	54.17
Avg. Total Snowfall (in)		7.1	4.9	4.4	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.6	3.2	20.8
Bowman Dam (0418018)	5,390	Period of Record: 7/1/1948 to 3/31/2005												
Avg. Max Temp		45.0	47.0	49.0	54.7	63.2	72.0	79.7	79.3	74.0	64.5	52.0	46.0	60.5
Avg. Min Temp		26.3	26.6	27.9	31.8	38.3	46.4	53.0	52.5	48.4	41.2	33.0	27.9	37.8
Avg. Total Precip. (in)		11.2	9.24	9.23	4.64	3.26	1.11	0.23	0.58	1.07	4.02	8.59	11.12	64.29
Avg. Total Snowfall (in)		49.6	42.0	46.8	22.9	6.8	0.2	0.0	0.0	0.1	1.6	20.2	40.7	231.0

Source: Western Regional Climate Center

1.3.2 Population Growth & Other Demographic Factors

NID covers portions of three counties: Nevada, Placer and Yuba. An estimate of growth within NID's boundaries, using population, would not be practical due to a lack of demographic information which corresponds with the NID boundary. A comparison of the number of connections to the treated water system over the past 10 years provides an indication of the growth experienced within the treated water service area. New urban water connections have increased at an annual rate of 4% over the past ten years. Growth increased by 8% from 1995-2000 and by 30% from 2000-2005. The total estimated population served urban water at the end of 2005 is approximately 45,000 people. Table 3 shows the projected number of connections for NID's service area. Table 4 provides population projections for the NID service area.

Table 3: District Treated Water Historic and Projected Service Connections

	Connections	
Year	Low Projection	High Projection
1995	15,294	15,294
2000	16,482	16,482
2005	21,356	21,356
2010	23,638	25,187
2015	28,886	32,477
2020	34,031	38,514
2025	38,716	43,833
2030	43,218	48,870

Table 4: Population Projections for Nevada Irrigation District

Year	2005	2010	2015	2020	2025	2030
Low Estimate	53,390	59,096	72,215	85,077	96,790	108,044
High Estimate	53,390	62,968	81,193	96,284	109,583	122,174

Note: Estimates for Projected Treated Water Connections provided to NID by Nevada County and includes Placer County. Population is determined by multiplying number of connections by 2.5 persons per connection.

Defined as “a special district operated by and for the people who own land within its 287,000-acre boundary,” NID was established as an irrigation district. The district also supplies water for municipal, domestic and industrial purposes.

Agricultural water use accounts for nearly 90 percent of the total demand on the water supply. The remaining 12-13% of water supplied by the District is delivered primarily to single-family residential accounts. NID’s 287,000-acre boundary includes 66,500 acres in Placer County, generally the area between Auburn and Lincoln and to the north. Land use in Lincoln is rapidly changing from rural to urban and water demand is changing from irrigation to treated water.

In Lincoln, NID is responsible for water service to outlying areas and to some sections of the city itself where city and district boundaries overlap.

Current accounting practices identify three types of treated water customers: commercial, noncommercial, and municipal. Noncommercial users include single-family residence, public agencies, schools, and nonprofit organizations. Customers considered commercial may include multi-family, true commercial, and industrial. Municipal customers include Grass Valley and Nevada City, which receive bulk raw water from NID. A small portion of treated water production is delivered through master meters to select areas under jurisdiction of other municipalities. The water is then resold for both commercial and noncommercial use. NID’s commercial customers vary as widely as in most urban areas. There are no major users of treated water for industrial or manufacturing processes.

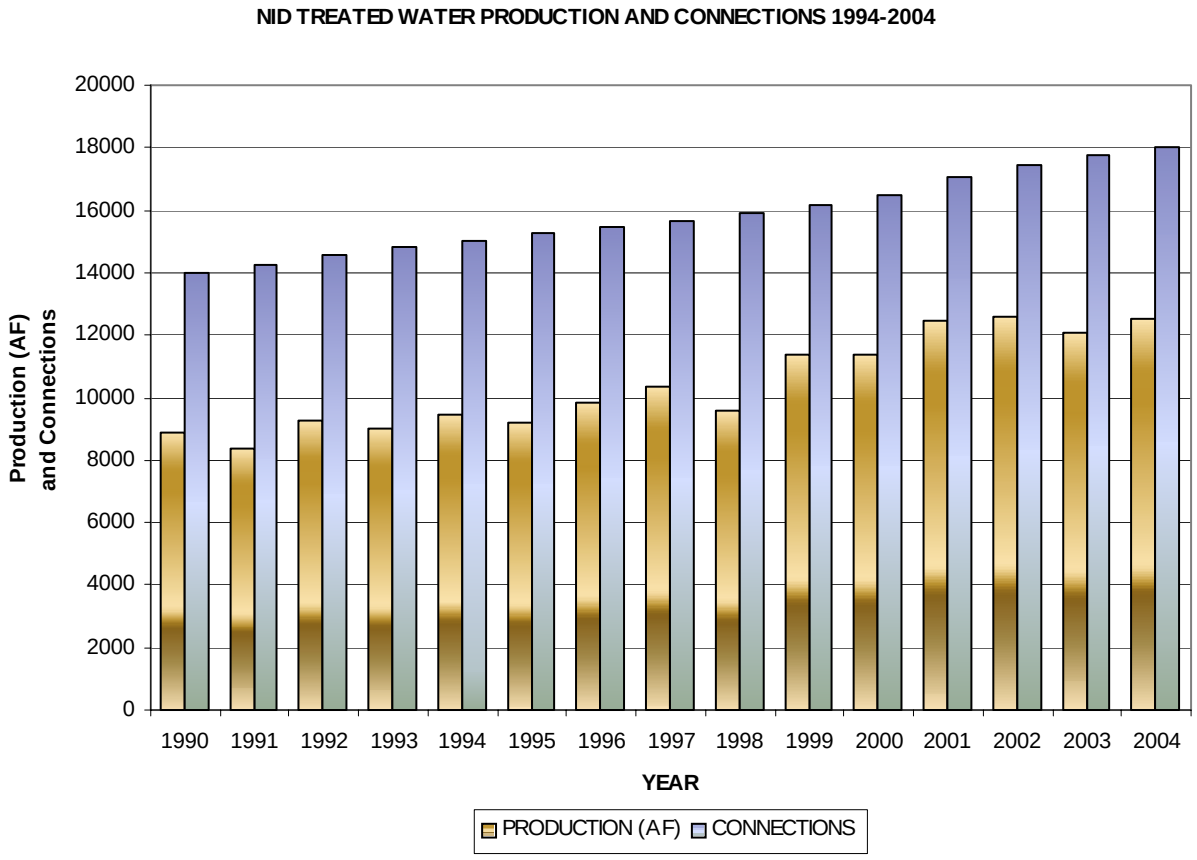
NID's residential customers have a higher percentage of retirees than most urban areas. This was especially true through the 60's and 70's. As the population growth began to accelerate in the mid 1970's to mid 1980's, the ratio of retired households to those with families began to decrease.

1.3.3 Past Drought, Water Demand, and Conservation Information

NID has experienced severe drought conditions twice in the past 30 years. The first drought period was in 1976 to 1977. During this drought all irrigation, except permanent agricultural crops, was reduced by 50 percent and all urban water customers were requested to stop watering lawns and washing vehicles. Other restrictions were imposed. NID conducted a thorough analysis of their operations and implemented changes in their operating procedures following this drought. The second drought period was in 1990 to 1992. During this drought no deficiencies in the urban or agricultural water supply were experienced.

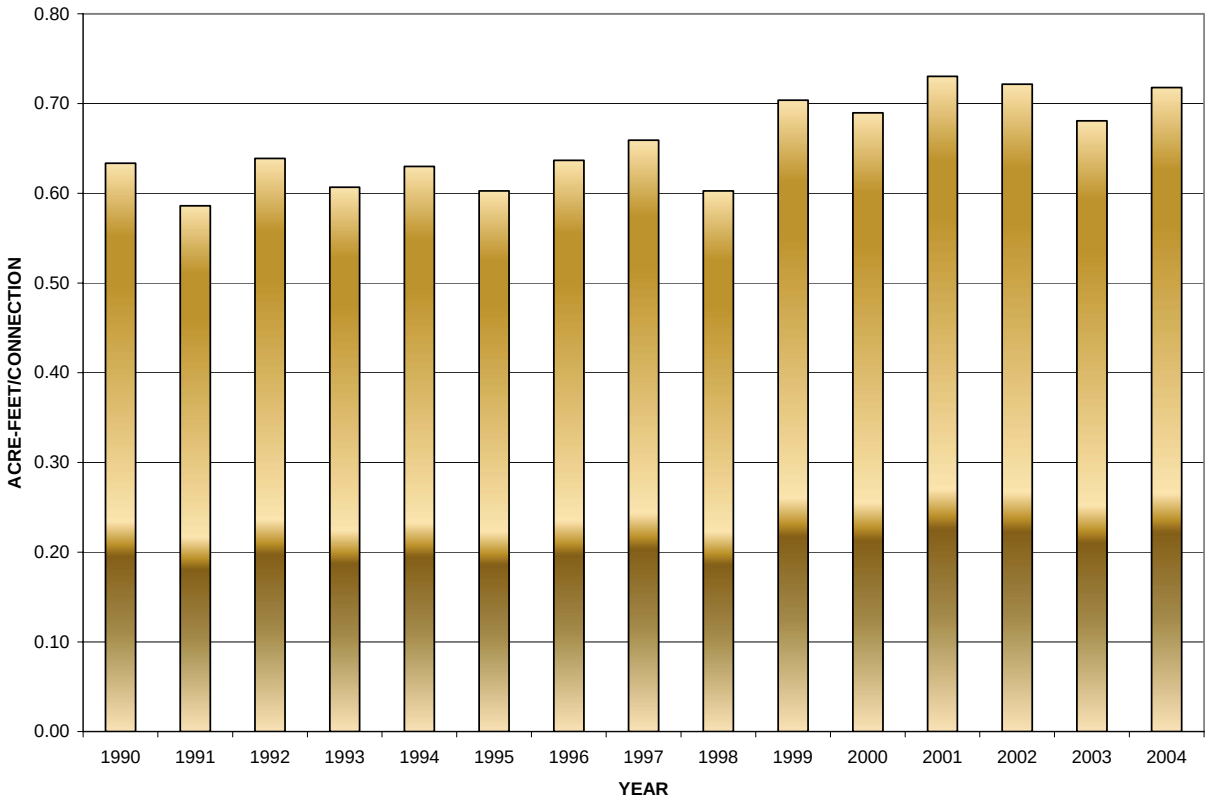
As the number of water service connections has increased, water production has also increased as shown in Figure 2.

Figure 2: NID Treated Water Production and Connections 1994 – 2004



Water use per connection is shown in Figure 3, which compares total treated water production to total connections, from 1990 to 2004. The trend in water production per connection shows an increase over the 15-year period as shown in Figure 3.

Figure 3: NID Treated Water Production per Connection 1994 – 2004



Water conservation is a priority for NID. NID actively implements programs such as residential water audits and quarterly newsletters updating precipitation and current storage capacity to keep customers informed of water availability in the District.

NID adopted a drought contingency plan in December 1992. The plan identifies drought caused water supply shortages and water demand reduction goals within NID during a drought. NID uses the March Snow Survey information for each year to make a preliminary determination of available water supplies. Depending upon the forecast, NID will implement one of the five stages of the contingency plan that includes voluntary and mandatory conservation programs. Section 7 discusses the water shortage contingency plan in detail.

Section 2: Water Sources (Supply)

> "10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:
>
> 10631 (b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments [to 20 years or as far as data is available]."

2.1 Surface Water Supply Sources

The District depends on surface water for its supply for both irrigation and urban water demands. The supply falls into four main categories: runoff from the watershed, carryover storage in surface reservoirs, contract purchases, and recycled water. Table 5 identifies the historic and projected sources and estimated volumes of water supply available for District use.

Table 5: Current and Projected Water Supplies (AFY)

Source of Supply	1995	2000	2005	2010	2015	2020	2025	2030
Watershed Runoff[(a)]	453,737	214,857	228,700	228,700	228,700	228,700	228,700	228,700
Carryover Storage[(b)]	56,534	144,295	112,557	118,200	118,200	118,200	118,200	118,200
Contract Purchase[(c)]	7,356	8,936	8,000	8,000	8,000	8,000	8,000	8,000
Recycled	2,856	3,200	3,000	3,200	3,400	3,600	3,800	4,000
Totals	520,483	371,288	352,257	358,100	358,300	358,500	358,700	358,900

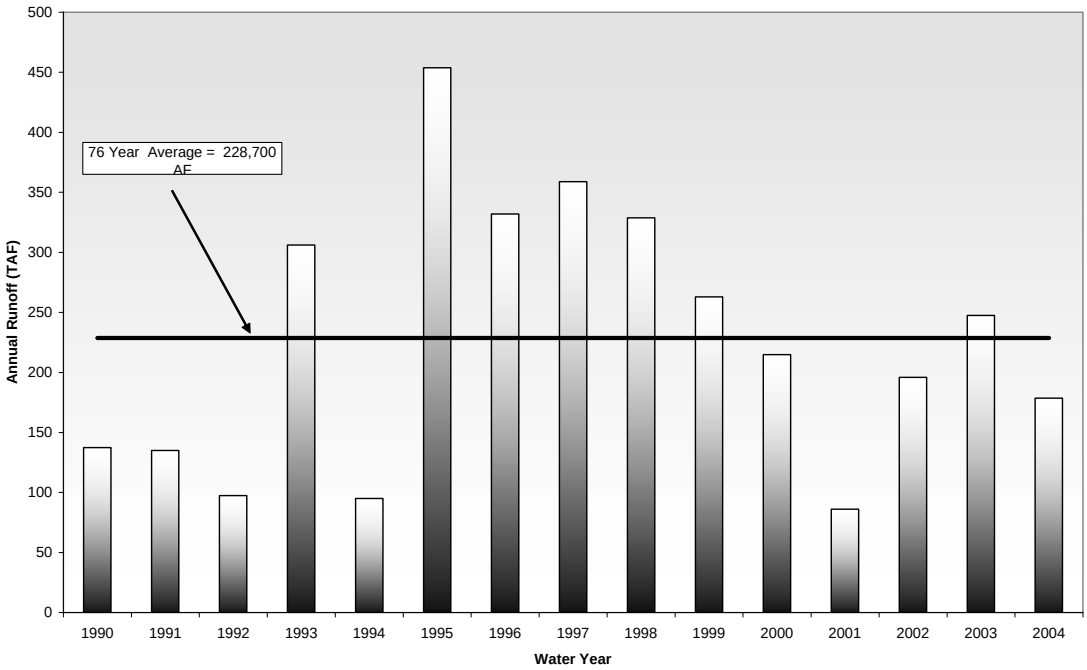
(a) Includes Middle Yuba River above Milton Diversion, Canyon Creek above Bowman Reservoir, Texas Creek, Fall Creek and Deer Creek. Does not include Bear River, or South Yuba due to PG&E contract provisions, and hydrological and water rights considerations. From October 1 of previous year to September 30.
(b) Storage recorded at end of September of previous year and reduced by 39,675 AF unusable minimum pool requirements and dead storage.
(c) Purchased under PG&E contract. Full entitlement of 59,361 AF usually not purchased during normal and above normal runoff years due to conduit conveyance restrictions. District purchases restricted to 23,591 AF during dry year conditions. The Consolidated Contract expires in 2013 and the District expects to renew.

2.1.1 Watershed Runoff

This category of supply includes all runoff produced by NID's watershed during the water year. Actual amounts are listed in Table 5. The amount of runoff and the manner in which it is used, depends upon the amount of water contained in the snow pack and the rate that the snow pack melts. Ideally, melting snow provides runoff lasting into June or July. The system of storage reservoirs and conduits used to transport water to NID's service area boundary are referred to as the Upper Division. The Upper Division is operated in conjunction with PG&E under the terms of a joint agreement. In periods of normal precipitation, ample runoff is available for power production. Conversely, power production is sacrificed to avoid supply deficiencies during dry years. Maximum capacity of key conduits in the Upper Division limits the amount of runoff that can be used effectively for consumptive purposes. Figure 4 shows the recorded watershed runoff since 1990 and compares it to the 76-year average.

Figure 4: NID Historic Watershed Runoff (AFY)

Figure 4. NID Historic Watershed Runoff (AFY)



Note: Includes Middle Yuba River, Canyon Creek, Texas Creek, Fall Creek and Deer Creek. Does not include Bear River or South Yuba due to PG&E contract provisions, and hydrological and water rights considerations. From October 1 of previous year to September 30.

2.1.2 Carryover Storage

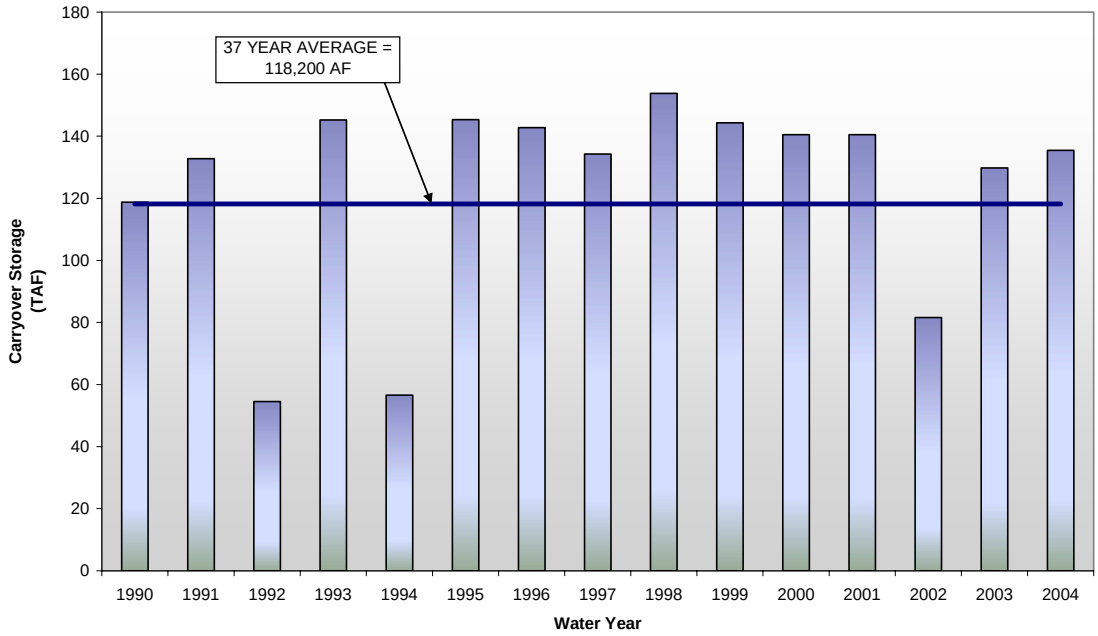
NID has ten main storage reservoirs totaling a maximum of 280,390 acre-feet. Table 6 shows the capacity, the maximum water surface elevation, and the minimum pool or dead storage of each reservoir.

Table 6: NID Reservoirs

Name	Capacity (AF)	Spill Elevation (ft)	Minimum Pool/Dead Storage (AF)
Jackson Meadows	69,205	6,036.00	21,000
Milton	295	5,690.50	148
Bowman	68,510	5,563.60	3,425
Jackson Lake	1,330	6,592.67	360
Sawmill	3,030	5,860.00	0
Faucherie	3,980	6,123.00	249
French	13,940	6,660.28	893
Rollins	65,988	2,171.00	7,200
Scotts	48,547	3,074.81	5,000
Combie	5,555	1,600.00	1,400
Total	**280,390**		**39,675**

Carryover storage is the amount of water left in these reservoirs at the end of the normal irrigation season, usually at the end of September. Experience has shown that carryover storage should be held at a level not less than 70,000 AF. This figure includes a total 39,675 AF of minimum pool requirements reserved for environmental needs and dead storage volume (includes siltation estimates) that cannot be counted upon as a supply. Figure 5 shows the usable carryover storage since 1990 and compares it to the 37-year average.

Figure 5: NID Historic Reservoir Carryover Storage (AFY)



Note: Includes Middle Yuba River, Canyon Creek, Texas Creek, Fall Creek, and Deer Creek. Does not include Bear River or South Yuba due to PG&E contract provisions, and hydrological and water rights considerations. From October 1 of previous year to September 30.

2.1.3 Contract Purchases

Contract water purchases were available each year through the 1963 agreement with PG&E. In years of at least normal precipitation, the maximum amount available is 59,361 AF. This maximum amount is reduced in dry years to 23,591 AF. Actual and projected purchases are listed in Table 5. It should be noted that the contract expires 2013. A renegotiated contract has the potential of affecting NID's overall water supply. However, NID staff does not foresee any major changes over present operations once negotiations have been concluded.

NID's Board of Directors has established a reserve fund to meet the anticipated expense of relicensing the multi-unit hydroelectric facility through the Federal Energy Regulatory Commission. For the purpose of this plan, supply projections for contract purchases have been based on historic records.

2.2 Recycled Water

This supply is made up of effluent from municipal wastewater treatment plants that is captured and mixed with surface waters. The amounts captured are listed in Table 5. This occurs below four municipal wastewater treatment plants: Grass Valley, Nevada City, Auburn, and Placer County at Joeger Road. This recycled wastewater is not used as a raw water supply for NID's treated water plants with the exception of the small town of Smartville where it is mixed with a large volume of surface water and transported through miles of natural drainage courses and earthen canals. The capture of this water augments NID's overall surface supply and is included as a source of supply.

The values in Table 5 represent April through October flow totals that coincide with the Irrigation season. After the fall rains begin, there is sufficient natural runoff to meet NID irrigation demands. The quantity of recycled water available during the summer months is estimated to increase throughout the planning period.

2.3 Existing Treatment & Distribution Facilities

Table 7 presents the existing treatment plant capacity, number of connections served, and the population served.

Table 7: Treatment Plant Capacity and Connection Served

Area	Plant Capacity (MG)	Connections[a]	Population Served
Loma Rica WTP	8	4,718	11,653
E. George WTP	10	5,160[b]	12,745
Lake Wildwood WTP	4	2,886	7,113
North Auburn WTP	6	2,522	5,851
Lake of the Pines WTP	5	2,083	5,291
Cascade Shores WTP	0.34	390	963
Smartville WTP	0.085	44	109
Lincoln Service Area [c]	0	2,098	
Total	33.4	19,901	43,725

(a) As of January 2005
(b) Snow Mountain Area is now served by E. George WTP
(c) Wholesale water is purchased from Placer County Water Agency

Section 3: Reliability Planning

"10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable.

10631 (c) For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to replace that source with alternative sources or water demand management measures, to the extent practicable.

10631 (c) Provide data for each of the following:

(1) An average water year, (2) A single dry water year, (3) Multiple dry water years.

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (b) An estimate of the minimum water supply available during each of the next three-water years based on the driest three-year historic sequence for the agency's water supply."

3.1 Reliability

NID has explored various alternatives to meet anticipated water supply requirements. These evaluations have included proposed expansions to five of NID's water treatment plants and a study to evaluate the back-up power supply needs of the District.

3.2 Frequency and Magnitude of Supply Deficiencies

NID has experienced wide variations in precipitation patterns in its watershed area. During the 1976-77 drought, all irrigation needs, except permanent agricultural crops, were rationed to 50 percent and all urban water customers were requested to stop watering lawns and washing vehicles. Other restrictions were imposed. This supply shortage prompted a thorough analysis of District operations affecting the Upper Division as well as exercising options contained in the agreement with PG&E.

NID's current method of operating the Upper Division watershed was tested in 1990 to 1992 with another series of extremely dry years; the driest on record. No deficiencies in the treated water supply were experienced.

3.3 Plans to Assure a Reliable Water Supply

The historic and future supply projections through 2030 are presented in Table 5. Future supply projections assume normal runoff and average annual precipitation. The District expects that the combined water supplies will provide sufficient quantities of water to meet projected demands over the next twenty-five years with an average growth rate of 4.2 percent per year. NID does not have any plans to increase their raw water supply; however, NID continues to consider options for providing a reliable treated water supply to customers. NID is planning various plant expansions (capital improvement projects) through 2017. A summary of proposed plant expansions is shown in Table 8.

Table 8: Summary of Proposed Treatment Plant Expansions

	Existing Capacity (mgd)	Proposed Expansion (mgd)	Proposed Capacity (mgd)	Proposed Expansion Date
Elizabeth George WTP	10	14	24	2008
Lake Wildwood WTP	4	1	5	2010
Loma Rica WTP	8	4	12	2012
North Auburn WTP	6	1	7	2017
Lincoln WTP	0	10	10	2008

The proposed WTP expansions noted in Table 8 would increase NID's treated water capacity by 30 mgd over the next 12 years.

NID recently completed a two-year, $7 million makeover of the water treatment plant serving Lake of the Pines and the surrounding community, providing more than 5000 people with a more reliable water supply.

3.4 Supply Reliability for Various Scenarios

In addition to water supply shortages caused by a drought, NID is concerned about treated water supply shortages caused by a power failure.

NID currently has two portable generators that can be moved between different locations as needed. NID also has four permanent back-up generators, a 50kW generator located at the Cascade Shores WTP, a 275kW generator located at the Elizabeth George WTP a 275kW generator located at the Lake Wildwood WTP and a 750kW generator located at the Lake of the Pines WTP.

3.5 Three Year Minimum Water Supply

NID has developed a hypothetical three-year worst-case scenario to prepare for water supply shortages. The severity of this hypothetical drought would yield 50 percent less runoff than the runoff recorded in the 1990-1992 series of dry years. The estimated water supply and resulting

supply deficiencies caused by this extreme case are shown in Table 9. It can be seen from this example that deficiencies in overall supplies could reach as high as 17.6 percent, based on a 164,900 AF normal demand. A series of dry years affecting supplies to the extent represented in Table 9 would probably trigger a Stage III Drought Warning, which would have a minimum effect on urban water users. NID's drought contingency plans and drought stages are discussed in Section 7.

Table 9: Hypothetical Three-Year Worst Case Water Supply

(Acre-Feet per Water Year)

	Current Supply	Hypothetical Multiple Dry Water Years		
Sources of Supply	**2005**	**2006**	**2007**	**2008**
Watershed Runoff[(a)]	228,700	62,019	57,383	43,566
Carryover Storage[(b)]	118,200	68,356	59,390	66,357
Contract Purchases	8,000	7,400	23,590[(c)]	23,590[(c)]
Recycled	3,000	2,800	2,600	2,400
Total	357,900	140,575	142,963	135,912
Percent Shortage[(d)]	0	14.8	13.3	17.6

(a) Hypothetical runoff based on 50% less runoff than the worst three years on record: 1990-1992.
(b) Hypothetical carryover based on 50% less carryover than the worst three years on record: 1990-1992.
(c) Maximum allowable purchases under dry conditions.
(d) Based on 164,900 AF demand.

3.6 Water Quality Impacts on Water Management Strategy and Supply Reliability

The State Department of Health Services (DHS) sets both primary and secondary water quality standards for drinking water. Primary standards are health-based. Secondary standards are related to palatability issues such as taste and odor, and scaling and corrosion of pipes.

As a result of preparing the District's Watershed Sanitary Survey Update and Source Water Assessment, several hundred photographs and extensive video documentation of the watershed were taken during the inventory process. From the Source Water Assessment NID expects a 0% loss of water used for urban purposes due to water quality impacts. The following primary observations were made during the field assessment of the watershed.

- Areas in the upper watersheds are, in general, minimally impacted by human activities
- Current and historic mining operations distributed over large areas in the watersheds have a combined high potential to impact raw water quality
- During summer months, recreation in the upper watersheds, including body contact recreation, motorized recreation, camping and hiking, bring large numbers of visitors into the area. This increases the potential for source water contamination.

- Major highways, local access roads and railroads are located throughout the watersheds increasing the risks to source water quality. Raw water canals meander across the freeway and railroads in many spots and parallel roads and highways that often drain directly or indirectly into the canals.

- Nevada City's wastewater treatment plant discharges into Deer Creek upstream of the Smartville Water Treatment Plant intake. In addition, the intake for the Smartville plant is located downstream from grazing lands and cattle have access to the canal.

- Various pesticides and herbicides are used for weed control around NID canals, however, during the maintenance period, the treatment plants are bypassed.

- Most areas 2,500 ft from the intakes are impacted by low density housing with septic tanks, some wildlife and domestic animal activity and occasional hikers

- Most canals are open; they receive untreated drainage from the uphill slopes and are not protected from vandalism or other sources of contamination

Natural disasters can also impact water quality. The quantity and quality of water supplies can be dramatically affected by fire. Storm damage to NID water collection systems may consist of the following elements:

- Damage to parts of canal intakes, canals and tunnels

- Collapse or weakening of some sections of canal flumes,

- Erosion and sedimentation of, and landslides into, many sections of the canals,

- Erosion, flooding, soaking, and sedimentation of, many of the hydro-electric power generation and pumping plant systems.

The above-listed damages can cause some temporary adverse water quality effects, and some short-term losses of NID water supplies in extreme cases. Of greater concern to overall water quality are flood- and precipitation-related damage occurrences that could cause longer term adverse water quality impacts such as sewer line breaks, sewage lift station overflows, excessive sewer inflows and infiltration, septic tank and leach field failures, excessive runoff and loading of surface contaminants (such as livestock manure, petroleum products, pesticides, and mineral wastes).

3.7 Transfer or Exchange Opportunities

> "10631 (d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis."

At this time, NID is not investigating opportunities for transfers and/or exchanges. However, NID maintains interties with PCWA, the City of Grass Valley and Nevada City.

3.8 Desalination Opportunities

> "10631(i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply."

NID has no sources of ocean water, brackish water, or groundwater that provide opportunities for development of desalinated water as a long term supply.

Section 4: Water Use Provisions

"10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:

(A) Single-family residential; (B) Multifamily; (C) Commercial; (D) Industrial; (E) Institutional and governmental; (F) Landscape; (G) Sales to other agencies; (H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof; and (I) Agricultural.

(2) The water use projections shall be in the same 5-year increments to 20 years or as far as data is available."

4.1 Past, Current and Projected Water Use

NID has three main water use sectors: agricultural, urban, and environmental requirements such as minimum pools and fish releases. Records are not available to provide uses among more narrowly defined water use sectors. From 1995 to 2005, 6,062 treated water connections have been added, an increase of 40 percent or about 4 percent per year. More than three-quarters of the growth that occurred in the last ten years, took place in the last five years.

Table 10 shows Past Current, and Projected Water Service Connections 2000-2030 in number of connections per year.

Table 10: Historic and Projected Water Service Connections

Water Use Sector	2000	2005	2010	2015	2020	2025	2030
Seasonal Irrigation	4,940	5,500	6,000	6,500	7,000	7,500	8,000
Year Round Irrigation	640	490	390	290	190	100	100
Treated Water	16,482	21,356	23,642	29,661	35,618	41,084	46,368

Note: Treated water connections based upon Nevada County low projection. Includes service connections in Placer County as well.

As the area within the District's boundaries urbanizes, the water used for agriculture will be converted to domestic purposes. Treated water customers tend to use less water per acre than their agricultural counterparts. The result will be very little change in the overall water demands caused by the change in land uses. Some irrigable lands remain unused. As these lands are brought under irrigation, a corresponding increase in agricultural demands is expected.

4.1.1 Treated Water Sector

Urban water uses, for the purpose of this plan, are considered to be all treated water production. Figure 2 shows the historic production as compared to the number of connections. Table 11 provides estimates of projected production and number of connections by customer category. Current accounting practices identify three types of treated water customers: commercial, noncommercial, and municipal. Noncommercial users include single-family residence, public agencies, schools, and nonprofit organizations. Customers considered commercial may include multi-family, true commercial, and industrial. Municipal customers include Grass Valley and Nevada City, which receive bulk raw water from NID. A small portion of treated water production is delivered through master meters to select areas under jurisdiction of other municipalities. The water is then resold for both commercial and noncommercial use.

NID's residential customers have a higher percentage of retirees than most urban areas. This was especially true through the 60's and 70's. As the population growth began to accelerate in the mid 70's to mid 80's, the ratio of retired households to those with families began to decrease. Currently, NID uses a factor of 2.5 people per household as a District-wide average. (Source: U.S. Bureau of the Census – 2000 Census).

NID's commercial customers vary as widely as in most urban areas. There are no major users of treated water for industrial or manufacturing processes.

4.1.2 Environmental Sector

NID is required to maintain a total minimum pool of 39,675 AF for all of its reservoirs to make flow releases for fisheries and account for dead storage. This minimum pool is subtracted out of the carryover storage on the supply side. In addition to the minimum pool requirement, uncaptured fish releases of approximately 7,700 acre-feet are required annually.

4.1.3 Agricultural Sector

Agricultural water use accounts for nearly 90 percent of the total demand on the water supply. During normal and wet water years, a portion of the supply is wholesaled to neighboring irrigation districts. The larger accounts provide water for commercial crops such as orchards, nurseries, and rice, and irrigation of golf courses. The bulk of the water is used on irrigated pasture. Smaller agriculturalists supplement their income with truck crops; others grow family gardens, irrigate small pastures, or maintain residential landscaping. A few customers use the raw water for household uses; however, most use bottled water for drinking or cooking. A few customers maintain their own water treatment equipment. A small portion of the supply is delivered to municipalities as surface water supplies to treatment plants, which they then deliver to their own urban water customers.

Table 11: Historic and Projected Water Connections and Demand by Customer Category 2000 – 2030

	2000		2005		2010		2015		2020		2025		2030	
Water Use Sectors	**# of Connections**	**Deliveries (AFY)**	**# of Connections**	**Deliveries (AFY)**	**# of Connections**	**Deliveries (AFY)**	**# of Connections**	**Deliveries (AFY)**	**# of Connections**	**Deliveries (AFY)**	**# of Connections**	**Deliveries (AFY)**	**# of Connections**	**Deliveries (AFY)**
Single family	Unknown	9004	10628	11714	12806	14279	16456	16847	19336	19478	21850	21439	24144	24031
Multi Family Residential	Unknown	682	9536	885	11491	1077	14766	1270	17350	1467	19605	1614	21664	1809
Commercial	Unknown	341	890	443	1072	539	1378	635	1619	734	1829	807	2022	904
Industrial	Unknown	227	36	295	43	359	55	423	65	489	73	538	81	603
Institutional/Governmental	Unknown	227	267	295	322	359	413	423	486	489	549	538	606	603
Landscape	Unknown	795	Unknown	1033	Unknown	1257	Unknown	1482	Unknown	1712	Unknown	1883	Unknown	2110
Sales to Other Agencies	NA	87	NA	87	NA	87	NA	87	NA	87	NA	87	NA	87
Agricultural [(b)]	NA	115,900	NA	150,149	NA	161,543	NA	168,732	NA	175,344	NA	181,193	NA	185,552
Totals:	16,482	127,265	21,356	164,900	25,734	179,500	29,661	189,900	35,618	199,800	41,084	208,100	46,288	215,700

(a) Demand projections derived from Table 6-2 Current and Future Water Demands, Draft Raw Water Master Plan Update, July 2005.

(b) All water for Agricultural uses is untreated raw water

Section 5: Supply and Demand Comparison Provisions

> "10635 (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from the state, regional, or local agency population projections within the service area of the urban water supplier."

Table 12 presents supply and demand comparisons for normal water years in 5-year increments. Under this scenario, no deficiencies are noted.

Table 12: Supply and Demand Comparison under Normal Water Year

Volume	2005	2010	2015	2020	2025	2030
Supply totals	352,257	358,100	358,300	358,500	358,700	358,900
Demand totals	164,900	179,500	189,900	199,800	208,100	215,700
Difference	187,357	178,600	168,400	158,700	150,600	143,200
Units of Measure: Acre-feet/Year						

The UWMP Act requires that water purveyors evaluate water demand and supply scenarios for periods of drought, wherein as little as 50 percent of the water supply may be available. Table 13 shows that if water supply was reduced to 50% of the current supply volume, the projected demand over the next three years would continue to be met without shortages.

Table 13: Single Dry Year and Multiple Dry Water Years

Water Supply Sources	Current Supply 2005 (Volume)	Single Dry Water Year (Volume)	Multiple Dry Water Years		
			Year 1 (Volume)	Year 2 (Volume)	Year 3 (Volume)
Supply totals	352,257	176,129	176,129	176,129	176,129
Percent Shortage	None	50%	50%	50%	50%
Demand totals	164,900	164,900	167,820	170,740	173,660
Difference	187,357	11,229	8,309	5,389	2,469
Unit of Measure: Acre-feet/Year					

Demand reductions will take place in accordance with NID's Drought Contingency Plan. Therefore if supply was reduced to a greater extent than shown in Table 13, agricultural use would be reduced by as much as 50% and M&I demand would be reduced as well.

Section 6: Water Demand Management Measures

"CWC Section 10631

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:"

NID is committed to implementing water conservation measures for all customer sectors. Water conservation can be achieved through managing the water supply and/or water demand. Supply management is used to improve overall system efficiency and reduce waste within water production and delivery facilities. NID uses demand management to encourage water conservation by the consumer. Supply management is generally preferable to demand management because it can reduce water loss and waste without the need to depend on consumers for implementation of water management measures. NID chooses to primarily focus on supply management, although demand management measures (DMMs) are also implemented.

For the purpose of responding to the Urban Water Management Planning Act, NID addresses the 14 DMMs with a focus on treated-water customers, unless otherwise stated. NID's water conservation programs are described below.

6.1 DMM1 –Water Survey Programs for Single-and Multi-family Residential Customers

IMPLEMENTATION DESCRIPTION: NID automatically performs a computerized check on all customer sector billings to compare current water usage to the corresponding period in the prior year. The program to implement DMM 1 began in 1985. If a large difference is noted, the customer is notified of a possible leak on their side of the meter.

IMPLEMENTATION SCHEDULE: NID will continue to compare water use and notify customers of any possible leaks. The planned number of water surveys depends on the number of customers queried by the computerized check of water usage records. An estimate of water surveys actually performed is presented in Table 14, and planned water surveys for the next five years are presented in Table 15. Typically NID performs 30 water surveys per week in the summer months and 10 water surveys per week in the winter months.

Table 14: Actual Water Surveys and Expenditures

Actual	2001	2002	2003	2004	2005
# of Water Surveys	1040	1040	1040	1040	1040
Actual Expenditures [(a)]	NA	NA	NA	NA	NA

Table 15: Planned Water Surveys and Expenditures

Planned	2006	2007	2008	2009	2010
# of Water Surveys	1040	1040	1040	1040	1040
Planned Expenditures [(a)]	NA	NA	NA	NA	NA

(a) Costs associated with this program are incorporated into NID's annual budget and are not accounted for separately.

METHODS TO EVALUATE EFFECTIVENESS: The computerized check on all customer sector billings allows NID to notify customers of possible leaks so problems can be addressed and facilities repaired as soon as possible. NID does not have information available to quantify actual water conservation savings by implementing this DMM and the effect of such savings on NID's ability to further reduce demand by implementing this DMM.

BUDGET: Costs associated with this program are incorporated into NID's annual budget and are not accounted for separately.

6.2 DMM2 – Residential Plumbing Retrofit

An estimated 90 percent of all showerheads installed in households served by NID meet water conservation standards. This estimate is based on the number of customers added since 1978 and the average life expectancy of a showerhead. NID also offered low-flow devices during the 1977 drought. Annual water savings would be minimal if NID initiated a new retrofit program and, therefore, no such program will be implemented.

6.2.1 DMM2 –Evaluation of DMM Not Implemented

This DMMs effectiveness is evaluated from the agencies perspective. The cost benefit ratios for DMM 2 were calculated using CUWCC's worksheets. The input information was provided by NID. Table 16 provides a summary of the cost benefit ratio calculated by the CUWCC worksheets. The worksheets are located in Appendix E. A ratio above 1 is considered cost effective, a ratio below 1 is not considered cost effective.

Table 16: Cost Effectiveness Summary for DMM 2

Total Costs	$79,000
Total Benefits	$2,461
Cost to Benefit Ratio	0.03
Discount Rate	4%
Time Horizon	25 Years
Cost of Water	$475/AF
Water Savings (AFY)	3.8 AFY

6.3 DMM3 – Distribution System Water Audits and Leak Detection and Repair

IMPLEMENTATION DESCRIPTION: NID conducts water audits and leak detection and repair on an ongoing basis. NID maintains records on all leaks repaired on its treated water system. The information is reviewed each year to determine which pipelines should be considered for replacement as part of the annual budgeted project list. Table 17 shows the approximate length of treated water pipeline replaced each year from 1996 to 2005. The program to implement DMM 3 began in 1985.

Table 17: Actual Pipeline Replacement

Year	Length (ft)
1996	900
1997	885
1998	1,320
1999	2,890
2000	4,750
2001	1,000
2002	3,500
2003	4,040
2004	2,400
2005	5,800

IMPLEMENTATION SCHEDULE: NID will continue to audit their water distribution systems by comparing water produced and water delivered. Each system is audited at least annually; the most recently completed audit was conducted in 2003 and the next complete audit will be conducted in 2005-06. NID will continue its leak detection program and will schedule surveys on high water loss systems as determined by the annual water audits and leak history records. NID will continue rehabilitating its water distribution system by replacing water mains with extensive leak histories. Table 18 shows the planned pipeline replacement for the next five years. The replacement represents an average of the past pipeline replacement.

Table 18: Planned Pipeline Replacement

Year	Length (ft)
2006	2,750
2007	2,750
2008	2,750
2009	2,750
2010	2,750

METHODS TO EVALUATE EFFECTIVENESS: NID maintains records of numbers and locations of leaks that are detected and repaired each year. The continuous surveillance of the system allows NID to reduce unaccounted for water losses in their treated water systems to a minimum. NID does not have information available to quantify actual water conservation savings by implementing this DMM and the effect of such savings on NID's ability to further reduce demand by implementing this DMM.

Table 19: Summary of DMMs Effectiveness

Year	% of Unaccounted Water	Linear Feet of Lines Surveyed	Linear Feet of Lines Repaired	Actual Expenditures ($)	Actual Water Savings (AFY)
2000	13	Not done on a Routinely basis. Surveys limited to as needed for known leaks.	4,750	Expenditures are not tracked separately	Unknown
2001	20		1,000		Unknown
2002	0		3,500		Unknown
2003	9		4,040		Unknown
2004	13		2,400		Unknown
2005	Unknown		5,800		Unknown

BUDGET: The annual budget for system water audits and leak detection and repair is estimated at about $201,700 for service crew time and material cost.

6.4 DMM4 – Metering with Commodity Rates

IMPLEMENTATION DESCRIPTION: NID is fully metered and all treated water connections are billed based on the volume of water used. The program started in 1968. NID has an inclining block rate structure. For rate information, see DMM 11 or Appendix F.

NID began a 5-year retrofit program in 2000 to replace the aging meters in their system. The new meters will provide more accurate readings of water use within NID.

IMPLEMENTATION SCHEDULE: This DMM is fully implemented and NID will continue to install and read meters on all new services.

METHODS TO EVALUATE EFFECTIVENESS: Meters allow NID to track customer water use and compare current use to historic data. NID does not have information available to quantify actual water conservation savings by implementing this DMM and the effect of such savings on NID's ability to further reduce demand by implementing this DMM. Since NID is fully metered no additional water savings will be realized nor additional expenditures incurred from installing meters due to being fully metered.

BUDGET: Meter installation costs are part of new service connection fees. The estimated 2001 budget for the NID meter replacement program is approximately $320,000, with an additional $355,000 for NID's radio read retrofit program.

6.5 DMM5 – Large Landscape Conservation Programs and Incentives

IMPLEMENTATION DESCRIPTION: NID does not have the jurisdiction to implement a landscape ordinance. As such, other than the information indicated below, no further descriptions of implementation or non-implementation descriptions are provided.

However, in order to encourage landscape conservation, NID employees promote landscape water management and NID maintains a Demonstration Garden operated by the Master Gardeners of Nevada County. NID also offers free computer programs to the public that help to educate users on ways to improve their irrigation efficiency. NID's newsletter is published four times a year and informs the public of the Demonstration Garden and the free computer programs.

IMPLEMENTATION SCHEDULE: NID will continue to offer landscape audits and suggestions for increased water conservation upon request.

BUDGET: Costs associated with this program are incorporated into NID's annual budget and are not accounted for separately.

6.6 DMM6 –High-efficiency Washing Machine Rebate Programs

SB-553 added DMM 6 to the UWMP by in October 2000. NID does not have current data available on high-efficiency washing machine rebate programs offered by local utilities. At this time, it is not anticipated that such a program will be implemented.

6.6.1 DMM6 –Evaluation of DMM Not Implemented

This DMMs effectiveness is evaluated from the agencies perspective. The cost benefit ratios for DMM 6 were calculated using CUWCC's worksheets. The input information was provided by NID. Table 20 provides a summary of the cost benefit ratio calculated by the CUWCC worksheets. The worksheets are located in Appendix E. A ratio above 1 is considered cost effective, a ratio below 1 is not considered cost effective.

Table 20: Cost Effectiveness Summary for DMM 6

Total Costs	$64,700
Total Benefits	$37,577
Cost to Benefit Ratio	0.58
Discount Rate	4%
Time Horizon	25 Years
Cost of Water	$475/AF
Water Savings (AFY)	68.5 AFY

6.7 DMM7 – Public Information Programs

IMPLEMENTATION DESCRIPTION: NID promotes water conservation and awareness through a variety of methods. NID prepares and distributes public information through bill inserts, newsletters, brochures, community speakers, advertising, web page, library, and many special events throughout the year. Appendix G displays samples of public information distributed by NID.

NID publishes a newsletter four times a year that is sent to all customer sectors. The periodical often contains articles on water conservation. NID routinely prints water conservation messages on water billings and return payment envelopes. In 1986, NID published a booklet entitled "Water Conservation Gardening" to assist its customers in conserving water. Another conservation article entitled "Lawn Watering Guide" was published by NID in 1989 and is updated or reprinted, as needed.

A water conservation library has been established in NID's main office. Customers have been advised of the availability of the library material that includes information on drip irrigation, efficient lawn irrigation, low water use landscape and household water conservation measures. Videotapes on water conservation are loaned to interested customers; a list of available material is included in Appendix G. NID has prepared news releases and made public announcements on local radio stations relating to water conservation issues.

IMPLEMENTATION SCHEDULE: NID began providing its customer sectors with information on water conservation in 1985 and will continue to do so. This effort will be at or near existing levels, but will intensify at the onset of a dry-year cycle.

METHODS TO EVALUATE EFFECTIVENESS: NID tracks any comments received regarding the usefulness of the information distributed. NID does not have information available to quantify actual water conservation savings by implementing this DMM.

BUDGET: Public information efforts are estimated at $40,000 annually for staff and materials.

6.8 DMM8 – School Education Programs

IMPLEMENTATION DESCRIPTION: NID staff routinely visits elementary, intermediate, and high schools with informative talks and handouts. Subject matter occasionally includes conservation. The educational material targets several grade levels. Appendix H shows samples of educational handout material used by NID. NID offers tours of its facilities to schools and scout troops.

NID has participated and continues to support the development of the American Water Works Association's "Project Water Works". The program is designed to teach junior and senior high school students about water related subjects including water conservation.

NID has donated analytical equipment and supplies to Nevada Union High School for use in their Agricultural Department. Students routinely test raw water quality at selected areas of the watershed, as well as study specific watershed areas known to have below normal water quality in order to isolate the source (s) of contamination. Although not directly related to water conservation, the program does increase student awareness of the importance of water.

The education material used by NID is provided by *The Partnership For Safe Water* (Elizabeth George Water Treatment Plant Tour Guide), and *Channing L. Bete Co., Inc. A Scriptographic Product* (Coloring Book).

IMPLEMENTATION SCHEDULE: NID began providing the school system with educational programs in 1994 and will continue to do so at the levels described. NID does not have information available to quantify actual water conservation savings by implementing this DMM. Historic classroom visits total six planned visits per year. NID plans to continue to perform six planned classroom visits per year for the next five years. Table 21 and Table 22 show the actual classroom visits and expenditures both in the past and what is planned for the future.

Table 21: Actual Classroom Education Visits and Expenditures

Actual	2001	2002	2003	2004	2005
# of Classroom Visits	6	6	6	6	6
Actual Expenditures	$10,000	$10,000	$10,000	$10,000	$10,000

Table 22: Planned Classroom Education Visits and Expenditures

Planned	2006	2007	2008	2009	2010
# of Classroom Visits	6	6	6	6	6
Planned Expenditures	$10,000	$10,000	$10,000	$10,000	$10,000

METHODS TO EVALUATE EFFECTIVENESS: NID will track any comments received regarding the usefulness of the information distributed.

BUDGET: School education efforts are estimated at about $10,000 annually for staff and materials.

6.9 DMM9 – Conservation Programs for Commercial, Industrial, and Institutional Accounts

IMPLEMENTATION DESCRIPTION: NID does not have any large commercial, industrial or institutional (CII) customers. Local city and county districts have authority over plan reviews of CII customers.

However, NID has established a program for testing and replacing large water meters. Table 23 shows the meter size and the schedule time for testing of meters. Any meters that require repair will be tested the following year.

Table 23: Large Meter Testing

Meter Size	Scheduled Testing
2"	4 years
3"	3 years
4"	2 years
6" and larger	Annually

IMPLEMENTATION SCHEDULE: NID will continue to implement this DMM at the levels described. NID does not have information available to quantify actual water conservation savings by implementing this DMM and the effect of such savings on NID's ability to further reduce demand by implementing this DMM.

METHODS TO EVALUATE EFFECTIVENESS: NID staff completes a test report form for each meter test conducted. An example form is shown in Appendix I.

BUDGET: Annual budget is estimated at about $10,000 for service crew time and material cost.

6.10 DMM10 – Wholesale Agency Programs

IMPLEMENTATION DESCRIPTION: DMM 10 was added to the UWMP by SB-553 in October 2000. NID wholesales a limited amount of raw water and treated water to the cities of Grass Valley and Nevada City. NID began supplying water to PCWA for the City of Lincoln in 2004. The cities generally follow recommendations from NID for implementing DMMs. NID does not have legal authority to require the implementation of DMMs by its wholesale water purchasers, and NID does not provide assistance to the wholesale water purchasers. PCWA and the City of Grass Valley are members of CUWCC and are up to date on their BMP reporting on the CUWCC web site. It is unknown what DMMs Nevada City performs for water conservation for the water it purchases from NID.

6.11 DMM11 – Conservation Pricing

IMPLEMENTATION DESCRIPTION: NID began implementing an inclining block rate structure for all urban water customer sectors in 1996. All customer sectors and meter sizes receive a base block of 2 HCF (hundred cubic feet). Usage above the base amount is billed at a higher

block rate. The Districts inclining rate structure has three blocks. NID's 2005 rate schedules are included as Appendix F.

IMPLEMENTATION SCHEDULE: NID plans to continue implementing its inclining block rate.

METHODS TO EVALUATE EFFECTIVENESS: NID is able to monitor the number of violators who use water in excess of their established allotment.

BUDGET: The inclining block rate is not expected to have any effect on the budget.

6.12 DMM12 – Water Conservation Coordinator

IMPLEMENTATION DESCRIPTION: NID has not assigned the title of "Water Conservation Coordinator" to any one person. In practice, NID's General Manager insures adequate rules and regulations are in place for metering all new urban water customers, setting water rates, and enforcing water waste prohibition. The General Manager directs various Department Managers to carry out other conservation measures such as water audits, leak detection and repairs, public information, school education and monitoring industry trends and research.

IMPLEMENTATION SCHEDULE: NID will continue to implement this DMM at the level described.

BUDGET: Costs associated with this program are incorporated into NID's annual budget and are not accounted for separately. NID estimates that they spend the equivalent of one full time employee at 50% time at $60.00 per hour on water conservation programs. Table 24 presents the actual expenditures over the past five years, and Table 25 shows the planned expenditures for the next five years.

Table 24: Actual Water Conservation Coordinator Efforts

Actual	2001	2002	2003	2004	2005
# of Full Time Positions	0.5	0.5	0.5	0.5	0.5
Actual Expenditures	$62,400	$62,400	$62,400	$62,400	$62,400

Table 25: Planned Water Conservation Coordinator Efforts

Planned	2006	2007	2008	2009	2010
# of Full Time Positions	0.5	0.5	0.5	0.5	0.5
Planned Expenditures	$62,400	$62,400	$62,400	$62,400	$62,400

6.13 DMM13 – Water Waste Prohibition

IMPLEMENTATION DESCRIPTION: NID has adopted regulations, which state in part "A water user who wastes water … may be refused further water service…" (Section 3.05 Water Conservation). Offenders are first written a letter calling their attention to the wasteful practice and asking for a schedule of correction. Continued violation is discussed before the Board's Water and Hydro Operations Committee and a recommendation is made to the full Board. Service may be refused, if necessary. Metered commodity rates are usually enough incentive for a corrective action by the customer. In addition, the computerized check discussed in DMM 1 alerts customers to unusual increases in usage patterns. This warning has historically been sufficient to prompt immediate corrective action for most customers.

IMPLEMENTATION SCHEDULE: NID will continue to enforce this regulation.

METHODS TO EVALUATE EFFECTIVENESS: NID is able to track customer usage through the computerized check discussed in DMM 1. NID has not been required refuse service in the past. The procedures described above have been effective in preventing water waste in the past.

BUDGET: Costs associated with this program are incorporated into NID's annual budget and are not accounted for separately.

6.14 DMM14 – Residential Ultra-low-flush Toilet Replacement Program

Since October 1992, the sale of toilets using more than 1.6 gallons per flush has been prohibited by State and Federal regulations. NID relies entirely on the cities and counties with jurisdiction in its service area to enforce these regulations through the building permit process. The estimated average annual water savings created by a new NID toilet retrofit program would be minimal, decreasing each year. It is not anticipated at this time that a ULFT replacement program will be implemented.

6.14.1 DMM 14 –Evaluation of DMM Not Implemented

This DMMs effectiveness is evaluated from the agencies perspective. The cost benefit ratios for DMM 14 were calculated using CUWCC's worksheets. The input information was provided by NID. Table 26 provides a summary of the cost benefit ratio calculated by the CUWCC worksheets. The worksheets are located in Appendix E. A ratio above 1 is considered cost effective, a ratio below 1 is not considered cost effective.

Table 26: Cost Effectiveness Summary for DMM 14

Total Costs	$89,450
Total Benefits	$52,602
Cost to Benefit Ratio	0.59
Discount Rate	4%
Time Horizon	25 Years
Cost of Water	$475/AF
Water Savings (AFY)	114.9 AFY

6.15 Additional Conservation Programs

6.15.1 Financial Incentive Programs

NID's primary focus is on delivery of irrigation water to agricultural customers. Financial incentive for reducing demand is limited to the inclining block rate structure described in DMM 4 and DMM 11.

6.15.2 Agricultural Water Conservation Programs

In 1991, NID prepared an Agricultural Water Management Plan in compliance with Article 2.8, Division 6 of the CWC. The primary objective of the plan is to conserve water. Ongoing water conservation measures include:

- Use of reclaimed water
- Use of flow gauging stations throughout the system
- Updated raw water system capital improvement list
- Weekly system management meetings
- Use of snow courses to monitor snow pack and predict runoff
- Staff training in water conservation
- Use of a public relations consultant
- Cooperation with Soil Conservation Service
- Irrigation system evaluations
- Annual workshops in water measurement and management
- Customer assistance in scheduling irrigation needs and improving farm efficiencies
- Accelerated water loss prevention program
- Investigation of new delivery systems
- Landscape water management training.

It should be noted that NID's raw water delivery system demonstrates a very low loss factor. In general, the system experiences the usual - and generally unavoidable - losses through evaporation, transportation, and deep penetration seepage. However, losses due to canal leakage, overflows, and return irrigation water (water which escapes the customer's property), in most cases, finds its way back into NID's system by entering a lower canal, reservoir, or stream. This return water augments the supply needed to make downstream deliveries. Repairing a leak in a canal or conduit does not always result in a corresponding conservation of water. Leaks can cause other problems, which usually dictate their repair, such as creation of unwanted wet areas or bogs, potential property degradation, and a reduction in the effective capacity of upstream facilities. NID is continuously patrolling and maintaining its facilities in an effort to reduce water loss due to leaks.

Section 7: Water Shortage Contingency Plan

7.1 Preparation for Catastrophic Water Supply Interruption

> "10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:
>
> 10632 (c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster."

7.1.1 Water Shortage Emergency Response

In the event of a supply emergency, which requires the rationing of water for health and safety purposes only, NID must be prepared to implement an emergency urban water rationing program until normal supplies are restored. In the event of such a supply shortage, the District will implement the following guidelines to be followed until the supply is restored:

1. Direct all available flows to a water treatment plant.
2. Notify customers on a house-to-house basis of emergency and curtailment of all:
   a. Outside water use.
   b. Water for manufacturing processes.
   c. Watering of recreational play areas.
   d. Flushing or flow testing of fire hydrants.
3. Intensify system water loss prevention measures.
   a. Conduct a water leak review to determine the amount of water, if any, leaking in the affected system
   b. Place District maintenance crews on call for priority water leak repair.
   c. Schedule District operation crews to patrol for unauthorized water use.
   d. Notify local news media to provide the most current information to NID customers.

4. Mutual aid will be called upon in order to provide an alternative supply of water to those customers affected by the supply shortage. This may include the following actions:
   a. Notify Cities/Counties/State.
   b. Maintain an up-to-date list of contractors with water on tank trucks.
   c. Notify the Office of Emergency Services that a water supply emergency exists.
5. The District will set up an Incident Command Center (ICC) in order to keep local authorities, radio, newspaper and television up to date on the then current status of the water rationing process that is in place, or if customers need special attention during this shortage of water, they can contact the ICC unit directly.

7.1.2 Supplemental Water Supplies

NID maintains interties with PCWA, the City of Grass Valley and Nevada City to share supply in an emergency. Purchase options are available in the consolidated contract with PG&E.

7.1.3 Water Transfers

NID is currently exploring the possibility of wholesale purchase from the City of Grass Valley to allow the City to make use of excess treated water capacity while allowing NID to defer enlargement of treated water facilities.

7.2 Water Shortage Contingency Ordinance/Resolution

> "10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:
>
> 10632 (h) A draft water shortage contingency resolution or ordinance."

7.2.1 Nevada Irrigation District Area Water Shortage Response

In December 1992, NID adopted a Drought Contingency Plan that identifies stages of water supply shortages, the corresponding water demand reduction goals, and the actions necessary to achieve those goals. The Drought Contingency Plan includes both voluntary and mandatory water rationing. A copy of the Drought Contingency Plan can be found in Appendix J. Appendix K includes the table of contents for NID's Water Service Regulations, which support the water shortage contingency plan.

7.3 Stages of Action

> "10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:
>
> 10632 (a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply and an outline of specific water supply conditions which are…"

NID has developed a five-stage rationing plan (see Table 27) to invoke during declared water shortages. The plan includes voluntary and mandatory rationing depending on the severity of supply shortage forecast.

Table 27: Water Rationing Stages and Reduction Goals

Stage	April 1st Forecast (AF)	Supply Shortage	Type of Rationing Program	Demand Reduction Goal
I	225,000	None	Normal Operation	
II (Alert)	200,000	10% - 15%	Voluntary	15%
III (Warning)	185,000	15% - 25%	Mandatory	25%
IV (Emergency)	170,000	25% - 35%	Mandatory	35%
V (Critical)	150,000	35% - 50%	Mandatory	50%

7.3.1 Priority by Use

Priorities for use of available water during shortages must take into consideration all District customer sectors and their varied water demands. The following list begins with the highest priority demand:

Highest Priority ↓ Lowest Priority

- Health and safety.
- Commercial and industrial.
- Permanent agriculture (requires five years to return to production).
- Existing landscaping.
- Annual agriculture
- New customers (honor 5/8" meter for treated water standby accounts only, no other new services).

7.3.2 Health and Safety Requirements

Based on commonly accepted estimates of interior residential water use in the United States, Table 28 indicates per capita health and safety water requirements.

Table 28: Per Capita Health and Safety Water Quantity Calculations

	Non-Conserving Fixtures		Habit Changes		Conserving Fixtures	
Toilets	5 flushes x 5.5 gpf	27.5	3 flushes x 5.5 gpf	16.5	5 flushes x 1.6 gpf	8.0
Shower	5 min x 4.0 gpm	20.0	4 min x 3.0 gpm	12.0	5 min x 2.0 gpm	10.0
Washer	12.5 gpcd	12.5	11.5 gpcd	11.5	11.5 gpcd	11.5
Kitchen	4 gpcd	4.0	4 gpcd	4.0	4 gpcd	4.0
other	4 gpcd	4.0	4 gpcd	4.0	4 gpcd	4.0
Total (gpcd)		68.0		48.0		37.5

Depending on the severity and time duration of an urban water supply shortage emergency due to a catastrophic failure, the District may need to implement mandatory rationing. The most severe mode of rationing would restrict all urban water customer sectors to interior uses only and prohibit use of water for manufacturing purposes. Demand sufficient for health and safely is estimated at 68 gallons per capita per day (gpcd), because that amount of water is sufficient for essential interior water with no habit or plumbing fixture changes. If customers wish to change water use habits or plumbing fixtures, 68 gpcd is sufficient to provide for limited non-essential (i.e. outdoor) uses.

7.3.3 Water Shortage Stages and Triggering Mechanisms

NID evaluates current reservoir storage, forecasted runoff, and purchase options from PG&E no later than April 1 of each year to determine what water supply stage will apply during the year. Based on the severity of the predicted shortage, as shown in Table 4, NID will take the following actions:

Stage I: Normal Water Conditions

1. District will make full supply and contract deliveries.
2. Continue to operate and maintain the water system in an efficient and economical manner.
3. Continue to update District customers of water conditions and District conservation measures.
4. Review and, if needed update current water conservation plans and system storage.

Stage II: Drought Alert – 10 to 15 Percent Shortage

1. District leak repair receives high priority.
2. Strongly encourage customers to conserve water.
3. Restaurant owners requested not to serve water unless requested by the customer.
4. Declare that no District surplus water is available.
5. Maintain 70,000 minimum acre-feet in storage by the end of October.

Stage III: Drought Warning – 25 Percent Shortage

1. All of Stage II requirements above, and the following:
2. Untreated water deliveries will be reduced by 25-percent and irrigation season delivery alternatives will be imposed.
3. Additional agricultural efficiency practices would be instituted to assist the agriculturist in proper water management as outlined in the Agricultural Water Management Plan.
4. Limit residential, garden, and landscape irrigation during the hottest portion of the day (10:00 a.m. to 6:00 p.m.).
5. Limit fire department practice drills and flow testing of fire hydrants.
6. Encourage that all treated water metered school grounds, and all other public grounds reduce their water usage by 15 percent from what they received under Stage I conditions and as outlined in the District's Urban Water Management Plan.
7. Implement strong conservation pricing on treated water.

Stage IV: Drought Emergency – 35 Percent Shortage

1. Implement all items under Stages II and III, and the following:
2. Untreated water deliveries will be reduced by 35 percent and irrigation season delivery alternatives will be imposed.
3. Implement strong conservation pricing on treated water.
4. Suspend all new untreated water sales.

5. All new treated water services will not be allowed to plant new lawns, landscaping, or gardens. The District will encourage customers to utilize water and efficient irrigation systems.

Stage V: Critical Drought Emergency – 50 Percent Shortage

1. Implement all items under Stage II, III, and IV, and the following:
2. Untreated water deliveries will be reduced by 50 percent and irrigation season delivery alternatives will be imposed.

Conservation oriented rate structure and pricing methods will be established to encourage water conservation.

7.3.4 Water Allotment Methods

Depending on the severity and time duration of the outage, it may be necessary to implement mandatory rationing. The most severe mode of rationing would restrict all urban water customer sectors to interior uses only and prohibit use of water for manufacturing purposes. Demand sufficient for health and safety is estimated at 68 gpcd.

7.4 Prohibitions, Consumption Reduction Methods and Penalties

> "10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:
>
> 10632 (d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.
>
> 10632 (e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.
>
> 10632 (f) Penalties or charges for excessive use, where applicable."

7.4.1 Mandatory Prohibitions on Water Wasting

Methods to reduce water use are addressed in the Drought Contingency Plan. Impacts on revenues and expenditures for various water shortages are addressed under 10632(a).

NID does not have a specific ordinance which prohibits the use of treated water for street washing. However, NID has adopted regulations, which state in part: "A water user who wastes water…may be refused further water service…" (Water Service Regulations, Section 3 General Conditions of Water Service, Section 3.05 Water Conservation). Under this regulation, the use of treated water for street washing would be prohibited at all times. Offenders are first written a

letter calling their attention to the wasteful practice and asking for a schedule of correction. Continued violation is discussed before the Board's Water and Hydro Operations Committee and a recommendation is made to the full Board. Service may be refused, if necessary.

The District does not prohibit specific activities that may result in wasting treated water. Therefore, no additional mandatory prohibitions against explicit water use practices are enforced by NID. However during various stages of drought conditions, NID limits landscape irrigation during the day, limits fire department practice drills and free-flow hydrant testing, and prohibits the planting of new lawns, landscaping and gardens for new service connections. Agricultural efficiency practices are encouraged for users of untreated water.

The District has identified a 50 percent reduction in water use as a Stage V critical drought emergency in its Drought Contingency Plan. Impacts on revenues and expenditures for water shortage scenarios up to 50 percent reduction in water supply are addressed under 10632(a).

7.4.2 Consumption Reduction Methods

In the event of a supply emergency, which requires the rationing of water for health and safety purposes only, the District is prepared to implement an emergency urban water rationing program until normal supplies are restored. In the event of such a supply shortage, the District will implement the following guidelines to be followed until the supply is restored:

1. Direct all available flows to water treatment plant.
2. Notify customers on a house-to-house basis of emergency and curtailment of all:
    a. Outside water use.
    b. Water for manufacturing processes.
    c. Watering of recreational play areas.
    d. Flushing or flow testing of fire hydrants.
3. Intensify system water loss prevention measures.
    a. Conduct a water leak review to determine the amount of water, if any, leaking in the affected system.
    b. Place District maintenance crews on call for priority water leak repair.
    c. Schedule District operation crews to patrol for unauthorized water use.
    d. Notify local news media to provide the most current information to our customers.
4. Mutual aid will be called upon in order to provide an alternative supply of water to those customers affected by the supply shortage. This may include the following actions:
    a. Notify Cities/County/State
    b. Maintain an up-to-date list of contractors with water on tank trucks.

c. Notify the Office of Emergency Services that a water supply emergency exists.

The District will set up an Incident Command Center (ICC) in order to keep local authorities, radio, newspaper and television up to date on the current status of the rationing process that is in place, or if customers need special attention during this shortage of water, they can contact the ICC unit directly.

7.4.3 Excessive Use Penalties

NID has adopted regulations, which state in part "A water user who wastes water … may be refused further water service…" (Section 3.05 Water Conservation). Under this regulation the penalty for excessive use would be discontinuation of service. Offenders are first written a letter calling their attention to the wasteful practice and asking for a schedule of correction. Continued violation is discussed before the Board's Water and Hydro Operations Committee and a recommendation is made to the full Board. Service may be refused, if necessary. The metered commodity rates provide for higher charges for excessive use and are usually enough incentive for a corrective action by the customer. In addition, the computerized check discussed in DMM 1 alerts customers to unusual increases in usage patterns. This warning has historically been sufficient to prompt immediate corrective action for most customers.

In addition to being able to refuse water service, NID also provides the following penalties for unauthorized taking of water:

Offense	Penalty
First	$ 250
Second	$ 500

As outlined in Section 6.13, the District may refuse further water service to a user who wastes water. Other penalties are not levied. There would be an insignificant impact to revenues and expenditures for refused water service.

7.5 Revenue and Expenditure Impacts and Measures to Overcome Impacts

> "10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:
>
> 10632 (g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier…
>
> 10632 (g) [An analysis of the impacts of each of the] proposed measures to overcome those [revenue and expenditure] impacts, such as the development of reserves and rate adjustments."

During a prolonged drought, NID is prepared to implement strong conservation pricing on treated water as a tool for encouraging water conservation and to supplement lost revenue

caused by mandatory rationing applied to agricultural demands. Increasing the base rate and steepening the inclined block rates would achieve treated water conservation pricing. Either reducing the block volumes, increasing the cost differential between blocks, or both, steepens inclined block rates. This type of action can be studied and implemented after public hearings, in a relatively short time period. An analysis of the financial impacts to NID during water shortages is presented in Appendix L. Per Section 3.5 of this Urban Water Management Plan, the driest three-year worst case scenario would be the equivalent of Stage V drought warning. Per response to 10632 (a) above, impact on revenue is estimated at $1,388,000 per year for a total of $4,164,000. $1,388,000 would be funded by reserves with the balance funded by deferral of capital improvement projects.

NID's drought contingency plan calls for conservation pricing; however, a fund has not been established specifically for stabilizing rates during a prolonged drought. The District does have sufficient revenue reserves, if required, to help stabilize revenues from water sales and continue near-normal operations during a drought. The conservation pricing rate structure can be found in Appendix F "2005 Rate Schedules."

NID evaluated two different emergency situations and their impact on the Districts revenue. The first situation is a regional power outage lasting ten days. The second is an earthquake that damages a dam.

Regional Power Outage

Assume the power outage lasts 10 days. All standby generators as identified in Section 3.4 as well as standby generators at various pump stations would be put into service to keep water treatment plants and pump stations operating. Table 29 lists pump stations that are currently without generators.

Table 29: Pump Stations Without Generators

Pump Station	KW Needed	Action
Banner Taylor	100	Use a portable generator (Purchase in 2007 to be rotated between two pump stations.)
Blackledge	20	Install a generator in 2007.
David Way	50	Install a generator in 2007.
Jayhawk	20	Use a portable generator (Purchase in 2007 to be rotated between two pump stations.)
Norlene Way	50	Use a portable generator (Purchase in 2007 to be rotated between two pump stations.)
Pleasant Valley Rd	30	Use a portable generator (Purchase in 2007 to be rotated between two pump stations.)
Song Sparrow	45	Install a generator in 2007.
Sun Forest	45	Use a portable generator (Purchase in 2007 to be rotated between two pump stations.)

Table 29: Pump Stations Without Generators (cont'd)

Pump Station	KW Needed	Action
Wayfarer	30	This pump station to be eliminated by installing a pipeline from an existing tank zone.
Smartville	20	Use a portable generator (Purchase in 2007 to be rotated between two pump stations.)

As indicated in Table 29, three permanent generators will be installed in 2007 and three portable generators will be purchase that will be rotated among the remaining five pump stations. The total cost of six generators in 2007 is estimated at $400,000 to be funded by treated water system improvement reserves.

Treated water customers in pump zones would be asked to limit water use. Estimated loss of revenue would be $10,000.

The cost of operating standby generators minus the avoided cost of electrical power for ten days is estimated at $10,000.

Administrative costs are estimated at $5,000.

After generators are purchased in 2007 for an initial cost of $400,000, the total cost of a ten day outage would be $25,000 which would be funded by reserves.

Earthquake Damages Dam

Assume an earthquake that damages one dam and requires a 50 percent re-build of the District's two largest treatment plants.

Assume half the water in the damaged dam would be released to relieve pressure on the dam. Assume package treatment plants would be rented for six months while treatment plants were being re-built.

Rental Costs:	$200,000
Construction Costs:	$30,000,000
Loss of Water sales:	$500,000
Total Budget Impact:	$30,700,000

All reserves would be made available to cover the budget impact. Reserves are currently adequate. If reserves were not adequate at the time of failure, money would be borrowed. Reserves would be replenished by all practical methods. Replenishment methods include reimbursement by insurance company, grants, disaster relief and by increasing water rates.

7.6 Reduction Measuring Mechanism

> "10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:
>
> 10632 (i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis."

All connections in the NID service area are metered. Therefore actual reductions in water use can be monitored as necessary to achieve the goals of the demand reduction program implemented during water shortages.

Section 8: Water Recycling

> "10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:
>
> 10633 (a) A description of the wastewater collection and treatment systems in the supplier's service area…"

8.1 Wastewater System Description

NID is currently receiving recycled water from four municipal wastewater treatment plants which discharges treated effluent into area streams. The City of Grass Valley discharges to Wolf Creek, Nevada City to Deer Creek, Placer County to Dry Creek, and the City of Auburn to Auburn Ravine. In each case, the discharge mixes with District water being transported in the creeks. The combined waters are then diverted from the creek into a canal, or delivered downstream where it is used by agricultural customers or for fish release requirements. This supply of water augments NID's overall water supply. The amount of wastewater treatment plant effluent taken on an average year makes up only one percent of the total supply.

8.1.1 Description of Wastewater Collection and Treatment in NID Service Area

The Placer-Nevada Wastewater Authority (PNWA), a Joint Powers Agency (JPA), was established in 1999 to develop a regional wastewater treatment and conveyance system. The charge of the PNWA is to regionalize the wastewater treatment of six jurisdictions in western Placer County. In so doing, five smaller and older treatment plants will be closed with their wastewater flows being sent to a larger modern facility located in Lincoln. PNWA has to date received approximately $2.0 million in funding from federal sources to conduct the necessary studies and design work for this project.

Four of the six jurisdictions are within the NID Service Area:

The City of Grass Valley operates a tertiary wastewater treatment plant, treating 2.8 MGD. Grass Valley maintains 55 miles of pipeline within the collection system and six wastewater lift stations. Treated wastewater is discharged to Wolf Creek. Nevada City collects and treats an average dry weather flow of 0.42 MGD (September 2005) and an average wet weather flow of 0.54 MGD (March 2005). In 2004, the Nevada City Wastewater Treatment Plant processed a total of 161,760 MG for discharge to Deer Creek

Placer County collects and treats an average dry weather wastewater flow of 1.8 MGD for discharge to Rock Creek, just above its confluence with Dry Creek.

The City of Auburn's treatment plant is located west of the city in the Ophir area. The plant is permitted to discharge its treated effluent into Auburn Ravine Creek to a maximum flow of

1.65 million gallons per day. The effluent is treated to what is commonly referred to as tertiary treatment, which is the highest level of treatment required by the State of California.

The city also maintains over 65 miles of wastewater collection lines throughout the city. This network of pipes collects sewage from residences and businesses within the city and transports it to the treatment plant.

Table 30 provides a projection of the quantity of wastewater collected and treated in the service area. Because there are four different wastewater treatment systems that serve urban portions of the NID, projections of wastewater treated is estimated based upon a conservative estimate of 70 percent of treated water supplied by NID.

Table 30: Wastewater Collection and Treatment

	2000	2005	2010	2015	2020	2025	2030
Total Wastewater collected and treated in NID service area	7,955	10,300	12,600	14,800	17,100	18,800	21,100
Volume that meets recycled water standard	7,955	10,300	12,600	14,800	17,100	18,800	21,100

8.1.2 Recycled Water Use

All wastewater treated within the NID service area is discharged to local watercourses. As stated above and shown in Table 31, some water is recaptured downstream by NID for agricultural uses. Table 32 compares the projected recycled water use to actual recycled water use. At this point NID uses recycled water exclusively for agricultural uses, since they currently do not have any alternate distribution system for recycled water installed.

NID recycles sewage effluent from the Nevada City sewage treatment plant. For 6 months per year, all of the sewage effluent is diverted from Deer Creek. Some gets treated and re-used at the Lake Wildwood Water Treatment Plant and the remainder gets re-used as irrigation water.

NID recycles sewage effluent from the Grass Valley sewage treatment plant. For 6 months per year, all of the sewage effluent is diverted from Wolf Creek and gets re-used as irrigation water.

NID recycles sewage effluent from the North Auburn sewage treatment plant. For 6 months per year, 70% of the sewage effluent is diverted from local drainage and gets re-used as irrigation water.

To address the determination of technical and economic feasibility of serving the potential uses for recycled water, NID is already using recycled water for the largest water user group (agricultural) in its service area. NID expects its projected recycled water use to match its future projected recycled water use. Table 31 shows the projected recycled water use to 2030.

Table 31: Recycled Water Use – Actual and Potential in Service Area (AFY)

User Type	2005	2010	2015	2020	2025	2030
Agriculture	3,040	3,200	3,400	3,600	3,800	4,000

Table 32: Recycled Water Uses – 2000 Projection Compared With 2005 Actual (AFY)

User Type	2000 Projection for 2005	Actual Use in 2005
Agriculture	3,400	3,040

8.1.3 Optimizing Recycled Water Use

NID will consider expanding its use of recycled water in the future. As waste water treatment plants are upgraded more recycled water will be available for use. The recycled water can be used in other areas beyond agriculture, including but not limited to landscape irrigation, street washing, and golf coarse irrigation. A study to determine the technical and economic feasibility of serving these potential uses may be performed when the upgrades to the treatment plants are planned. At this time the projected results cannot be determined.

Section 9: Water Service Reliability

> "10635 (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from the state, regional or local agency population projections within the service area of the urban water supplier."

Supply totals include watershed runoff, reservoir carryover storage, contract purchases and recycled water. The supply of runoff is dependent on hydrologic conditions and may vary drastically. Historically, runoff has ranged from about 100 TAF in 2001 to approximately 450 TAF in 1995. 228.7 TAF is the average annual runoff and is used for projections of future supply. Reservoir carryover storage is also a variable component of supply and is dependent upon hydrologic conditions as well as operational variations. Contract purchases are dependent upon water available from PG&E and largely related to hydrologic conditions and operations. Recycled water supply is expected to increase with population growth, as it is comprised of all treated wastewater in the NID service area. Urban demand is shown in Table 11 and total service area demands including irrigation demands is shown in Table 12.

The single dry year supply is estimated to be 25% deficient from average, or normal water year supply. Single dry year demand is assumed to be 100% of demand, as it is assumed there would be no effect on customer usage until the second year of a dry year sequence.

The multiple dry year scenarios are based on 25% overall reduction in the irrigation component of demand and a 15% reduction in the urban component of demand. Supply reductions reflect a 10% reduction in supply during the first year of a dry year sequence, a 15% reduction in the second year and a 25% reduction in the third year. The reductions in supply could be from any one of the four components of supply or any combination thereof. The fourth and fifth year are assumed to be recovery years of projected average supply and demand.

Quantities in all tables are in acre-feet per year unless otherwise noted.

9.1 Projected Normal Water Supply and Demand

Projected supply during normal, or average runoff, year

	2010	2015	2020	2025	2030
Supply	358,100	358,300	358,500	358,700	358,900
% of projected normal	100	100	100	100	100

Projected demand during normal years

	2010	2015	2020	2025	2030
Demand	179,500	189,900	199,800	208,100	215,700
% of projected normal	100	100	100	100	100

Projected difference between supply and demand for planning period

	2010	2015	2020	2025	2030
Supply Totals	358,100	358,300	358,500	358,700	358,900
Demand Totals	179,500	189,900	199,800	208,100	215,700
Difference (supply minus Demand)	178,600	168,400	158,700	150,600	143,200
Difference as % of Supply	50%	47%	44%	42%	40%
Difference as % of Demand	99%	89%	79%	72%	66%

9.2 Single Dry Year Scenarios

This section presents the single dry year supply and demand comparison. The analysis reveals that there will not be any supply deficiencies during single dry water years projected to 2030.

9.2.1 2010-2030

Projected supply during single dry year throughout planning period

	2010	2015	2020	2025	2030
Supply	264,193	268,575	268,725	268,875	269,025
% of projected normal	75	75	75	75	75

Projected demand during single dry year throughout planning period

	2010	2015	2020	2025	2030
Demand	179,500	189,900	199,800	208,100	215,700
% of projected normal	100	100	100	100	100

Projected supply during single dry year throughout planning period

	2010	2015	2020	2025	2030
Supply Totals	264,193	268,575	268,725	268,875	269,025
Demand Totals	179,500	189,900	199,800	208,100	215,700
Difference (supply minus Demand)	84,693	78,675	68,925	60,775	53,325
Difference as % of Supply	32%	29%	26%	23%	20%
Difference as % of Demand	47%	41%	34%	29%	25%

9.3 Multiple Dry Year Scenarios

This section presents the multiple dry year supply and demand comparison. The analysis shows that there will be no supply deficiencies throughout the planning period.

9.3.1 2006-2010

Projected supply during multiple dry year period ending in 2010-AF/Y

	2006	2007	2008	2009	2010
Supply	318,083	301,405	266,822	356,931	358,100
% of projected normal	90	85	75	100	100

Projected demand during multiple dry year period ending in 2010-AF/Y

	2006	2007	2008	2009	2010
Demand	127,404	129,658	131,912	134,167	136,421
% of projected normal[(a)]	75/85	75/85	75/85	75/85	75/85

(a) Demand is comprised of 75% of the total irrigation demand and 85% of the total urban demand

Projected supply during multiple dry year period ending in 2010-AF/Y

	2006	2007	2008	2009	2010
Supply Totals	318,083	301,405	266,822	356,931	358,100
Demand Totals	127,404	129,658	131,912	134,167	136,421
Difference (supply minus Demand)	190,679	171,747	134,910	222,764	221,679
Difference as % of Supply	60%	57%	51%	62%	62%
Difference as % of Demand	150%	132%	102%	166%	162%

9.3.2 2011-2015

Projected supply during multiple dry year period ending in 2015-AF/Y

	2011	2012	2013	2014	2015
Supply	322,326	304,453	268,665	358,260	358,300
% of projected normal	90	85	75	100	100

Projected demand during multiple dry year period ending in 2015-AF/Y

	2011	2012	2013	2014	2015
Demand	138,045	139,669	141,293	142,918	144,542
% of projected normal	75/85	75/85	75/85	75/85	75/85

Projected supply during multiple dry year period ending in 2015-AF/Y

	2011	2012	2013	2014	2015
Supply Totals	322,326	304,453	268,665	358,260	358,300
Demand Totals	138,045	139,669	141,293	142,918	144,542
Difference (supply minus Demand)	184,281	164,784	127,372	215,342	213,758
Difference as % of Supply	57%	54%	47%	60%	60%
Difference as % of Demand	133%	118%	90%	151%	148%

9.3.3 2016-2020

Projected supply during multiple dry year period ending in 2020-AF/Y

	2016	2017	2018	2019	2020
Supply	322,506	304,623	268,815	268,815	358,500
% of projected normal	90	85	75	100	100

Projected demand during multiple dry year period ending in 2020-AF/Y

	2016	2017	2018	2019	2020
Demand	146,093	147,643	149,194	150,745	152,296
% of projected normal	75/85	75/85	75/85	75/85	75/85

Projected supply during multiple dry year period ending in 2020-AF/Y

	2016	2017	2018	2019	2020
Supply Totals	322,506	304,623	268,815	358,460	358,500
Demand Totals	146,093	147,643	149,194	150,745	152,296
Difference (supply minus Demand)	176,413	156,980	119,621	207,715	206,204
Difference as % of Supply	55%	52%	44%	58%	58%
Difference as % of Demand	121%	106%	80%	138%	135%

9.3.4 2021-2025

Projected supply during multiple dry year period ending in 2025-AF/Y

	2021	2022	2023	2024	2025
Supply	322,686	304,793	268,965	358,660	358,700
% of projected normal	90	85	75	100	100

Projected demand during multiple dry year period ending in 2025-AF/Y

	2021	2022	2023	2024	2025
Demand	153,590	154,884	156,178	157,472	158,766
% of projected normal	75/85	75/85	75/85	75/85	75/85

Projected supply during multiple dry year period ending in 2025-AF/Y

	2021	2022	2023	2024	2025
Supply Totals	322,686	304,793	268,965	358,660	358,700
Demand Totals	153,590	154,884	156,178	157,472	158,766
Difference (supply minus Demand)	169,096	149,909	112,787	201,188	199,934
Difference as % of Supply	52%	49%	42%	56%	56%
Difference as % of Demand	110%	97%	72%	128%	126%

9.3.5 2026-2030

Projected supply during multiple dry year period ending in 2030-AF/Y

	2026	2027	2028	2029	2030
Supply	322,866	304,963	269,115	358,860	358,900
% of projected normal	90	85	75	100	100

Projected demand during multiple dry year period ending in 2030-AF/Y

	2026	2027	2028	2029	2030
Demand	159,971	161,175	162,380	163,585	164,790
% of projected normal	75/85	75/85	75/85	75/85	75/85

Projected supply during multiple dry year period ending in 2030-AF/Y

	2026	2027	2028	2029	2030
Supply Totals	322,866	304,963	269,115	358,860	358,900
Demand Totals	159,971	161,175	162,380	163,585	164,790
Difference (supply minus Demand)	162,895	149,909	112,787	201,188	199,934
Difference as % of Supply	50%	49%	42%	56%	56%
Difference as % of Demand	102%	93%	69%	123%	121%

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