WATER AND ENVIRONEMENTAL SERVICES
MEMORANDUM #07-05

DATE: July 12, 2007

TO: Honorable Mayor Kathleen M. Novak and City Council Members

FROM: A.J. Krieger, City Manager
David Allen, Director of Water and Environmental Services

SUBJECT: CR-63 – 2007 Water Conservation Plan Approval

RECOMMENDATION:
Attached to this memorandum is a Resolution which, if approved, would formally adopt and approve the 2007 Water Conservation Plan and direct staff to submit the Plan to the State. City staff recommends approval.

BACKGROUND:
The following provides background and other relevant information pertaining to the Water Conservation Plan (Plan):

- In accordance with House Bill 04-1365, all providers who supply over 2,000 acre-feet of water to retail customers are required to submit a water conservation plan to the State in order to be eligible for grant funding.
- On September 28, 2006, the City Council adopted Resolution 06-119 which accepted a $16,000 grant from the Colorado Water Conservation Board. These funds were used to prepare the attached Plan.
- The Plan has a targeted savings of 600 acre-feet at ultimate build-out. This level of projected savings is consistent with the final draft of the City's Integrated Water Resources Plan.
- No comments were submitted during the mandatory 60-day public comment period.
- The targeted savings will be achieved by implementing various conservation measures and programs in a "cafeteria" type manner. Funding for future programs will be subject to annual appropriations by City Council.
- If the Plan is approved by the State, the City will be eligible to receive additional grant funding.
- In the future, the Plan will need to be updated every seven years and resubmitted to the State for approval.

POTENTIAL OBJECTION:
City Staff is not aware of any specific opposition to the draft Plan; no public comments were received during the 60 day review period.

BUDGET/TIME IMPLICATIONS:
There is no impact to the General Fund. Future water conservation programs will be funded by operating expense appropriations from the Water and Sewer Fund, as well as anticipated grants from the State.

STAFF REFERENCE:
If Council members have any comments or questions, they may contact David Allen at (303) 450-8783 or dallen@northglenn.org.

SPONSORED BY: COUNCIL MEMBER MARTIN

COUNCILMAN'S RESOLUTION

No. CR-63
Series of 2007

RESOLUTION NO.

Series of 2007

A RESOLUTION ADOPTING THE 2007 WATER CONSERVATION PLAN FOR THE CITY OF NORTHGLENN, COLORADO

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF NORTHGLENN, COLORADO, THAT:

Section 1. The City of Northglenn Water Conservation Plan prepared in compliance with House Bills 91-1154 and 04-1365, and attached hereto as **Exhibit A** is hereby adopted and approved by the City Council. The City Council hereby directs that the Plan be submitted to the State of Colorado, Colorado Water Conservation Board for approval.

DATED, at Northglenn, Colorado, this_____day of _____2007.

RICK LINDSEY
Mayor Pro Tem

ATTEST:

DIANA L. LENTZ, CMC
City Clerk

APPROVED AS TO FORM:

COREY Y. HOFFMANN
City Attorney

CITY OF NORTHGLENN
WATER CONSERVATION PLAN

July 2007

Prepared for
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Purpose and Need

All providers who annually supply over 2,000 acre-feet[1] (af) of water to retail customers are required to submit a water conservation plan to the State Office of Water Conservation in accordance with the Colorado Water Conservation Act of 2004 (HB 04-1365). This plan is submitted by the City of Northglenn ("the City" or "Northglenn") to satisfy the requirements set forth in HB 04-1365. Agencies who do not submit a Plan are not eligible to receive water conservation grants from the State.

The City of Northglenn recognizes the value of its water and the need to use this resource as wisely as possible. Conserving water can help insure adequate water supplies for future generations and reduce the risk of water shortages. It is the City's policy to manage its water supply and distribution systems to minimize waste and encourage the efficient use of its water supply. The purpose of this plan is to develop water conservation goals and select water conservation programs and measures, both ongoing and planned, which will enable the City to meet these goals.

This Water Conservation Plan was developed under the direction of the City of Northglenn's water conservation staff. Input was solicited from City Council and Northglenn residents and integrated into this plan.

Document Format

The Colorado Water Conservation Board (CWCB) recently developed a Model Water Conservation Plan Guidance Document which is designed to guide water providers in the development and implementation of comprehensive and effective water conservation plans. This plan is structured according to the nine planning steps presented in the CWCB guidance document. The City also utilized a series of worksheets provided by the CWCB in the guidance document, which have been labeled as "CWCB Worksheets" in this document.

[1] An acre-foot is the amount of water it takes to cover one acre with water one foot deep. It equals 325,851 gallons and is the approximate amount of water needed to supply one to four households per year, depending on lawn size and landscaping requirements.

1 - PROFILE THE EXISTING WATER SYSTEM

1.1 Profile Physical Characteristics of the Existing Water Supply System

Northglenn is located nine miles north of Denver, Colorado in western Adams County (Figure 1). The City began as a planned community in the spring of 1959, when a housing and land development firm finalized plans for a large housing subdivision north of the Denver Metropolitan area. The vision of a well-balanced community included acres of open space for parks and recreational development along with residential, industrial, educational and commercial plans. From the first residential development in 1959, Northglenn has grown to a home rule City with a population of 36,857 encompassing 7.5 square miles of land. In addition to Northglenn proper, City boundaries include a parcel of land referred to as "Section 36" located northwest of the City in Weld County. Northglenn's wastewater treatment facility is located in Section 36 and some form of commercial and light industrial development is likely to occur in the future.

Figure 1: City of Northglenn Service Area

Northglenn began operating a municipal water system in 1980. As of December 2006, the City had approximately 10,334 customer accounts: 8,819 single family residences, 877 townhomes, 136 apartments, 413 commercial and industrial, 24 schools, and 65 municipal connections. Table 1 provides the number of customers by type of account (i.e. customer class) and the Equivalent Residential Units (EQRs) for each. The City defines an EQR as the average annual volume of treated water supplied to a detached, single family, residential unit account within the City. EQRs are updated annually and are calculated as the five year rolling average of annual water consumption by single family accounts divided by the number of single family homes. For other customer classes, the number of EQRs is calculated by dividing the total water consumed by the five-year rolling average of single family home water use (as described above). Using EQRs is one way in which the City can compare water use between customer classes. During the 2001 to 2006 period, the total number of all accounts increased by 289 or 2.9% and EQRs increased by 6.79% during the same period. Northglenn does not provide water service outside of its City limits.

Table 1: 2001 and 2006 City of Northglenn Water Users by Account Type

		Single Family	Townhome	Apartment	Commercial & Industrial	School	Municipal	Total
2001	# of Accounts	8,697	783	110	364	26	65	10,045
	EQRs	8,621	727	2,199	1,980	425	578	14,530
2006	# of Accounts	8,819	877	136	413	24	65	10,334
	EQRs	8,798	848	2,461	2,369	375	666	15,516

Table 2, which is the CWCB's worksheet 1-1, provides a summary of the City's Water System, including information on supplies, accounts, water use, sales and demands during 2006. Section A of this table provides general information on the City's system. Section B provides information on water supplies, which are primarily derived from surface water sources. The City's average year supply is approximately 2.25 billion gallons while 2006 total water use was around 1.88 billion gallons. Water use by type of service connection (or account), 100% of which are metered, is broken down in Section C. Residential use, which includes both single and multi-family accounts, accounted for 72% of the total water use in 2006. However, use by connection for residential accounts was much lower than for nonresidential and municipal accounts. Total dollar amounts billed by account type are also shown. The City's supply capacity (volume of treated water that can be produced and delivered) currently exceeds average water demands so there is no immediate need to expand supplies. Two planning documents, the City's Integrated Resources Plan which is under development, and this Water Conservation Plan, will assist the City in planning to meet future demands at ultimate buildout.

Table 2: CWCB Worksheet 1-1 "Water System Profile" (based upon 2006 data)

A	SERVICE CHARACTERISTICS			
1	Estimated service population	36,857		
2	Estimated service area (square miles)	7.5		
3	Miles of mains	120 miles potable water, 112 miles sewer		
4	Number of treatment plants	1 drinking water treatment plant, 1 waste water treatment plant		
5	Number of separate water systems	1		
6	Interconnection with other systems	3		
B	**ANNUAL WATER SUPPLY**	**Annual volume (1000 gallons)**	**Number of intakes or source points**	**Percent metered (%)**
7	Groundwater			
8	Surface water[1]	2,248,369	1	100%
9	Purchases: raw			
10	Purchases: treated			
11	Total annual water supply	2,248,369		
C	**SERVICE CONNECTIONS**	**Connections**	**Water sales ($)**	**Percent metered**
12	Residential, single-family	8,819	$3,507,643	100%
13	Residential, multi-family	1,013	$1,119,752	100%
14	Commercial	408	$821,690	100%
15	Industrial	5	incl. w/commercial	100%
16	Public or governmental	24	$246,477	100%
17	Wholesale	0	$0	0%
18	Other (municipal accounts)	65	not billed	100%
19	Total connections	10,334	$5,695,562	100%
D	**WATER DEMAND**	**Annual volume (1000 gallons)**	**Percent of total (%)**	**Per connection (1000 gallons)**
20	Residential sales	1,343,691	72%	137
21	Nonresidential sales	268,538	14%	615
22	Wholesale sales	0	0%	0
23	Other (municipal, not billed)	85,389	5%	1,314
24	Nonaccount water: authorized uses	0	0%	0
25	Nonaccount water: unauthorized uses[2]	179,421	10%	NA
26	Total system demand (total use)	1,877,039	100%	182
E	**AVERAGE & PEAK DEMAND[3]**	**Volume (1000 gallons)**	**Total supply capacity (1000 gallons)**	**Percent of total capacity (%)**
27	Average-day demand	4,988	16,000	31%
28	Maximum-day demand	11,773	16,000	74%
29	Maximum-hour demand	22,983	----	----
F	**PLANNING**	**Prepared a plan?**	**Estimated completion date**	**Filed with state**
30	Capital, facility, or supply plan	in progress	2007/2008	
31	Drought or emergency plan	in progress	2007/2008	
32	Water conservation plan	in progress	2007	

[1] Average water year value, includes approximately 1,100 acre-feet of FRICO Exchange water (per Cory Peterson, Northglenn Engineer)

[2] This is the difference between produced water and metered water deliveries and includes water loss, as well as authorized uses such as fire suppression and construction uses.

[3] 2005 values

1.2 Identify All Sources of Water

Current Supplies and Storage

The City's primary water supply sources are derived from its ownership of various Clear Creek and trans-basin water rights such as Berthoud Pass Ditch, Church Ditch inches, Farmers Reservoir and Irrigation Company (FRICO) shares and junior Clear Creek rights. Water from all of these sources is delivered to Standley Lake in Jefferson County for storage. The Croke Canal, Farmers Highline Canal, and Church Ditch are the primary facilities that are used to convey water from Clear Creek to Standley Lake.

Berthoud Pass Ditch diverts trans-basin water from the Frasier River Basin in Grand County, through Berthoud Pass Tunnel to Hoop Creek which flows into Clear Creek. The City of Northglenn owns the Berthoud Pass facilities. The City of Golden has a contractual right for a portion of the water right and pays half of the operations and maintenance costs. This water can be diverted from May 15 to October 15 and is principally delivered to Standley Lake via the Church Ditch which runs from Clear Creek in Golden. The City of Northglenn owns 18% of the total Church Ditch inches and is two-thirds owner of the ditch structure itself. Ownership of the structure allows Northglenn to use Church Ditch to deliver its Berthoud Pass water as well as its Church Ditch inches. The Church Ditch operating season is April 1 through October 31.

The City of Northglenn also has junior water rights on Clear Creek during "free river" conditions. Free river conditions imply that the flow in the river is high, all senior water rights are being met, and no call on the river exists. During periods of drought, the flow in most rivers is low and the call on Clear Creek is too senior to allow the City to divert these rights. Additionally, Northglenn owns non-tributary groundwater rights and pumps wells along the South Platte River that are mainly an augmentation source.

Northglenn currently has insufficient water supplies to meet drought year demands. In 1976, to enhance the City's water supplies, Northglenn developed an innovative agricultural/municipal partnership. The Northglenn/FRICO exchange gives the City the first use of agricultural supplies in Standley Lake and the City returns treated wastewater effluent and a 10% bonus to the irrigators. This agreement has effectively extended Northglenn's supplies by the amount exchanged without requiring the City to purchase water rights or expand storage. FRICO shares are delivered to Standley Lake via the Croke Canal from November 1 through March 31. The appropriation date for this water is 1902 which is senior to many upstream rights on Clear Creek but junior to several large reservoirs and water diversions downstream on the main stem of the South Platte River. In average years, between 1,000 and 1,200 af is exchanged. During the 2003 drought, in addition to invoking drought mitigation measures, the City increased the amount of borrowed FRICO agricultural supplies to 1,800 af.

More detailed information regarding Northglenn's water supplies and yields will be included in the 2007 Integrated Resources Plan.

Potable Water Treatment and Storage

The City's raw water supply is stored in Standley Lake. Water from Standley Lake flows by gravity through a 48 inch pipe to a terminal reservoir with a storage capacity of 40 million gallons. The terminal reservoir is located at the Northglenn Water Treatment Facility (WTF) at 2350 West 112th Avenue. The WTF has a 16 million gallons per day (MGD) capacity, of which the City typically uses a 14 MGD instantaneous daily

maximum. The City's peak and average daily demands were 11.77 MGD and 4.99 MGD, respectively.

In 2002, the City built a new finished water storage tank with a capacity of 3 million gallons. Combined with three existing storage tanks, the City has 7.75 million gallons of finished water storage. The City's potable water supply system includes 120 miles of pipe which delivers water throughout the service area.

Wastewater Treatment and Storage

The Northglenn Wastewater Treatment Facility (WWTF) is located on 320 acres of City owned land in the West ½ of Section 36, T1N, R68W in Weld County at the intersection of Weld County Roads 2 and 11. The City's sewer system includes 112 miles of sewer main that collect wastewater and deliver it to the WWTF.

The currently effective Colorado Discharge System (CDPS) Permit for the Northglenn Wastewater Treatment Plant was issued in 2002. This permit will expire on July 31, 2007. An application for renewal of this permit has been submitted to the Colorado Department of Public Health and Environment. To adhere to a compliance schedule and meet new ammonia limits by June 1, 2006, the City recently upgraded the WWTF to a 3-stage biological nutrient removal (BNR) system. The upgraded facility has nitrification, denitrification and biological phosphorus removal capacity to meet permitted and future effluent limits. Treatment also includes a system of aerated lagoons. Treated effluent water is stored in Bull Reservoir (4,200 af capacity) until irrigation season when it is released to Bull Canal for use by farmers for crop irrigation. Northglenn has the ability to release effluent water to big Dry Creek or Thompson Ditch both of which are tributaries to the South Platte River.

The WWTF treats an average of 3.7 million gallons per day and has a permitted capacity of 6.5 MGD. Additionally, if more stringent effluent limits are imposed in the future, the WWTF could be upgraded to a 5-stage BNR process. At ultimate build out in 2020, Northglenn will require an estimated capacity of 4.94 MGD to provide service within its corporate boundaries. The remaining unused capacity above the City's needs could be made available to the Cities of Broomfield and Thornton, unincorporated Weld County, and others within the vicinity of the treatment plant who may need wastewater treatment service.

1.3 Identify System Limitations

The amount of FRICO agricultural supplies available for exchange to Northglenn is diminishing due to the gradual transition from agricultural to residential and commercial developments. The City recognizes that it may not be able to depend upon FRICO exchange water to the same extent in the future. To address this and other water supply concerns, the citizens of Northglenn voted to extend a one-half percent (0.50%) sales and use tax in November 2004. The sales and use tax will be used exclusively for the purchase or lease of water or water rights for use in, and/or augmentation of, the municipal water system. The tax terminates on December 31, 2010. Since the sales and use tax has been in effect, Northglenn has purchased $6.5 million in FRICO-Standley Division and Church Ditch shares and intends to continue purchasing shares as they become available.

A summary of system conditions is provided in Table 3. The City's population is approaching build out levels (when all development currently anticipated will be in place)

and there are no unusual or troubling conditions. In addition, the City is planning ahead and intends to make substantial purchases of water rights and make improvements and additions to current system infrastructure to meet its future supply needs.

Table 3: CWCB Worksheet 1-2 "Summary of System Conditions"

PLANNING QUESTIONS	Yes	No	Comment
Is the system in a designated critical water supply area?		X	
Does the system experience frequency shortages or supply emergencies?		X	
Does the system have substantial unaccounted-for and lost water?		X	Unaccounted for system loss is approximately 10 - 12% of total water produced. Delivery lines and meters have been and continue to be replaced to help decrease loss.
Is the system experiencing a high rate of population and/or demand growth?		X	City is at 87% of the build out population estimate and 93% of build out land area.
Is the system planning substantial improvements or additions?	X		See Worksheet 3-1 for anticipated system improvements and additions.
Are increases to wastewater system capacity anticipated within the planning horizon?		X	

1.4 Characterize Water Costs and Pricing

Rates

Customer water accounts are charged based on the following classes: residential, commercial domestic, commercial mixed use, or commercial irrigation. Commercial domestic accounts provide water for indoor use only, commercial mixed use accounts provide both domestic use and irrigation on the same meter, and commercial irrigation accounts are designated for irrigation only. Indoor water use for both residential and commercial accounts is set at a lower rate than those for outdoor use. This differential rate system, where the highest rates apply to outdoor only (i.e. commercial irrigation accounts) or mixed use accounts (i.e. residential or commercial mixed use accounts), is designed to encourage outdoor water conservation. Additionally, if a higher water savings goal is identified during a period of drought, surcharges may be applied as noted in the rate discussion below. Rates for commercial irrigation and commercial domestic use customers are based on a fixed consumption use charge.

Residential Accounts

In 2003, the City implemented a three-tiered water rate structure designed to cover the costs associated with operating and maintaining the water distribution system. Every residential water account is billed for a minimum of 3,000 gallons of water and sewer usage each month; the total minimum bill for water is $9.45 and $8.55 for sewer. Sewer charges are based upon customers' average water consumption for the months of November, December, January and February, when it is assumed outdoor water use is at a minimum. Average household consumption per thousand gallons during these months is multiplied by $2.85 to set the sewer rate for the next year beginning with the April utility statement.

The City's current tiered Residential rate system for water service is as follows:

0 to 3,000 gallons: $9.45 flat fee for water
3,001 to 15,000 gallons: $3.15 per 1,000 gallons of usage
15,001 to 23,000 gallons: $3.70 per 1,000 gallons of usage

23,001 gallons and above: $5.00 per 1,000 gallons of usage
Surcharge at 19,000 gallons (and over) when applicable

Commercial Accounts

Commercial Mixed Use water accounts are billed for water based on a tiered rate using percentages of the EQR currently being used. Commercial Domestic Use and Commercial Irrigation Accounts have uniform usage rates.

The City's Commercial water rate systems are summarized as follows:

Commercial – Mixed Use Accounts
$3.25 per thousand gallons for less than 80% EQR[2]
$3.70 per thousand gallons for 80 – 90% EQR
$4.75 per thousand gallons for over 90% EQR
$4.75 per thousand gallons for over 100% EQR

Commercial – Domestic Use Accounts
$3.25 per thousand gallons for up to 100% EQR
$3.25 per thousand gallons for over 100% EQR

Commercial – Irrigation Accounts
$4.75 per thousand gallons for up to 100% EQR
$4.75 per thousand gallons for over 100% EQR

Note: A per thousand surcharge will be added when applicable for all above accounts over 100% EQR

Metering and Billing

All taps in the City are metered, enabling the water utility to charge customers based on their actual water use. Apartment accounts are the exception since they are metered by building, or building segment, rather than individual unit. To help insure meter accuracy, in the last several years the City has replaced 100% of residential meters, many of which had been more than 20 years old.

Charging customers for the amount of water used contributes directly to water conservation. Individual customer meters are read on a monthly basis using an electronic radio receiver. The meter reading is automatically read into a handheld or laptop computer that accepts or rejects the reading if it is outside of the normal use pattern. Additional quality control occurs when the reading is again checked prior to a utility bill being issued. This system of meter reading checks helps ensure meter accuracy and detect system leaks.

The City's water utility billing system includes charges for water and sewer use, user fees, and capital costs. In 2006 the City billed $8.34 million in water and sewer charges, $1.28 million in capital charges for a total of $9.66 million billed, including interest charges. A review of recent water sales and revenue revealed no unusual billing or revenue issues.

[2] EQR = Equivalent Residential Unit. The City defines an EQR as the average annual volume of treated water supplied to a detached-single-family residential-unit account within the City.

1.5 Review Current Policies and Planning Initiatives

The City's Waste of Water Ordinance was adopted in 2002 and is described in detail in section 1.6 of this document. This ordinance regulates activities to insure that water is not being used in a careless manner and provides the City with the ability to impose fines on violators.

Northglenn is currently reviewing a draft Integrated Resources Plan (IRP) developed by CDM consultants. The IRP evaluates existing supplies, future water demands and water resources priorities, and develops a long-term water portfolio (including conservation savings) for the City. The IRP is designed to secure sufficient water supply to meet future demands and decrease the City's susceptibility to water shortages during periods of drought. The final IRP is expected to be completed in mid-2007. This Water Conservation Plan evaluates a variety of existing and potential conservation activities in order to select the most appropriate to meet the City's water conservation goals.

1.6 Summarize Current Water Conservation Activities

The City began implementing a water conservation program late in the summer of 2001 to help insure adequate supplies of water for domestic and other uses in the present and in years to come. Current and previously implemented program measures that continue to provide water use savings include:

WATER-EFFICIENT FIXTURES AND APPLIANCES, INCLUDING TOILETS, URINALS, SHOWERHEADS AND FAUCETS

1992 Energy Efficiency Law

The passage of the Federal 1992 Energy Efficiency Law set maximum water use standards for toilets and showerheads. All new developments are built with water efficient fixtures and appliances and many older buildings have been retrofitted, leading to indoor water use savings.

Appliance Rebate Program

The City implemented a toilet and clothes washer rebate program in June 2003. Residents are eligible to receive a $75 rebate for the purchase and installation of low volume toilets. Commercial rebates for apartments are $50 per toilet. The commercial rebates are limited to eight per month for one customer but can be reapplied for in sequential months. This limit was set to spread out the funding of the program to more customers. The commercial rebate was also set lower than that for residential properties to encourage increased numbers of customers to benefit from savings. The City distributes rebates of $100 for the purchase and installation of high efficiency (HE) residential clothes washers. Washers that are eligible for the rebate must be included on the clothes washer product list that is regularly updated by the Consortium for Energy Efficiency. Through 2006, the City has provided rebates for 457 toilets and 283 clothes washers.

Replacement of Municipal Appliances

In 2002, the City replaced all older, higher water use toilets on the main floor of City Hall with low flow toilets. Six toilets still need to be replaced. All older toilets at the water treatment facility and the Police Station have also been replaced and Police Station showerheads were replaced with low flow models.

Conservation Kits

In 2002, the City delivered free conservation kits to approximately 7,500 single-family residences. In 2003, another 430 kits were delivered to townhome owners. Each kit included aerators for kitchen and bathroom sinks, a low-flow showerhead, a five-minute shower timer and Teflon tape. The kits were delivered to residential properties constructed prior to 1995 since the properties that were constructed after this time were required to install efficient plumbing appliances. Conservation kits containing free rain gages, shower timers, flow bags and dye tablets are currently available to residents for pick up at City Hall.

LOW WATER-USE LANDSCAPES, DROUGHT-RESISTANT VEGETATION, REMOVAL OF PHREATOPHYTES AND EFFICIENT IRRIGATION

Curbside Sprinklerhead Replacement Program for City Parks

In 2003, the City replaced 140 curbside sprinklerheads to optimize irrigation efficiency and comply with the City's Waste of Water Ordinance. This program sets a good example for citizens not to water impervious surfaces and to comply with City ordinances regarding the waste of water. Sprinklerheads continue to be replaced with lower use models as normal system repairs are made.

Municipal Landscaping

The City irrigates approximately 125 acres. Ninety-five percent of the water used by the City (i.e. municipal accounts) is for parks irrigation. Conservation measures such as sprinklerhead replacement, xeriscaping and installation of low water use turf have been implemented in about 3% of the City's total municipal acreage.

In 2004, the City converted multiple turf areas to mulched planting beds resulting in the removal of 85 high water use sprinklerheads. Over 100,000 gallons of annual water savings was expected as a result of the landscape replacement and associated reduction in irrigation. An additional 75 municipal sprinklerheads have also been replaced with more efficient models.

The City completed reconstruction of the E.B. Rains Park in 2001. Webster Lake was deepened and the surface area of the lake reduced. The net affect was a decrease in evaporative losses and an increase in recreational uses such as fishing and boating on the lake and picnicking on the additional ground surface area. The lake is maintained using non-potable sources such as a deep well and untreated ditch waters and can be used to irrigate some of the Park's surrounding landscape. The City also has the ability to use non-potable, raw water to irrigate the turf areas at the Northwest Open Space.

Outdoor Watering Schedule and Efficient Irrigation Education

Residents are encouraged to water their landscape efficiently. The City posts a recommended water schedule on the City's website and also in the *Northglenn Connection* newsletter. During periods of drought or supply shortage, mandatory restrictions may be imposed. The City's website also provides information for residents on a variety of outdoor water conservation methods, many of which describe efficient irrigation practices.

Irrigation System Adjustment Class

In 2004, the Parks Department presented two classes on irrigation system adjustment and watering schedules. Residents were introduced to proper selection of irrigation

heads for specific applications, irrigation system maintenance, leak repair, and horticultural practices that help maintain a healthy lawn on less water.

Xeriscape Demonstration Garden, Demonstrations and Educational Information
The City promotes low water use landscaping. A Xeriscape Demonstration Garden is located at the Water Treatment Facility and a smaller garden is maintained at the City's Maintenance and Operations Facility. Water-wise landscaping courses for City residents were taught by an Adam's County master gardener in 2002 and 2003. Free Xeriscape information is always available on the City's website and brochures may be picked up at City Hall.

Low-Water Use Turf Tests
The City has installed and is studying several varieties of low-water use turf for residential use and use in municipal landscaping. A sod, which retains its aesthetic qualities while using one-fourth to one-third less water than commonly used Kentucky Blue Grass varieties, was installed at three residential properties. The City of Northglenn has also installed Streambank Wheat Grass in a right-of-way setting. This grass is a sod forming, cold season native grass that can be maintained and thrive with minimal amounts of water. It also grows slowly so it requires less maintenance than other turf types. Tests are ongoing and have resulted in the City adjusting the turf it installs for new landscape projects. The City strives to use low water use turf and plants for new projects and improvements.

Rain Gages
The City provides free rain gages to residents to assist with watering at the estimated evapotranspiration rate and to avoid over watering of lawns. Rain gages were included in educational conservation kits provided to second grade students in 2002 and 2003 and are distributed annually at the City's 4th of July celebration. Rain gages can be picked up free of charge at City Hall.

Water-efficient industrial and commercial water-using processes
Due to the small number of commercial and industrial costumers served in the City, this sector has not been a focus of past conservation efforts. Currently, there are no water conservation measures that target commercial and industrial customers.

WATER REUSE SYSTEMS

Municipal Water Supply
Northglenn pioneered the concept of the "First Use Agreement" with agricultural water users. Under this agreement, water is first used by the City then treated and reused by downstream irrigators. One source serves both urban and rural needs. During this system's development in the late 1970's, Northglenn received praise from Governor Richard Lamm and then President Jimmy Carter for creative and innovative planning to meet the ever-increasing water demands of the region. Since then, similar water reuse systems have proliferated throughout Colorado.

Since the inception of the FRICO/Northglenn Exchange Agreement, an average of 25% of the water used by the City of Northglenn is reused by FRICO irrigators. Each year, as farmland is converted to urban uses, the amount of water available from this source has been decreasing. The City estimates that within the next five to ten years, they will need to replace FRICO Exchange Agreement water. In developing replacement supplies, it is likely that the City will purchase additional FRICO water as it becomes available.

DISTRIBUTION SYSTEM LEAK IDENTIFICATION AND REPAIR

System Maintenance, Leak Detection and Repair

To insure that the water distribution system is operating efficiently and effectively, inspections and repair of the potable water distribution system is included in the City's five-year capital improvement program (CIP) list. System segments that have had multiple breaks or a break that indicates poor conditions are identified and scheduled for evaluation, repair, or replacement. In addition to the CIP, point repairs to the system are promptly made. Large leaks are immediately repaired and small leaks (i.e. service line leaks) are typically repaired within one or two days.

The cities of Northglenn and Thornton jointly own a seven mile raw water pipeline that supplies water from Standley Lake to the City's water treatment plant. Both entities contribute approximately $50,000 annually to replace sections of pipeline in need of repair.

Meter Replacement and Water Meter Monitor Loan Program

By the end of 2006, the City had replaced 100% of residential water meters with remote reading meters. The average meter is now only 1.5 years old whereas, prior to this program, most of Northglenn's residential meters were at least 20 years old. Periodic meter replacement improves accuracy in billing as accuracy is only guaranteed for 10 years. Over time, mechanical water meters tend to wear out which results in a gap between the amount of water delivered and the amount billed. The new meters will also enable the City to better monitor water use and more quickly detect and repair (or require the customer to repair) system leaks. The City also has a Water Meter Monitor that allows customers to monitor their use of water during customer defined time intervals. The City will loan these meters out to residents at no charge.

DISSEMINATION OF INFORMATION REGARDING WATER USE EFFICIENCY MEASURES, INCLUDING BY PUBLIC EDUCATION, CUSTOMER WATER AUDITS AND WATER-SAVING DEMONSTRATIONS

Water Conservation Communications

The City regularly communicates with residents regarding efficient water use and conservation. Utility billing message blocks, the City's website, citizen mailings, newspaper articles and programs on local community access television have been utilized to help citizens use water more efficiently throughout their homes and landscaping. Additionally a new monthly feature called the "Conservation Corner" was added to Northglenn's community newsletter in the summer of 2006. The City's Water Conservation Specialist and others develop informative articles with a conservation focus. These articles are intended to educate residents and provide them with useful tools to integrate water conservation into their daily lives.

24-Hour Water Hotline

The City maintains a 24 hour water hotline (303-451-1289) to report water breaks, broken sprinkler heads, etc. Residents may also report suspected violations of the City's Waste of Water Ordinance by calling the waste of water hotline (303-450-8982).

Annual July 4th Celebration

Since 2003, the City has promoted water conservation at Northglenn's annual July 4th celebration. Flow meter bags, dye tablets, low-flow showerheads, rain gages, water bottles with stormwater and conservation logos, as well as note pads and magnetic

picture frames with conservation messages, have been given away. During the 2003 and 2004 events, residents could win water-efficient spray hand nozzles with an automatic shut-off by playing a water conservation game, in which both parents and children participated.

Community Groups

Upon request, water conservation information and kits are distributed to local community groups.

Youth Education

The City recognizes that youth can serve an important role in water conservation. They can be taught conservation techniques that they will use and convey to their parents or guardians. In the spring of 2002 and 2003, the City presented a weeklong water conservation game to second grade elementary school children. Students received shower timers, flow meter bags, and dye tablets. At the end of the weeklong game, students reported on how much water they had saved. In 2004, approximately 2,000 children, ranging from preschool to high school, attended the Safe Street Halloween event where a water conservation quiz and Halloween water maze were handed out.

Annual Youth Water Festival

The City participates in an annual Youth Water Festival co-sponsored by the cities of Thornton, Westminster and Northglenn. The Youth Water Festival is a daylong, hands-on learning experience attended by fifth grader students to prepare them for responsible decision-making regarding the use of this precious natural resource. Local professionals share their knowledge on a wide variety of water related subjects including conservation, non-point source pollution prevention, the importance of wetlands as wildlife habitat, and water law. Since 2004, approximately 530 Northglenn fifth graders have attended the Water Festival, which is capped at a total of 1,000 students per year from all three cities.

Xeriscape and Irrigation System Classes and Demonstrations

See information provided under the “Low water-use landscapes, drought-resistant vegetation, removal of phreatophytes and efficient irrigation” section of this document.

WATER RATE STRUCTURES AND BILLING SYSTEMS DESIGNED TO ENCOURAGE WATER USE EFFICIENCY IN A FISCALLY RESPONSIBLE MANNER

Tiered Water Rate Structure and Surcharges

The City utilizes a tiered, inclining block rate structure designed to encourage water conservation while covering the costs associated with maintaining a water distribution and sewer collection system. Tiered rates can be adjusted through the use of surcharges during extensive droughts and water supply shortages. The surcharges are set according to water supply and the percent water use savings the City is targeting.

Utility Billing and Message Blocks

The City’s utility bill shows the applicable tiers for the customer’s monthly use. This clearly indicates to the customer when they use water in a higher tier and the incremental cost increase. Bills also compare the current month’s water use to the same month in the previous year, helping customers to gage their water use and savings. The City can also include a short conservation related message in the message block of the monthly utility bill. The City has also considered using bill inserts, but a survey of residents found that very few people look at bill inserts prior to disposing of them.

REGULATORY MEASURES DESIGNED TO ENCOURAGE WATER CONSERVATION

Waste of Water Ordinance

Pursuant to the Northglenn Municipal Code, adopted in 2002, the waste of water is prohibited. The following water wasting activities and practices are prohibited:

- Violating mandatory watering restrictions as established by the City Manager pursuant to the determination of the stage of a water shortage and desired level of water conservation for the benefit of the community;
- Watering landscaping in a single irrigation zone at a rate and/or quantity that allows water to accumulate on the surface of the ground and then runoff into the public right-of-way in a steady stream for an unreasonable period of time;
- Watering in a single irrigation zone so that water falls directly onto impervious surfaces and enters the public right-of-way in a steady stream (does not apply to an incidental amount of water that may come in contact with sidewalks and driveways but does not result in runoff to the public right-of-way;
- Washing of cars and other vehicles without an automatic shutoff nozzle and/or with a sufficient quantity of water to cause water to flow to the public right-of-way in a steady stream;
- Power-washing or hosing down patios, housing, gutters on buildings, fences, windows, decks, or other impervious surfaces so that water flows into the public right-of-way in a steady stream;
- Hosing down or power-washing of sidewalks or driveways except for reasons of health and safety, in which case, runoff entering the public right-of-way must be minimized;
- Exceeding recommended irrigation practices for the installation of new lawns;
- Failing to repair indoor plumbing and outdoor irrigation systems and/or devices, connections or fixtures thereto within two weeks of the discovery of a leak or break in the system, device, connection or fixture;
- Failing to comply with established regulations for the use of water for construction purposes; and
- Failing to comply with other water usage practices determined to be necessary to prevent the waste of water as they may be promulgated from time to time.

Violation of the Waste of Water Ordinance shall result in a letter of violation sent to the responsible party or the assessment of a penalty fee. Repeat offenders are subject to penalty fees up to $999 that are imposed on the responsible party's utility bill.

INCENTIVES TO IMPLEMENT WATER CONSERVATION TECHNIQUES, INCLUDING REBATES TO CUSTOMERS TO ENCOURAGE THE INSTALLATION OF WATER CONSERVATION MEASURES

The City offers several incentives to implement water use efficiency techniques including:

- Tiered water use rate structure;
- Waste of Water Ordinance including financial penalty for violations;
- Water efficient clothes washer and toilet rebates;
- Free conservation kits;
- Xeriscape and irrigation systems classes, demonstrations and educational materials;
- New radio transmitting water meters with "leak detection" arrows;

- Ongoing water conservation related communication with residents;
- Educational materials, games and free giveaways at community events; and
- Numerous education resources provided to citizens through City Hall and the City's website.

OTHER WATER MANAGEMENT ACTIVITIES

Water Conservation Coordinator

In 2006 the City created a full time Water Conservationist position to develop, implement and oversee conservation programs. The Conservationist communicates with the public and relevant City departments to promote water conservation issues and activities within the City, creates and manages rebate programs and equipment give-aways, and enforces water restrictions, among other activities.

Association Memberships

To protect the City's water supplies, Northglenn participates in the following watershed organizations:

- Upper Clear Creek Watershed Association (UCCWA);
- Big Dry Creek Watershed Association;
- Colorado Lake and Reservoir Management Association;
- Rocky Flats Environmental Technology;
- Standley Lake Cities Water Quality IGA;
- SPCURE (South Platte Coalition for Urban River Evaluation); and
- Barr/Milton Watershed Association.

Northglenn is also a member of numerous water conservation and supply related organizations including the Colorado Water Wise Council, American Water Works Association (AWWA), American Water Resources Association (AWRA), and American Public Works Association (APW), among others.

Drought Mitigation Measures

In addition to ongoing water conservation measures, the City of Northglenn has several policies and procedures to further reduce water use during periods of drought. When the City's water supply is low, water conservation measures may be increased and drought mitigation measures implemented. Conservation and drought mitigation programming is set up in a matrix style to allow the City to select appropriate program levels based on savings goals, staff expertise, and public request or tolerance. Drought mitigation measures were utilized in 2002, 2003, 2004 and 2006.

- *Outdoor Watering Schedule*: The City adjusts outdoor watering restrictions for customers depending upon existing and projected supplies and the percentage water savings goal.

- *New Turf Seeding Restrictions:* During periods of drought, additional irrigation needed to support the installation of new seed and new sod may be restricted. Exceptions are made under limited circumstances. Citizens are required to obtain a permit prior to installation, are limited on the period of time granted for additional watering for establishment and may not be granted a permit for additional watering in the heat of the summer.

- *Water Conservation Communications:* During periods of drought, the City increases water conservation information and education using the following media: utility billing message blocks, special monthly citizen update mailings, the City's website, City employee newsletter, the regular monthly citizen newsletter and community access television. During drought, City staff will work with other Front Range water providers to consolidate efforts and present a unified message.

- *Tiered Rates:* A three-tiered increasing block rate structure is always in effect. A surcharge is implemented according to water supply and the percentage savings goal.

- *Well Permits:* The City requires that residents obtain well permits for the use of state registered ground water wells. During water restrictions, permits must be posted where they can be seen.

- *Outdoor Water Fountains and Displays:* The operation of outdoor water fountains and displays is generally for aesthetics. During times of water shortage the City ceases operation of the water fountain at the Webster Lake recreation area.

- *Public and Private Swimming Pools:* The operation and filling of public and private pools may be limited during water shortages.

- *Vehicle and Power Washing:* During periods of drought, the City recommends that the washing of vehicles at a residential property be performed efficiently by the use of a bucket and hose with a shutoff nozzle. Power washing may be restricted, with exemptions to preparing surfaces for painting or finishing, for health and safety reasons and for graffiti removal.

- *Fire Hydrants:* Fire hydrants are typically flushed as part of the City's routine annual maintenance program. Fire hydrant flushing may be postponed during water shortages. Fire hydrant permit costs may also be increased significantly during drought periods.

As a result of the City's water conservation activities, water use per capita has declined over the 2000 (pre-drought and pre-water conservation activities) to 2006 period even though the population increased by 16.7%. The greatest decrease in use was seen in 2004 as a result of weather patterns, water conservation and drought response measures. Total treated water use by all customer accounts in the City in 2006 was almost 40 million gallons[3], or 122 acre-feet, less than total treated water used by customers in 2000. 2006 was drier than 2000, so using the differences between these two years appears to provide a conservative estimate of water savings resulting from conservation activities. Assuming a current cost of $12,500 per acre-foot to purchase an equivalent volume of FRICO water, this water use savings is equivalent to a capital cost savings of $1,525,000. In comparison, the City spends approximately $123,000 annually on conservation activities including a full time Water Conservationist. These numbers illustrate the extraordinary cost-effectiveness of water conservation.
Table 4 lists conservation measures and programs that have been implemented by the City, estimated water savings, implementation dates, and whether the activity is anticipated to continue. It is important to note that estimates of water conservation savings must be based upon assumptions regarding variables such as rates of

[3] This value does not include water categorized as "Real and Apparent Losses".

participation, frequency and duration of uses, and different water use rates associated with fixtures, appliances and practices. The water savings that result from replacing a less efficient appliance with one that uses less water can be estimated based upon the difference in water required and estimates of frequency of use. Table 4 only lists water conservation savings for measures which can be estimated with relative certainty. Without intensive surveying and data collection, many other water conservation activities must be evaluated more broadly, based upon overall changes in water use over time.

Table 4: CWCB Worksheet 1-3 "Summary of Conservation Activities through 2006"

Water conservation measures and programs	***Approximate* annual water savings, if known (1000 gallons)**	**Implementation dates**	**Is continued (or renewed) implementation planned?[1]**
Appliance rebate program[1]	9,902	2003 - present	yes
Replacement of municipal appliances[2]	20	2002 - present	yes
Free conservation kits[3]	3,876	2002 - 2005	yes
Municipal landscaping/curbside sprinklerhead replacement[4]	100	2001 - present	yes
Outdoor watering schedule	not known	2002 - present	yes
Irrigation system adjustment class	not known	2004, 2007	yes
Xeriscape demo garden, classes,and educational information	not known	2002 - present	yes
Low-water use turf test	not known	2002 - present	yes
Free rain gages	not known	2002 - present	yes
Water reuse agreement with FRICO	358,436	late 1970s - present	yes
System maintenance, leak detection and repair	not known	ongoing	yes
Meter replacement program	not known	2003 - 2006	yes
Water conservation communications	not known	2002 - present	yes
24-hour water hotlines	not known	2002 - present	yes
Annual July 4th Celebration water conservation booth	not known	2003 - present	yes
Community groups educational materials and presentations	not known	2002 - present	yes
Youth education/Annual Youth Water Festival	not known	2002 -present	yes
Tiered water rate structure and surcharges	not known	2002 - present	yes
Utility billing and message blocks	not known	2002 - present	yes
Waste of Water ordinance	not known	2002 - present	yes
Full time Water Conservationist staff position	not known	2006 - present	yes
Association membership	not known	varies	yes

[1] Northglenn program specific data

[2] Assumes 20 3.5 gpf toilets replaced with 1.6 gpf models, using an average of male (492 gallons) and female (1,482 gallons) annual use per office building (Vickers, 2001)

[3] Assumes 20% of 7,930 (pre-1995) homes receiving kits use them. Assumes 3.0 gallons per minute (gpm) showerheads replaced w/2.5 gpm (annual household savings of 1702 gallons); assumes 1 kitchen and 1 bathroom 2.75 gpm faucet replaced per household w 1.5 gpm faucets saving 371 gallons annually per faucet (Vickers, 2001)

[4] Value estimated by Northglenn's staff.

2 - CHARACTERIZE WATER USE AND FORECAST DEMAND

2.1 Characterize Current Water Use

Use by Account Type

Northglenn is primarily a residential community with a small commercial and industrial base. Residential users account for the majority of water use, with single family homes using an annual average of 54.9%, townhomes 3.2%, and apartments 13.0% of total annual water use for the 2000 through 2006 period. Commercial and industrial accounts used an average of 12.4%, schools used 2.5% and municipal accounts use 3.9% of total annual water produced. “Real and Apparent Losses”, which is the difference between produced water (leaving the water treatment plant) and all metered water deliveries, accounted for an average of 10.1% of total water produced annually for the 2000 through 2006 period. "Real and Apparent Losses" include both real, or physical, losses as well as apparent, or paper, losses. Real losses include water lost to system leaks or tank overflows. "Apparent" losses may be due to meter, billing, or accounting inaccuracies and may include authorized uses such as for fire suppression or construction activities. Figure 2 provides a breakdown of total water use in 2006 by each account type.

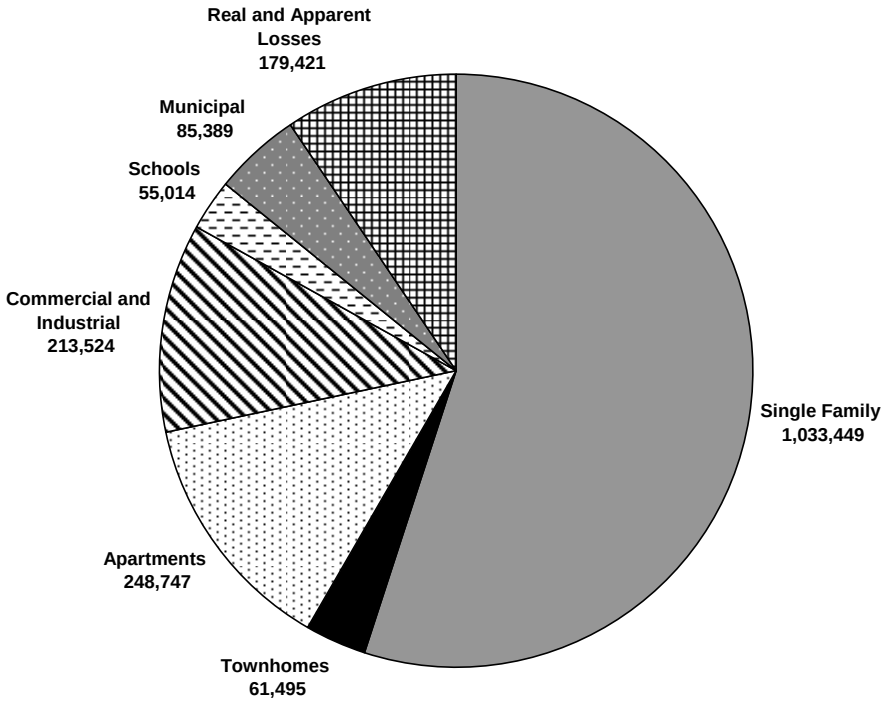

Figure 2: 2006 Northglenn Total Water Use by Account Type (in 1,000 gallons)

Figure 3 shows total monthly water use, by account type for the 2000 to 2006 period for all metered accounts. 2000-2001 water use data illustrates pre-drought conditions. In 2002 a multi-year, regional drought began, prompting the City to adopt temporary drought mitigation measures. The 2002-2004 period includes the effects of water conservation and drought mitigation measures, which included lawn-watering restrictions of 2-3 days per week with time limitations on watering. In addition to the City’s water conservation and drought mitigation measures, favorable weather and precipitation

patterns influenced water usage, especially in the summer months of 2004, where water use was significantly lower than in other years.

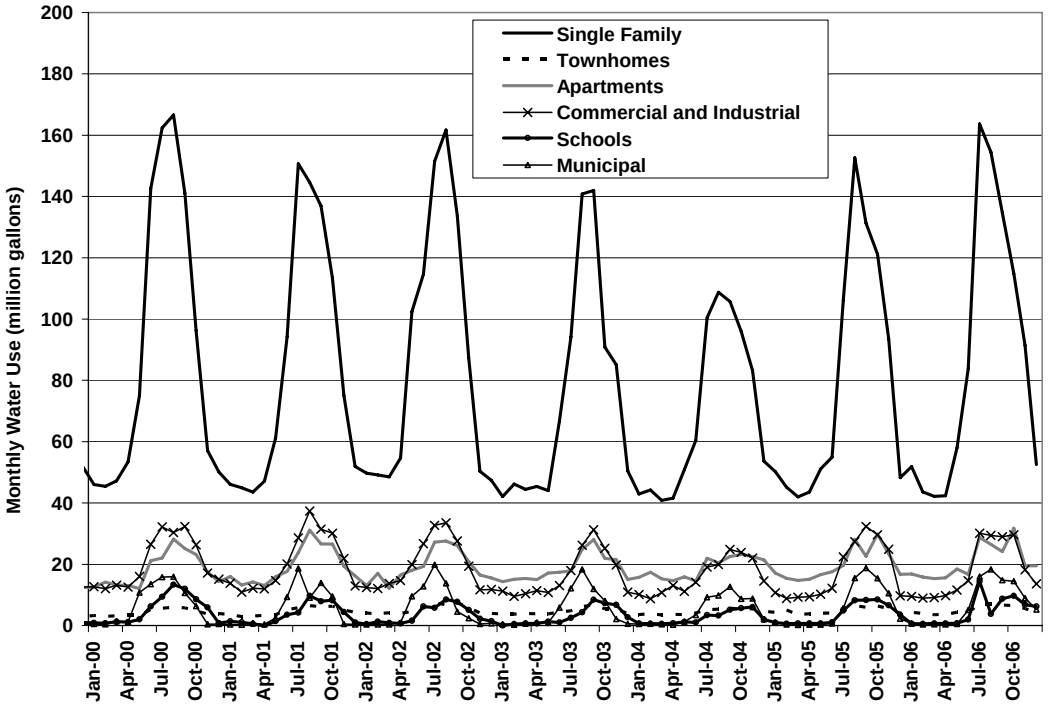

Figure 3: City of Northglenn Monthly Water Use 2000 through 2006

Table 5 lists total annual treated water use, including "Real and Apparent Losses". Total annual water use declined from 1,889 million gallons to 1,546 million gallons over the 2000 to 2004 period, a decrease of 18% or 342 million gallons. Drought restrictions were lifted in 2005. By 2005 water use again increased as a result of climatic conditions, customers perceived the worst of the drought as having ended, and the City lifted drought response measures. Annual water use continued to increase in 2006 but not to pre-drought levels.

Table 5: Total Annual Citywide Treated Water Use

	Total Annual Use (1000 gallons)
2000	1,888,575
2001	1,855,733
2002	1,884,423
2003	1,649,448
2004	1,546,469
2005	1,746,739
2006	1,877,039

Indoor and Outdoor Use

Temporal variations in water use patterns are evident for all account types shown in Figure 3 with water use being lower in the winter and early spring, peaking in the summer, and decreasing over the fall and early winter months. Increased use during summer months is due to outdoor water use, principally for landscape irrigation. Total use by single-family accounts, much of which is outdoor water use, is significantly higher

than other account types. Townhomes, which have limited outdoor landscaping, show the smallest increase in seasonal outdoor water use. Though single-family accounts used the greatest volume of water, it is important to note that this customer class also had the most accounts and EQRs (see Table 1).

Compared to surrounding communities, single-family homes in Northglenn tend to use less water on outdoor irrigation. Many single-family homes in the City are older and do not have outdoor sprinkler systems installed. This has a positive effect on outdoor water use, as residents must manually turn on the water and move hoses. Residents tend to minimize the amount of time spent on this task and also easily adjust to the weather. In comparison, home sprinkler systems often do not have rain sensors and may not be programmed to adjust application rates seasonally.

Table 6 shows the 2000 to 2006 average estimated percentage of indoor and outdoor annual water use by customer class as well as average total volumes. Outdoor water use was calculated for each year by subtracting the average water use during winter months from the total water use during irrigation season. The difference is assumed to be outdoor water use. For the 2000 through 2006 period, outdoor water use accounted for approximately 37% of all metered water used in the City.

Table 6: 2000 - 2006 Annual Indoor and Outdoor Water Use by Account Type

As Percentage of Total Use							
	Single Family	Townhomes	Apartments	Commercial & Industrial	Schools	Municipal	Total
Indoor	59%	81%	81%	63%	33%	13%	63%
Outdoor	41%	19%	19%	37%	67%	87%	37%
Total	100%	100%	100%	100%	100%	100%	100%
In Millions of Gallons							
	Single Family	Townhomes	Apartments	Commercial & Industrial	Schools	Municipal	Total
Indoor	571	46	187	139	15	9	966
Outdoor	406	11	44	81	30	60	632
Total	977	57	231	220	45	69	1599

Per Capita Use

Table 7 shows daily system-wide water use per capita (or per person). Average annual use declined from 151 gallons per day per capita (gpcd) in 2000 (pre-drought) to 126 gpcd in 2006. Northglenn's per capita water use rates are some of the lowest in the Denver metropolitan area. For comparison, daily system-wide water use per capita in 2001 for the cities of Boulder and Denver was 180 gpcd and 205 gpcd, respectively (Western Resource Advocates, 2003). Westminster's per capita water use was 190 gpcd for the 2000 and 2001 period and decreased to 142 gpcd in 2004 (Westminster Staff Report, 2005) as a result of water conservation and drought response measures. It is important to note that Northglenn's commercial sector is limited because many residents commute to other municipalities for work which helps keep per capita water use values for the City low.

Table 7: Average Daily Water Use per Person in the City of Northglenn

Year	Population	Daily Per Capita Water Use (gallons)		
		Residential	Other	Total
2000	31,575	117	34	151
2001	32,523	109	30	139
2002	33,945	108	28	136
2003	35,531	90	23	113
2004	37,061	82	21	103
2005	36,854	92	24	116
2006	36,857	100	26	126

2.2 Forecasting Method

Northglenn Integrated Resources Plan (IRP), to be completed by mid-2007, provides a detailed assessment of the City's current water supplies as well as future demand projections and plans for meeting future needs. Northglenn initiated the IRP and this Water Conservation Plan simultaneously. Analyses which were completed in the IRP were not duplicated in this Plan. The IRP should be referred to for additional information regarding projected demands, alternatives to meet future demands, and new supply objectives.

2.3 Demand Forecast

Ninety-three percent of Northglenn's physical service area is developed. The average annual yield of all the City's water rights is approximately 6,900 af and average annual use is approximately 5,300 af. The firm yield (the volume of water that can be depended on, even in periods of drought) for all of the City's water rights currently owned is estimated at 4,245 af. This means that, while Northglenn can meet current demands in average years, the City has insufficient water supplies to meet demands in drought years. At build-out, when the City is fully developed, the Integrated Resource Plan (IRP) estimates an annual demand of 7,440 af and a firm yield of 3,580 without the FRICO Exchange. This leaves a gap in firm yield of 3,860 af. Included in future demands is the assumption that Northglenn's Section 36 will be developed as a mix of commercial, business, retail, and park/reservoir facilities. The IRP assumes that approximately 430 af/yr of wastewater will receive further treatment and be used in Section 36 for irrigation and other nonpotable uses. The City has set 600 af as a reasonable water conservation savings goal. In addition, the City will continue to purchase agricultural water and will investigate storage options to enhance its water supplies, improve reliability and reduce risk of supply shortfalls.

Table 8 uses the CWCB's demand forecast methodology to estimate future average and peak demands and supply capacity. This methodology assumes current water use characteristics will remain essentially the same into the future and predicts use based upon population projections. Water demands are then compared to expected supply capacity to determine if a shortfall exists. Table 8 shows that in average years the City expects to have sufficient water supplies to meet demands. Peak day and average day demand data is useful in ensuring that facilities are sized properly. Northglenn's facilities have all been sized to meet future demands or to be expanded as needed.

Table 8: CWCB Worksheet 2-1 "Preliminary Water Demand Forecast"

Line	Item	Current (2006)	2015 forecast	2020 forecast	2030 forecast
A	**RESIDENTIAL DEMAND**				
1	Current annual water residential sales (1000 gallons)	1,343,691			
2	Current population served	36,857			
3	Residential sales per capita (line 1 divided by line 2) (1000 gallons)	36			
4	Projected population		38,472	39,793	42,246
5	Projected annual residential water demand (line 3 multiplied by line 4) (1000 gallons)		1,402,569	1,450,728	1,540,157
B	**NONRESIDENTIAL DEMAND [C]**				
6	Current annual water nonresidential sales (1000 gallons)	353,927			
7	Current number of employees or jobs	12,820			
8	Water use per employee or job (line 6 divided by line 7) (1000 gallons)	28			
9	Projected number of employees or jobs		13,814	14,457	15,438
10	Projected annual nonresidential water demand (line 8 multiplied by line 9) (1000 gallons)		381,369	399,120	426,203
C	**NONACCOUNT WATER[1] (WATER NOT SOLD TO CUSTOMERS)**				
11	Current and forecast amount (1000 gallons)	179,421	180,178	186,835	198,602
D	**WATER SYSTEM TOTAL DEMAND**				
12	Current total annual water demand (add lines 1, 6, and 11) (1000 gallons)	1,877,039			
13	Projected total annual water demand (add lines 5, 10, and 11) (1000 gallons)		1,964,115	2,036,683	2,164,963
14	Adjustments to forecast (+ or -) (1000 gallons)		0	0	0
15	Current (line 12) and adjusted total annual water demand forecast (add lines 13 and 14) (1000 gallons)	1,877,039	1,964,115	2,036,683	2,164,963
16	Current and projected annual supply capacity (1000 gallons)	2,248,369	3,089,932	3,089,932	3,089,932
17	Difference between total use and total supply capacity (+ or -) (subtract line 15 from line 16) (1000 gallons)	371,330	1,125,817	1,053,249	924,969
E	**AVERAGE-DAY AND MAXIMUM-DAY DEMAND**				
18	Average-day demand (line 15 divided by 365) (1000 gallons)	5,143	5,381	5,580	5,931
19	Current maximum-day demand (1000 gallons)	11,773			
20	Maximum-day to average-day demand ratio (line 19 divided by line 18)	2.29			
21	Projected maximum-day demand (line 18 multiplied by line 20) (1000 gallons)		12,319	12,774	13,579
22	Adjustment to maximum-day demand forecast [e]		0	0	0
23	Current (line 19) and adjusted maximum-day demand forecast (add lines 21 and 22) (1000 gallons)	11,773	12,319	12,774	13,579
24	Daily supply capacity (divide line 16 by 365) (1000 gallons)	6,160	8,466	8,466	8,466
25	Ratio of maximum-day demand to daily supply capacity (divide line 23 by line 24)	1.91	1.46	1.51	1.60

[1] Current value is the difference between water metered leaving the treatment plant and metered account use. Forecasted amount is assumed to be 10.1% of total account water use (10.1% is the 2000 to 2006 average). Unaccounted for water include meter and billing inaccuracies, system leaks, and authorized uses such as fire supression and construction permits.

3 – PROFILE PROPOSED FACILITIES

3.1 Identify and Cost Potential Facility Needs

In November 2004, the citizens of Northglenn voted to extend a one-half percent (0.50%) sales and use tax to be used exclusively for the purchase or lease of water or water rights for use in, and/or augmentation of, the municipal water system. Revenues from this tax are placed in the "Water and Rates Fund". Funds may be used for financing, repair, maintenance, renovation or construction of water supply, diversion, conveyance or storage projects or facilities and other purposes that would maintain, protect, enhance, optimize or increase the City's water supply. The sales tax terminates on December 31, 2010. The Integrated Resources Plan was developed to help guide the City in strategically meeting future demands through a variety of purchases, related infrastructure and facilities, as well as demand management and reuse. Detailed information regarding water supply alternatives and the facilities which would be required for each are presented in the IRP. The City is assessing alternatives so it does not have a well defined list of future projects available at the current time.

Table 9 lists currently planned projects, all slated for completion in 2007, as well as a target for water acquisitions over the next several years. The range of costs given in Table 9 for Anticipated Future Water Purchases includes all costs associated with increasing the City's firm water supply by approximately 1 billion gallons. The City is currently investigating the possibility of reclaiming clarifier and backwash water from the drinking water treatment facility (evaluated as a potential water conservation activity in this Plan). The IRP calls for expansions to facilities, however any suggested system modifications are in a conceptual stage and would require significant additional study prior to the City adopting them.

Table 9: CWCB Worksheet 3-1 "Anticipated Improvements and Additions"

Type(s) of Project(s)	Improvement	New Capacity	Start date	End date
Source of supply	☑	☑	ongoing	2020
Water treatment facilities	☑	☑	ongoing	2020
Treated water storage	☐	☐		
Major transmission lines	☑	☐	2007/08	2010
Other _____	☐	☐		

Need(s) for Project(s) (Check all that apply)		Notes
Enhance compliance with regulations	☑	
Replace older equipment or facilities	☑	
Meet average-day demand	☐	
Meet maximum-day demand	☐	
Meet future growth needs	☑	
Other _____	☐	

Funding

Project: 2007 Water Treatment Plant Clearwell Expansion
Project Cost: $1.2 to $1.5 million
Financing Cost: $0 (City has sufficient funds to cover the project via the Water and Rates Fund)
Total Capital Cost: $1.2 to $1.5 million

Project: 2007 Elevated Storage Tank
Project Cost: $225,000
Financing Cost: $0 (City has funds to cover the project via the Water and Rates Fund)
Total Capital Cost: $225,000

Project: 2007 Croke Canal Headworks
Project Cost: $150,000 - $200,000
Financing Cost: $0 (City has funds to cover the project via the Water and Rates Fund)
Total Capital Cost: $150,000 - $200,000

Water Purchases and Related Infrastructure

Anticipated future water purchases	997,102,775 gallons
Cost of water purchases and infrastructure[1]	$62,000,000 to $172,000,000

1 The IRP assesses various alternatives to meet future waters. At the present time, the City has not selected specific projects for implementation. The range of costs listed here are for the various alternatives presented in the IRP and include water pur

3.2 Develop Preliminary Capacity and Cost Forecasts

According to the State demographer, Colorado's population is expected to grow to 7.8 million by 2035, a 65% increase from the 2005 population estimate of 4.7 million. This will impact Northglenn's supplies as FRICO water is converted from agricultural water to domestic uses, leading the City to replace the FRICO Exchange Agreement water it has historically relied upon. In addition, most of the State's growth is expected to occur along the Front Range. This is leading to increased competition among municipalities for available water supplies and costs will only continue to increase. As a result, Northglenn is aggressively seeking to acquire additional water rights as they become available and would like to have purchased all rights needed to meet build out demands within the next five to six years. Table 10 is a preliminary schedule for water purchases and retirements (FRICO Exchange Agreement water).

Table 10: CWCB Worksheet 3-4 "Preliminary Supply-Capacity Forecast"

Year	Additions (+) (1000 gallons)	Retirements (-) (1000 gallons)	Total annual supply capacity for the system (1000 gallons)
0			2,248,369
1	150,000	175,000	2,223,369
2	275,000	90,000	2,408,369
3	300,000	30,000	2,678,369
4	275,000	25,000	2,928,369
5	170,000	17,000	3,081,369
6	30,000	13,000	3,098,369
7	0	8,437	3,089,932
8	0	0	3,089,932
9	0	0	3,089,932
10	0	0	3,089,932
11	0	0	3,089,932
12	0	0	3,089,932
13	0	0	3,089,932
14	0	0	3,089,932
15	0	0	3,089,932
16	0	0	3,089,932
17	0	0	3,089,932
18	0	0	3,089,932
19	0	0	3,089,932
20	0	0	3,089,932

4 – IDENTIFY CONSERVATION GOALS

4.1 Develop Water Conservation Goals

Water use efficiency is central to the City's water supply planning and is essential in insuring the long-term adequacy and reliability of the City's water supply. Demand forecasts indicate that at build out in 2020 the City will need an additional 1,640 af of supply in average years and 3,860 af in dry years. The primary goal of the City's water conservation plan is to generate an annual savings of 600 af to help meet these future water demands. Water savings from existing water conservation activities are estimated to be 122 af/yr. With an estimated build out population of 42,246, an additional 478 af of water savings translates into a further decrease of 10.1 gallons per person per day.

The City of Northglenn has developed the following water conservation goals:

1. Decrease average annual water demands by 600 af at build out through water conservation activities (using year 2000 demands as the baseline);
2. At build out, reduce per capita water use in the City from 126 gpcd in 2006 to 116 gpcd (a 10.1 gpcd reduction) to meet the 600 af/yr water savings goals;
3. Continue existing water conservation activities which have proven effective and that have been accepted by the community;
4. Evaluate the costs and water savings associated with water conservation activities in order to select those which will provide the greatest savings for the least cost;
5. Consider high and/or inefficient water use categories when evaluating new water conservation activities;
6. Select additional measures and programs which will attain desired water conservation savings while maintaining residents' quality of living;
7. Promote water conservation education and awareness for all water users in the City's service area; and
8. Continue data collection, making modifications as necessary, to effectively monitor and characterize water use and conservation savings.

4.2 Document the Goal Development Process

Northglenn developed the goal of decreasing water use by 600 af from 2006 water use as part of its Integrated Resources Plan. Additional goals were identified during the development of this Water Conservation Plan. Historical water use and forecasted demands were analyzed to identify areas where water conservation activities might have the greatest impact or would eliminate waste. Previous and existing water conservation measures were also taken into consideration. As a result, an initial list of water conservation goals was developed. Input on proposed goals was solicited from the City's Water Conservationist and water resources staff. Goals were also revisited after conservation measures and programs were selected for implementation. Input on the draft Water Conservation Plan, including goals, was solicited from citizens of Northglenn during a 60-day public review period which occurred in May and June of 2007.

5 – IDENTIFY CONSERVATION MEASURES AND PROGRAMS

5.1 Identify Conservation Measures and Programs

Northglenn began implementing water conservation initiatives in the summer of 2001 to help ensure a safe, stable and affordable water supply for its citizens. Water conservation has become an integral component of the City's water supply plan, improving reliability and mitigating the impacts of droughts. The measures and programs outlined in Table 11 are the specific activities which were evaluated in this Water Conservation Plan. The table specifies whether an activity is "Existing" (currently or previously implemented) or "Potential" (new measure or program under consideration). Narrative descriptions of previous and existing conservation activities can be found in section 1.6 "Summarize Current Water Conservation Activities". New activities under consideration are discussed in greater detail following Table 11.

Table 11: Modified CWCB Worksheets 5-1 and 5-2 "Conservation Measures and Programs Identified in the Planning Process"

WATER CONSERVATION MEASURES AND PROGRAMS	STATUS
Water-efficient fixtures and appliances, including toilets, urinals, showerheads and faucets	
Appliance Rebate Program	Existing
Free Conservation Kits	Existing
Replacement of Municipal Appliances	Existing
Low Flow Toilet Give-Away	Potential
Low water-use landscapes, drought-resistant vegetation, removal of phreatophytes and efficient irrigation	
Municipal Landscaping and Irrigation	Existing
Outdoor Watering Schedule	Existing
Xeriscape Demonstration Garden and Educational Information	Existing
Low-Water Use Turf Tests	Existing
Rain Gage Give-Away	Existing
Large Scale Replacement of Municipal Bluegrass Turf	Potential
Irrigation Audit Program	Started in 2007
Irrigation System Design and Adjustment Class	Renewed in 2007
Landscape Incentive Program	Potential
ET Controller Rebates	Potential
Water-efficient industrial and commercial water-using processes	
Commercial Water Audits	Started in 2007
Commercial Pre-Rinse Sprayer Give Away	Started in 2007
Water reuse systems	
FRICO Exchange Agreement	Existing
Water Treatment Plant Backwash and Waste Water Reuse	Potential
FRICO Reuse for Parks	Potential
Distribution system leak identification and repair	
Customer Meter Replacement	Existing
Water Meter Monitor Loan Program	Existing
Systematic Leak Detection and Repair	Potential
Systemwide Water Audit	Potential
Removal of Phreatophytes	Potential
Dissemination of information regarding water use efficiency measures, including by public education, customer water audits and water-saving demonstrations	
City Website	Existing
24-hour Water Hotlines	Existing
Annual July 4th Celebration	Existing
Community Groups	Existing
Water Wise School Program	Potential
Annual Youth Water Festival	Existing
Xeriscape and Irrigation System Classes	Renewed in 2007
Local Television Educational Programming	Existing
Water rate structures and billing systems designed to encourage water use efficiency in a fiscally responsible manner	
Tiered Water Rate Structure and Surcharges	Existing
Water Budget Rate Structure	Potential
Utility Billing Message Blocks	Existing
Improved Water Accounting	Potential
Regulatory measures designed to encourage water conservation	
Waste of Water Ordinance	Existing
Landscape Ordinance	Potential
Incentives to implement water conservation techniques, including rebates to customers to encourage the installation of water conservation measures	
Included under other headings	
Other water management activities	
Water Conservation Coordinator	Existing
Association Memberships	Existing
Drought Mitigation Measures	Existing

Summary information for new or "potential" water conservation measures and programs included in Table 11 is provided below:

- Low Water Use Toilet Give Aways: In addition to rebates, the City is considering a one-time give-away of free low water use toilets for customers. The City can provide free toilets for about the same price as residential rebates. Rebates would also be continued as some residents may prefer to select the model of toilet. Some of the free toilets would be reserved for Adams County schools serving the City which include the high school, two middle schools and eight elementary schools. The replacement of toilets in schools can result in significant water savings.
- Irrigation Audit Program: The Center for Resource Conservation's (CRC) Slow the Flow Colorado program is a residential landscape irrigation audit program. The CRC is contracted by municipalities to assess irrigation system efficiency, develop watering schedules, and review maintenance needs. Northglenn will spend roughly half of the budget for this program evaluating schools, parks and Home Owner Associations (HOAs). Remaining funds will be used to provide free irrigation audits for single family residential customers. This program has been funded for the 2007 irrigation season.
- Irrigation System Design and Adjustment Class: Northglenn's Water Conservationist will be offering an irrigation system design and adjustment class for free for the public. Currently one class per year is planned, with the potential for additional classes depending on interest and participation levels.
- Landscape Incentive Program: Incentive programs can be geared towards new or existing developments and are designed to encourage efficient outdoor water use. Incentives often pay homeowners for replacing turf areas with lower water use landscaping or for installing low water use landscaping when a property is developed. Replacing high water use turf with Xeriscaping can save significant amounts of water. If an irrigation system is involved, this needs to be properly adjusted for savings to be realized.
- ET Controller/Soil Moisture Sensor Rebates: Most irrigation systems use a timer where the user pre-sets irrigation times and water periods. Many timers allow for programming changes throughout the irrigation season, with more water being applied mid-summer and less in the fall, for example. Irrigation systems are usually programmed to apply more water than landscaping actually needs. ET controllers use real time climate data to estimate current crop water needs (in this case, turf and/or other landscape plants). Soil moisture sensors use the actual soil moisture content to determine when water needs to be applied.
- Commercial Water Audits: The City has just over 400 commercial customers. A thorough analysis of water use by account and target areas for potential savings has not been undertaken. The City is proposing to evaluate commercial water use by account to identify those with high water use rates and/or those where water may be used inefficiently. Individualized commercial water audits will then be provided to a limited number of customers (to be determined based upon the study's findings) to help evaluate possibilities for decreasing water use.
- Low Flow Pre-Rinse Sprayer Give Away: A low-flow pre-rinse spray valve installed in commercial and/or institutional settings is an easy and cost effective means to decrease water use. Typical spray valves use up to three gallons of water per minute (gpm) while low-flow spray valve retrofits typically use only 1.6 gpm. School cafeterias and restaurants will be targeted.

- Water Treatment Plant Backwash and Waste Water Reuse: The City's water treatment plant produces wastewater (from clarifiers) and backwash water (from filters) which is discharged to the sewer system. The City's Capital Improvements Plan includes a project scheduled for 2010 to reclaim this waste and backwash water through a solids removal process. The estimated cost of this project is $1.2 million. In 2006, a total of 264 af of waste and backwash water was produced. If 85% of this could be salvaged, that would result in an annual savings of approximately 224 af.
- FRICO Reuse for City Parks: The City's right to use FRICO water by exchange is decreasing as irrigated land is developed. Northglenn plans to purchase FRICO shares as they become available to replace some of these supplies. Owning FRICO shares would give Northglenn the right to reuse some of this water. Northglenn could capture a volume of its wastewater, which has been treated to meet agricultural standards, and pump it back for irrigation of parks and open space. Currently most City irrigation systems are connected to the potable water system. This potential conservation measure would require additional and potentially costly infrastructure development. Note that this measure refers to reuse in Northglenn proper and is not the same as water reuse proposed in the IRP for Northglenn's Section 36.
- Systematic Leak Detection and Repair: Northglenn currently repairs obvious leaks in its system. A more systematic and proactive leak detection program could be implemented to find and repair smaller, less obvious leaks. There are various methods for detecting water distribution system leaks but they usually involve using sonic leak detection equipment which identifies the sound of water escaping a pipe. Undetected leaks, even small ones, can lead to large quantities of lost water over time.
- Systemwide Water Audit: Using the AWWA water audit or a similar methodology, the City could complete a water audit of its entire system, from source to end water user. This process would provide the City with a better understanding of "Real" (physical) and "Apparent" (paper losses related to inconsistencies in accounting) losses. An audit also allows water utilities to assess their water losses in comparison with other water utilities and to set performance targets. A water audit also determines how much losses may be costing water utilities and identifies improvement areas.
- Removal of Phreatophytes: Phreatophytes are plants which consume water from groundwater or surface water sources through uptake and subsequent evapotranspiration. These plants are often a concern along streams and rivers and may account for significant water loss. Phreatophytes, such as Tamarisk, are not native and their removal can result in a significant decrease in the volume of water uptaken by plants.
- City Website: The City's website contains useful water conservation information for residents. Conservation content could be moved to a more visible location and enhanced with minimal effort. Links could be provided to existing conservation related websites, which would eliminate the need for the City to invest significant staff time to develop original content.
- WaterWise™ School Program: The WaterWise program was developed by teachers and emphasizes resource conservation education. Through lesson plans, classroom resources and conservation kits, the WaterWise Program introduces students and their families to the importance of conservation. Families conduct home audits, make behavioral changes, install lower water use fixtures, keep track of water use and calculate water savings.

- Local Television Educational Programming: Education programs will air on Northglenn's local Channel 8 television station. Programming will include topics such as an irrigation system design class, simple plumbing retrofit and repair, and H_2O Joe children's programming. H_2O Joe is Colorado's official mascot for the stormwater program and is the key character in several water resources related videos geared toward elementary school aged children.
- Water Budget Rate Structure: A water budget determines the amount of water individual customer accounts are expected to use in a specific billing period, usually monthly. Every customer's water budget is the sum of estimated indoor and outdoor water needs for their specific household and landscape for the billing period. For a single-family residential account for example, the indoor allotment may be based upon an estimate of the number of individuals living in the house. The outdoor allotment may be based on customer-specific irrigable area and seasonal watering needs. Customers are only billed on their actual water use, but if they exceed the budgeted amount, water rates increase, often steeply.
- Revised Billing System: The City is currently in the process of modifying their system to read meters more frequently and bill customers more promptly. Customers currently receive their bills approximately six weeks after the period for which they are being billed. The new process will bill customers just two weeks after the period for which they are being billed. This will allow customers to more quickly adjust their water use after reviewing their bill. This revised system will enable the City and customers to more quickly identify and respond to metering errors, system leaks, and excessive water use, among other situations. The City anticipates all billing system modifications will be completed by January of 2008.
- Improved Water Accounting: To improve water accounting and develop a better understanding of "Real" system losses, the City could improve its tracking of construction, fire suppression, hydrant flushing and other non-account approved uses. Construction uses are metered, though this data is not currently integrated with billing systems records. Estimates could also be made for fire suppression and hydrant flushing. Currently these approved activities are not tracked and are considered system losses.
- Landscape Ordinance: Municipalities have utilized a variety of landscape ordinances to help insure that outdoor water use is optimized. Ordinances are usually designed to affect landscaping during the development process and rarely to require redesign of existing areas. Ordinances can require soil amendments, a separate meter for outdoor uses, limits on turf areas, and Xeriscape requirements, among other items.

6 –EVALUATE AND SELECT CONSERVATION MEASURES AND PROGRAMS

6.1 Define Evaluation Criteria

Several criteria were developed to evaluate existing and potential water conservation activities. Criteria range from very quantitative cost and water savings analyses to more subjective criteria such as overall public education benefits. Additionally, though the benefits of a measure or program may include water savings, for many it is extremely difficult to assess actual changes in water use. The following criteria were used to evaluate proposed water conservation activities (note that they are not listed in order of importance):

Criteria 1: Educational benefits

Northglenn is committed to aiding its residents in their efforts to use its water resources responsibly. Education is an important means of instilling a value of water conservation and in providing citizens with the resources they need to select and implement specific conservation activities. The City relies upon educational activities as integral components of its conservation plan.

Criteria 2: Best practice

Northglenn has one of the lowest per capita water use rates in the Metro Denver area. To provide a positive example for its citizens and the larger community, water conservation measures and programs may be adopted due to their nature as best practices. These activities may not be the most cost effective or have easily measured water savings, but they demonstrate Northglenn's commitment to promoting efficient water use and serve as an example to the community and surrounding municipalities.

Criteria 3: Cost effective

A large range of potential water conservation activities exists. Considering the costs and water savings for measures and programs is an important tool in evaluating potential measures and programs. In addition to the direct costs related to implementing an activity, cost savings are also incurred as a result of decreased demands and include savings related to eliminating the need for additional water purchases, storage, treatment, and other infrastructure.

Criteria 4: Community expectations/acceptance

Northglenn began implementing water conservation activities in the summer of 2001. City residents have grown accustomed to and expect certain conservation activities. Community acceptance is a key component of a successful water conservation plan, so Northglenn considers this to be a key component in evaluating potential activities. In recent years citizens have become more aware of the need for water conservation so may be more willing to implement certain activities that they perceive of as being helpful in insuring the viability of the City's water resources.

Criteria 5: Feasibility of implementation (technical and/or institutional)

An important criteria in evaluating conservation activities is whether the activity is feasible. An activity may appear to be a good candidate for implementation, but technical, legal, institutional, social or other concerns may serve as impediments to enacting measures and programs. Depending on the impediment, it may be appropriate to revisit measures that have been removed from consideration due to this criteria at a future date.

Criteria 6: Insufficient data currently available to evaluate

Insufficient data is currently available to fully evaluate several of the potential water conservation activities considered in this Water Conservation Plan. The City may not wish to remove these activities from future consideration, but at the present time they can not be adequately assessed without additional information. Where appropriate, it is suggested that data be collected for future evaluation.

6.2 Initial Screening of Conservation Measures and Programs

CONSERVATION MEASURES AND PROGRAMS REMOVED FROM FURTHER CONSIDERATION

Prior to completing a more in-depth analysis of conservation measures and programs, an initial screening was made to determine which measures would be selected for detailed consideration at this time.

Large Scale Municipal Bluegrass Turf Replacement: The City has removed the large scale replacement of bluegrass turf at City parks due to issues identified under Criteria 4 and 5. City landscaping staff and residents place value on bluegrass' ability to hold up to high traffic and to recover from drought. The City is investigating other turf varieties, but at this time does not plan to implement a large scale turf replacement program. In addition, the City believes that the funds which would be needed to implement this measure could be used more cost effectively elsewhere.

Landscape Incentive Program: This measure was removed from further consideration due to the costs associated with implementation as well as the feasibility of implementation. While several Colorado municipalities have implemented similar programs, these tend to be communities where supplies are severely strained. Administering a landscape incentive program requires significant staff time to manage the program and to make site visits to verify landscape replacement areas. Without undertaking a detailed cost/benefit analysis, the City has determined that it wishes to remove this program from consideration at the current time.

Reuse for City Parks: This conservation measure was removed from consideration as a result of considerations under Criteria 3 and 5. The volume of water that would be available for the City to pump back for parks application would be limited. In addition, it would require costly infrastructure including pumps, water lines and irrigation system redesign. This conservation measure is currently not considered to be an economically feasible option.

Water Budget Rate Structure: Criteria 3 and 5 led to the removal of this program from further evaluation. Northglenn has one of the lowest per capita water use rates in the Metro Denver area and currently has sufficient supplies to meet average year demands. Implementing a water budget rate structure is an expensive and time consuming endeavor and requires that every customer account be evaluated in order to develop a water budget. For single family residences, calculations and measurements must be

made to determine permeable (landscape) and impermeable (house, driveways, other) surface areas, as well as the type of landscaping present. In addition, major modifications to the City's billing system would be necessary to accommodate a Water Budget Rate Structure. The City's existing Tiered Rate Structure has a similar effect as a Water Budget Rate Structure, increasing water rates as customer water use exceeds expected use.

Landscaping Ordinance: 93% of Northglenn's land area is developed, with an estimated 500 acres remaining that will be developed as new apartments and townhomes. An additional 150 acres will likely be redeveloped as multi-use commercial and high-density housing. Northglenn's Section 36 will most likely be developed for mixed use including commercial/business/retail and park/reservoir facilities. Because the majority of Northglenn's single family residential areas have already been developed, implementing a landscaping ordinance geared towards new residential development would have a minimal impact. Criteria 3 and 5 led to the removal of this potential measure from further consideration.

Removal of Phreatophytes: This potential conservation measure was removed from further consideration as a result of Criteria 5. The City would need to complete additional studies to determine the potential for water savings, costs, and environmental and other impacts related to removing vegetation from along water supply canals and ditches.

CONSERVATION MEASURES AND PROGRAMS SELECTED FOR IMPLEMENTATION

The majority of proposed measures and programs remained after the City's preliminary screening. The City also selected several existing and new conservation activities for implementation based upon a subjective analysis, as it would be difficult or impractical to quantify the water savings for many of these activities. Table 12 lists the initial conservation measures and programs that were chosen for implementation as well as the criteria used to evaluate them. The majority were selected because they have educational benefits, minimal costs and/or can be, or have been, easily implemented. Many are also considered best practices and represent the City's commitment to water conservation. A narrative description of the evaluation process for each is included in Table 14.

Table 12: Initial List of Water Conservation Activities Selected for Implementation

INITIAL WATER CONSERVATION MEASURES AND PROGRAMS SELECTED FOR IMPLEMENTATION	Primary Screening Criteria Used
Water-efficient fixtures and appliances, including toilets, urinals, showerheads and faucets	
Replacement of Municipal Appliances	2, 5
Low water-use landscapes, drought-resistant vegetation, removal of phreatophytes and efficient irrigation	
Municipal Landscaping and Irrigation	2, 5
Outdoor Watering Schedule	1, 2, 3, 4, 5
Xeriscape Demonstration Garden and Educational Information	1, 2, 4, 5
Low-Water Use Turf Tests	1
Irrigation System Design and Adjustment Class	1, 2
Water-efficient industrial and commercial water-using processes	
Commercial Water Audits	2, 6
Water reuse systems	
FRICO Exchange Agreement	3, 5
Distribution system leak identification and repair	
Customer Meter Replacement	2, 3
Water Meter Monitor Loan Program	1
Dissemination of information regarding water use efficiency measures, including by public education, customer water audits and water-saving demonstrations	
City Website	1, 3
24-hour Water Hotlines	1, 3
Northglenn Connection "Conservation Corner"	1, 3
Annual July 4th Celebration	1, 3
Community Groups	1, 3
Annual Youth Water Festival	1, 2, 3
Xeriscape and Irrigation System Classes	1, 3
Local Television Educational Programming	1, 3
Water rate structures and billing systems designed to encourage water use efficiency in a fiscally responsible manner	
Tiered Water Rate Structure and Surcharges	2, 3, 4, 5
Utility Billing and Message Blocks	1, 3
Regulatory measures designed to encourage water conservation	
Waste of Water Ordinance	1, 2, 3, 4, 5
Incentives to implement water conservation techniques, including rebates to customers to encourage the installation of water conservation measures	
Included under other headings	
Other water management activities	
Water Conservation Coordinator	2, 3, 5
Association Memberships	2
Drought Mitigation Measures	1, 2, 3

6.3 Estimate Costs and Water Savings of Conservation Options

Comparing costs and water savings is an important evaluation tool and can assist water managers in selecting and prioritizing appropriate conservation activities for implementation. Water savings can also result in additional financial benefits related to a decreased need for water acquisitions and the development of additional water supply related infrastructure (for example increased water and wastewater treatment and storage). An analysis of costs and water savings may not be appropriate for all potential conservation measures and programs, nor should it be the only criteria applied in selecting activities.

The measures and programs evaluated in Table 13 are those where existing data made it possible to reasonably estimate costs and water savings. Estimated water savings have not been adjusted for savings related to natural retrofit or replacement rates for fixtures and appliances that would have been installed without program implementation.

Summary information for each of the measures and programs evaluated for costs and water savings is provided in Appendix A (which uses a modified version of the CWCB's Worksheet 6-1). Information includes: target sector, description, assumptions, potential annual water savings, duration of program, staffing requirements and the City's annual implementation costs. Estimated costs and water savings for the measures and programs in Appendix A are summarized below in Table 13. Where multiple data sources were available, conservative estimates of water savings were used. As a result, actual savings would likely be greater than those calculated for this plan. Savings may also be underestimated due to the difficulty in quantifying total savings for certain activities. For example the savings estimated for "Free Conservation Kits" only includes water savings for replaced showerheads. Savings which may occur due to residents using dye tablets to identify and fix leaky toilets, or by using rain gages to cut back on outdoor watering, are not included.

A seven year horizon was used for calculations of costs and water savings. There were several reasons for this. The State of Colorado requires that Water Conservation Plans be updated every seven years. In addition, the City of Northglenn anticipates that it will acquire the additional water supplies it needs to support its build-out population within the next seven years. Finally, several of the programs analyzed include hardware that may need to be replaced after approximately 5 to 10 years (faucets, showerheads, sprayers) so using this time period simplified calculations. This is a concept level analysis and does not consider escalating costs or inflation over time.

Costs per acre-foot of water saved range from $29.50 for the commercial pre-rinse sprayer give away program to $1,427 to capture and treat backwash and clarifier water at the water treatment plant. It is important to compare costs not only to other conservation activities but also with the costs needed to acquire an equivalent volume of new water supply. Currently an acre-foot for FRICO water, for example, costs between $10,000 and $15,000 and this will increase sharply as shares become more limited. This value also ignores the additional costs for water treatment and expanded system infrastructure which would be required to expand the City's supplies. Although the washer rebate program may compare poorly to other potential measures, compared to the costs associated with acquiring an acre-foot of new supply water it is still an extremely cost effective activity.

Table 13: Costs and Water Savings of Various Water Conservation Programs and Measures

Conserveration Measure or Program	Project is Ongoing?	Number of Units (annual value if ongoing project)	Estimated Annual (or one-time) Costs[1]	Estimated Annual Water Savings (in year 1) (gallons)	Estimated Annual Water Savings (in year 7) (gallons)	Total Over Seven Year Time Horizon				Ranking (1 = most desirable)	
						Total Estimated Cost (assuming constant rate of implementation) ($)	Total Estimated Water Savings (gallons)	Cost Per 1,000 Units of Water Saved ($/1000 gallons)	Cost per Acre Foot of Water Saved ($/acre-ft)	By Cost	By Volume Saved
Appliance Rebates: Toilets	Ongoing	150	$ 10,875	2,466,750	17,267,250	$ 76,125	69,069,000	$ 1.10	$ 359.14	4	2
Appliance Rebates: Washers	Ongoing	124	$ 13,150	1,045,568	7,318,976	$ 92,050	29,275,904	$ 3.14	$ 1,024.55	8	5
Free Conservation Kits	Ongoing	150	$ 3,250	450,000	3,150,000	$ 22,750	12,600,000	$ 1.81	$ 588.34	6	8
Low Flow Toilet Give-Away	One-time	500	$ 40,000	8,222,500	8,222,500	$ 40,000	57,557,500	$ 0.69	$ 226.45	3	3
Irrigation Audit Program	Ongoing	37	$ 5,000	713,491	4,994,437	$ 35,000	19,977,748	$ 1.75	$ 570.87	5	7
ET Controller/Soil Moisture Sensor Rebate	4-years	10	$ 1,750	517,860	2,071,440	$ 7,000	11,392,920	$ 0.61	$ 200.21	2	9
Commercial Pre-Rinse Sprayer Give Away	One-time	80	$ 2,820	4,452,000	4,452,000	$ 2,820	31,164,000	$ 0.09	$ 29.49	1	4
Water Treatment Plant Backwash and Waste Water Reuse	One-time Capital Investment, Ongoing O&M	NA	$1,200,000 one-time; $20,000 annual	73,047,300	73,047,300	$ 1,280,000	292,189,200	$ 4.38	$ 1,427.46	10	1
Systematic Leak Detection and Repair	One-time	NA	$ 100,000	3,592,000	3,592,000	$ 110,000	25,144,000	$ 4.37	$ 1,425.53	9	6
Water Wise School Program	Pilot (one-time initially)	150	$ 5,400	366,600	366,600	$ 5,400	2,566,200	$ 2.10	$ 685.68	7	10

[1] Costs do not include existing Northglenn staff time.

6.4 Select Conservation Measures and Programs

Table 14 lists all conservation measures and programs addressed in this Water Conservation Plan and summarizes evaluation results. Selection criteria are provided as well as a narrative of the rationale behind selection or elimination. Where appropriate, water savings for existing measures is provided as well as the estimated annual savings expected at the end of the seven year implementation period. Three activities were "Recommended" rather than being selected or eliminated. These are all related to accounting and would aid the City in developing a better understanding of system loss and potential savings which could result from a systematic leak detection and repair program and other system modifications. We recommend the City further evaluate these options, perhaps as a group, as they are interrelated.

Table 14: Program Evaluation and Selection Status of Conservation Measures

WATER CONSERVATION MEASURES AND PROGRAMS	Selected for Implementation	Primary Selection Criteria Applied	Evaluation Narrative	Annual Water Savings as of 2007 (gallons)	Estimated Additional Annual Water Savings[2] (gallons)
Water-efficient fixtures and appliances, including toilets, urinals, showerheads and faucets					
Appliance Rebate Program	Yes	3, 4	Providing rebates encourages customers to purchase lower water use appliances and may speed up replacement rates for older appliances. An analysis of costs and water savings for both toilet and washer rebates is provided in Table 14. Though toilet rebates are more cost effective than washer rebates, both are extremely cost effective as compared to the costs of acquiring new water supplies. In addition, the community has come to expect both. The City plans to continue this successful program.	9,901,787	24,586,226
Free Conservation Kits	Yes	1, 3, 4	Free conservation kits have been mailed to nearly 8,000 older homes in Northglenn. The City will continue to encourage the replacement of high water use fixtures with lower flow models by providing water conservation kits to residents at community events and for pick up at City Hall. Though conservation kits ranked in the middle range for water saved compared to other measures, it is likely the potential water savings for kits were underestimated as they also help residents identify and repair leaky toilets and have educational benefits. The kits are extremely cost effective in comparison to the cost of acquiring new water supplies.	3,876,184	3,150,000
Replacement of Municipal Appliances	Yes	2, 3	The City has identified and is committed to replacing the few higher water use toilets which remain in municipal buildings.	19,760	5,928
Low Flow Toilet Give-Away	Yes	3	Low flow toilets can be purchased at the same cost as the residential rebate. Offering free toilets will increase toilet replacement rates, leading to significant water savings. This program is cost effective and will result in significant water savings. This program is dependent on receiving a grant in order to implement.	NA	8,222,500

[1] Does not include cost associated with current staff time

[2] Estimated annual water savings at end of 7 year timeframe, includes cumulative effects of years 1 through 7

Table 14: Program Evaluation and Selection Status of Conservation Measures (continued)

WATER CONSERVATION MEASURES AND PROGRAMS	Selected for Implementation	Primary Selection Criteria Applied	Evaluation Narrative	Annual Water Savings as of 2007 (gallons)	Estimated Additional Annual Water Savings[2] (gallons)
Low water-use landscapes, drought-resistant vegetation, removal of phreatophytes and efficient irrigation					
Municipal Landscaping and Irrigation	Yes	2, 3, 4, 5	The City will continue to replace higher volume sprinklerheads with lower volume models on an as needed basis (i.e. when sprinklerheads need replacement). The City is not currently planning on a more aggressive program to cut back on municipal outdoor water use.	100,000	
Outdoor Watering Schedule	Yes	1, 2, 3, 4	Recommended watering schedules assist residents in developing reasonable schedules for watering their landscaping. In addition to decreasing outdoor water use, schedules also have the educational benefit of being one of the most obvious reminders that residents should use water wisely.		
Xeriscape Demonstration Garden and Educational Information	Yes	1, 2	Outdoor residential water use is an area where significant water savings could occur. The Xeriscape Demonstration Garden is well established and, in conjunction with educational materials, is a useful resource in helping residents assess ways in which they can modify their own landscaping. The City will continue to maintain and promote it's Xeriscape Garden and provide citizen's with Xeriscape educational materials.		
Low-Water Use Turf Tests	Yes	1,2	The City will continue collecting data on different turf varieties and will use this information when selecting turf for municipal lands.		
Rain Gage Give-Away (included with "Free Conservation Kits")	Yes	3	Rain gages will continue to be included in conservation kits (see "Free Conservation Kits" above)		
Large Scale Replacement of Municipal Bluegrass Turf	No	4, 5	See narrative in section 6.2, Programs Removed from Further Consideration		
Irrigation Audit Program	Yes	1, 3	The potential for significant water savings exists for outdoor water use. The irrigation audit program scored well for both cost and water savings. Water audits are inexpensive and provide residents, businesses and schools with site specific information to efficiently irrigate their landscaping.		4,994,437
Irrigation System Design and Adjustment Class	Yes	1, 3	Outdoor water use is an area with the potential for significant water savings. This program will require a minimal financial commitment on the part of the City while providing residents with educational information to help them efficiently irrigate their landscaping.		
Landscape Incentive Program	No	3	See narrative in section 6.2, Programs Removed from Further Consideration		
ET Controller/Moisture Sensor Rebates	Yes	3, 5	Irrigating plants based upon their actual needs is something the City would like to encourage. This program scored well regarding cost per unit of water saved. This is a new conservation activity so the City may need to make adjustments as the program is implemented in order to encourage residents and business to switch from automatic timers. Technical assistance, in addition to rebates, may be required on the part of the City.		2,071,440

[1] Does not include cost associated with current staff time

[2] Estimated annual water savings at end of 7 year timeframe, includes cumulative effects of years 1 through 7

Table 14: Program Evaluation and Selection Status of Conservation Measures (continued)

WATER CONSERVATION MEASURES AND PROGRAMS	Selected for Implementation	Primary Selection Criteria Applied	Evaluation Narrative	Annual Water Savings as of 2007 (gallons)	Estimated Additional Annual Water Savings[2] (gallons)
Water-efficient industrial and commercial water-using processes					
Commercial Water Audits	Yes	1, 3	The City will implement an initial ranking of commercial customers in order to identify high water user accounts and/or accounts where water is being used inefficiently. After this analysis is completed, the City will assess whether individual commercial audits may be useful and, if so, to what extent these will be provided. Prior to collecting this information, the costs and water savings associated with the program are difficult to assess.		
Commercial Pre-Rinse Sprayer Give Away	Yes	1, 3	This program scored v well on both cost per unit of water saved and the potential for total water savings. To insure its success, Northglenn's Water Conservation Specialist plans to personally install all sprayers.		4,452,000
Water reuse systems					
FRICO Exchange Agreement	Yes	3, 5	FRICO Exchange Agreement water is currently an important part of the City's water supply. The City will continue to utilize this agreement while more long range water supplies are being developed.		
Water Treatment Plant Backwash and Waste Water Reuse	Yes	2, 3, 5	Significantly more water can be saved annually by implementing this project than by any of the other conservation activities analyzed in this plan. Though it scored low for cost among the conservation activities which were evaluated, it is much more cost effective than acquiring new supplies in an equivalent amount. This project is tentatively slated for development in 2010.		73,047,300
FRICO Reuse for Parks	No	3, 5	See narrative in section 6.2, Programs Removed from Further Consideration		
Distribution system leak identification and repair					
Customer Meter Replacement	Yes	1, 2, 3	The City has replaced 100% of residentila meters. Meter replacement is a proven means for improving water accounting and the City has a schedule for ongoing meter replacement in place.		
Water Meter Monitor Loan Program	Yes	1	The City currently has meters available for loan to residents to track their water use over defined time periods. This program can be maintained, and better promoted, at minimal expense to the City.		
Systematic Leak Detection and Repair	Recommended	2, 3, 5	Detecting and repairing leaks could result in a significant decrease in water lost from the system. Many water utilities conduct regularly scheduled (or ongoing, rotating) sonic leak detection programs, which can be costly. Additional information is needed to further evaluate this activity prior to implementation, perhaps in conjunction with completing a systemwide water audit to better estimate potential savings.		3,592,000
Systemwide Water Audit	Recommended	2, 3, 5	Approximately 10% of the water produced annually in the City is currently unaccounted for. Some of this water is most likely lost only on paper, or is due to accounting discrepancies. The actual volume which is lost due to system leaks could be better quantified by completing a systemwide water audit. This could also help define physical areas where leaks may be occurring and may identify areas where hardware or other system modifications may improve system operation.		
Removal of Phreatophytes	No	5	See narrative in section 6.2, Programs Removed from Further Consideration		

[1] Does not include cost associated with current staff time

[2] Estimated annual water savings at end of 7 year timeframe, includes cumulative effects of years 1 through 7

Table 14: Program Evaluation and Selection Status of Conservation Measures (continued)

WATER CONSERVATION MEASURES AND PROGRAMS	Selected for Implementation	Primary Selection Criteria Applied	Evaluation Narrative	Annual Water Savings as of 2007 (gallons)	Estimated Additional Annual Water Savings[2] (gallons)
Dissemination of information regarding water use efficiency measures, including by public education, customer water audits and water-saving demonstrations					
City Website	Yes	1, 2, 3, 4	Northglenn's website provides a wealth of information for residents and local businesses. Water conservation related content will be expanded to provide information on existing and new conservation measures and to link to a variety of external resources. The City will also revise the website to make conservation information more prominent. This can be accomplished at a low cost to the City.		
24-hour Water Hotlines	Yes	3	The City will continue to maintain hotlines to address residents' water related questions and concerns.		
Annual July 4th Celebration	Yes	1, 2, 3, 4	The July 4th Celebration is an opportunity to remind residents of the importance of water conservation and to educate them about specific measures and programs. The City will continue to have a water conservation booth at the event.		
Community Groups	Yes	1	The City's Water Conservation Specialist will continue to meet with community groups upon request.		
Water Wise School Program	Maybe	1, 2, 3	The Water Wise School program provides a well-defined framework for educating Northglenn students about the potential for integrating conservation activities in their own lives. This program is intended to impact students' and their families' water use patterns into the future. Participants in the program install low water use fixtures in their homes, which has an immediate impact on water use. The program came out at the lower end of the cost/water savings analysis because only one year of implementation was included and many of its benefits are educational in nature and cannot be quantified. The City plans to implement the pilot project in five classrooms and collect data to determine if the program should be continued and/or expanded in future years. Additionally, funding constraints could impact program implementation.		366,600
Annual Youth Water Festival	Yes	1, 2, 3	Northglenn is committed to continuing its support of, and participation in, this annual educational program for the City's youth.		
Xeriscape and Irrigation System Classes	Yes	1	Outdoor water use is an area with the potential for significant water savings. This program will require a minimal financial commitment on the part of the City while providing residents with educational information to help them design and efficiently irrigate their landscaping.		
Local Television Educational Programming	Yes	1, 3	The City can tape Xeriscape and irrigation system classes to be shown on local television. In addition, locally developed children's conservation related programming (H2O Joe) can be broadcast. Both have the potential for educational benefits which outweigh their minimal costs.		

[1] Does not include cost associated with current staff time

[2] Estimated annual water savings at end of 7 year timeframe, includes cumulative effects of years 1 through 7

Table 14: Program Evaluation and Selection Status of Conservation Measures (continued)

WATER CONSERVATION MEASURES AND PROGRAMS	Selected for Implementation	Primary Selection Criteria Applied	Evaluation Narrative	Annual Water Savings as of 2007 (gallons)	Estimated Additional Annual Water Savings[2] (gallons)
Water rate structures and billing systems designed to encourage water use efficiency in a fiscally responsible manner					
Tiered Water Rate Structure and Surcharges	Yes	1, 2, 3, 4	The City has successfully implemented and will maintain its tiered rate structure.		
Water Budget Rate Structure	No	3, 5	See narrative in section 6.2, Programs Removed from Further Consideration		
Utility Billing Message Blocks	Yes	1, 2, 3	Utility billing message block notices are an effective means of communicating with residents. Having just received a bill, residents are likely to be open to water savings suggestions. The City will continue to utilize utility message blocks as an educational tool.		
Improved Water Accounting	Recommended	2, 3, 5	As discussed above under "Systemwide Water Audit", by keeping track of approved but unbilled water uses, the City could better estimate how much of its systemwide water loss is real and how much is due to accounting processes. Additional information is needed to further evaluate this potential activity.		
Regulatory measures designed to encourage water conservation					
Waste of Water Ordinance	Yes	2, 4	The Waste of Water ordinance is critical to the City's ability to minimize excessive water use. The Waste of Water Ordinance is part of Northglenn's governing code and, as such, will continue to be enforced.		
Landscape Ordinance	No	2, 3, 5	See narrative in section 6.2, Programs Removed from Further Consideration		
Incentives to implement water conservation techniques, including rebates to customers to encourage the installation of water conservation measures					
Included under other headings					
Other water management activities					
Water Conservation Coordinator	Yes	2, 3	The City is committed to this full-time staff position wich is pivitol to the success of the City's water conservation program.		
Association Memberships	Yes	2	The City will continue to be an active member of a variety of watershed, water quality, and water supply related organizations.		
Drought Mitigation Measures	Yes	2, 3, 4	During times of drought, more stringent measures may be required of or requested by the City to temporarily curtail water use. As with other water providers in Colorado, the City will continue to utilize such measures as necessary to insure that water supplies are sufficient to meet demands.		

[1] Does not include cost associated with current staff time

[2] Estimated annual water savings at end of 7 year timeframe, includes cumulative effects of years 1 through 7

Table 15 provides total water savings estimates from the existing and new conservation activities detailed in Table 14. Based upon the analysis completed, the City will meet and likely exceed its goal of attaining 600 acre-feet of water savings annually through conservation measures. It is important to note that the Drought Response Measures included in Table 14 would only be imposed during times of water shortages and are therefore not included in the total savings amounts shown in Table 15.

Table 15: Summary of Annual Water Savings Estimates (Existing and Selected Conservation Measures and Programs)

	Gallons	Acre-feet
Existing water conservation measures and programs as of 2007	39,860,000	122
New activities and expansion of existing water conservation measures and programs		
Quantifiable Measures and Programs[1]	124,488,431	382
Other Programs (estimated)	35,000,000	107
Estimate of Total Annual Water Savings In 2013	199,348,431	612

[1] From Table 14

Note that the estimated savings associated with "Other Programs" which were difficult to quantify are likely underestimated.

6.5 Measures Reserved for Future Consideration

This plan focuses on existing conservation measures, those scheduled for implementation, and new programs and measures that meet the evaluation criteria described in Section 6.1. The programs and measures adopted by the City to date effectively address indoor conservation potential through use of water efficient fixtures and appliances, while outdoor conservation potential is addressed primarily through educational programs and limited infrastructure improvements.

Through the evaluation process used in the development of this plan, several potentially feasible and cost effective indoor and outdoor measures have been identified that could result in significant additional water savings. These programs and measures were not selected for implementation at this time due to public policy considerations and the need for additional information and analysis. These potential additional programs and measures will be reserved for further investigation and consideration in the future. Additional potential programs and measures for future evaluation include the following:

- Water efficient toilet and fixture retrofit program for schools;
- ET controllers and/or soil moisture sensors for irrigated parks, open space areas, and large commercial plots;
- Additional incentives to encourage residents to switch to lower water use landscaping and improve irrigation efficiency; and
- Surveys of residents and businesses and/or the formation of a citizens work group focused on water conservation, among others.

6.6 Energy Saving Benefits of Water Conservation

This plan focuses on water conservation and the resulting water savings. It is also important to acknowledge that many water conservation measures and programs also result in energy savings and related cost associated with that energy. Using less water decreases energy used for:

- Pumping Water;
- Treating Water (drinking and wastewater);
- Maintaining and Operating Water Facilities;
- Constructing New or Expanding Water Facilities;
- Heating Water; and
- Running Appliances, among other uses.

7 – INTEGRATE RESOURCES AND MODIFY FORECASTS

7.1 Revise Demand Forecast

Northglenn's water supply is sufficient to meet average year demands. Water supply related infrastructure has been designed to meet average and peak daily and hourly demands. The City's facilities can be upgraded to accommodate build out demands with minimal modification.

Northglenn initially implemented water conservation activities in response to drought conditions in order to immediately impact demands. Since that time annual water savings related to conservation activities have grown to an estimated 39,860,000 gallons per year (or 122 acre-feet). The purpose of this planning initiative is to expand on current conservation efforts to decrease both average and drought year demands, encourage residents to embrace an ethic of efficient natural resource use, and minimize the need to acquire additional supplies to meet future demands at build out.

The City considers water conservation to be an integral component of its water supply planning and has included current and estimates of future water savings related to conservation activities in its planning initiatives. As a result, the City has not developed plans for acquiring water supplies or constructing related facilities which could be deferred or downsized as a result of conservation savings. The City is currently evaluating the IRP which includes alternatives for meeting future demands, including water conservation and potential capital projects.

Current and build out supply and demand data is shown in Table 16 for the current year and at build out. Table 16 also includes average and dry year supplies, demands with existing and additional conservation measures, and additional supplies needed to meet current and build out demands. Currently there is a 55 acre-foot dry year shortfall, although drought response measures would decrease this. Discrepancies between demand and supplies at build out illustrate the gap in the City's supplies which must be addressed through conservation and other initiatives.

Table 16: Modified Supply Forecast and Estimated Total Savings

	Supply (without additional purchases) (acre-feet)		Demands (acre-feet)		Additional Supply and/or Reuse Needed (acre-feet)			
					Average Year (Average Yield)		Dry Year (Firm Yield)	
Year	Average Yield	Firm Yield	With Existing Conservation	With Additional Conservation	With Existing Conservation	With Additional Conservation	With Existing Conservation	With Additional Conservation
Current Year	6900	5245	5300	NA	0	0	55	NA
Build Out	5800	3580	7440	6966	1640	1166	3860	3386

Note "With Conservation" does not include drought response measures.

7.2 Consider Revenue Effects

As discussed in section 7.1, the City has included water conservation savings as a component of its water supply plan. As a result, decreases in revenue resulting from lower demands are included in planning initiatives and when evaluating potential system improvements and modifications. As water use decreases, less revenue is received by the City. However conservation savings are designed to help offset increases in demand resulting from a growing population so revenue losses should be offset by revenues from new customers. The "Water and Rates Fund", revenue from a tax in effect through 2010, provides the City with funds to be used exclusively for the purchase

or lease of water or water rights for use in, and/or augmentation of, the municipal water system. This tax enables the City to develop the water supplies and infrastructure it needs while at the same time encouraging a water conservation ethic without worrying about the impacts of decreases in revenue that may result from lower water demands.

8 – DEVELOP IMPLEMENTATION PLAN

8.1 Develop Implementation Schedule

Table 17 is a preliminary schedule for the implementation and/or continuation of selected conservation measures and programs. The City will begin work on all new activities in 2007, though full implementation may not occur until late in the year or in 2008. As described in previous sections of this Plan, the City's Water Conservation Specialist will be responsible for supervising and coordinating the actions needed for implementation of the selected conservation measures and programs.

Table 17: CWCB Worksheet 8-1 "Implementation Schedule for Measures and Programs"

Line	Measure/Program	Required action	Beginning date	Completion date	Notes
1	Appliance Rebate Program	Continue to promote program and provide rebates	Existing	Ongoing	
2	Free Conservation Kits	Continue to promote program and provide kits	Existing	Ongoing	
3	Replacement of Municipal Appliances	Replace remaining higher water use toilets	Existing	2008	
4	Low Flow Toilet Give-Away	1. Meet with Northglenn Lowes about partnering 2. Identify target accounts 3.Purchase toilets 4. Promote program among residents 5. Provide toilets	Fall 2007	Contigent upon grant funding	
5	Municipal Landscaping and Irrigation	Continue to replace higher water use sprinklerheads and higher water use landscaping as opportunities arise	Existing	Ongoing	Consider a more aggressive approach
6	Outdoor Watering Schedule	Continue to promote	Existing	Ongoing	Enforce watering schedule during times of drought or shortage as needed
7	Xeriscape Demonstration Garden and Educational Information	Continue to maintain and promote	Existing	Ongoing	
8	Low-Water Use Turf Tests	Continue to collect and utilize data when selecting new turf	Existing	Ongoing	
9	Rain Gage Give-Away (included with "Free Conservation Kits")	Continue to give away in Conservation Kits (or individually if requested)	Existing	Ongoing	
10	Irrigation Audit Program	1. Contract with Center for Resource Conservation 2. Advertise audits 3. Provide follow up	Summer 2007	Ongoing	
11	Irrigation System Design and Adjustment Class	Promote and offer in late-spring/early summer. Tape for showing on local television	Summer 2007	Ongoing	Request input and suggestions for future classes from participants
12	ET Controller/Moisture Sensor Rebates	Begin promoting program in the summer of 2007. After commercial water audits, target specific commercial customers.	Summer 2007	Ongoing	Consider review of residential accounts to develop list to target for rebates.
13	Commercial Water Audits	1. Review billing data to identify high use/potentially inefficient accounts. 2. Develop audit plan and approach targeted commercial customers 3. Conduct audits 4. Provide follow up	2007	Revisit periodically	
14	Commercial Pre-Rinse Sprayer Give Away	1. Develop list of restaurants and schools 2. Contact schools 3. Purchase and Install sprayers	2007	Ongoing	
15	FRICO Exchange Agreement	Continue	Existing	Ongoing	Until Exchange Water is no longer available

Table 17: CWCB Worksheet 8-1 "Implementation Schedule for Measures and Programs" (continued)

Line	Measure/Program	Required action	Beginning date	Completion date	Notes
16	Water Treatment Plant Backwash and Waste Water Reuse	Plans will need to be approved by City Council and funding secured prior to project design and implementation.	2010	Ongoing	
17	Customer Meter Replacement	Schedule periodic replacement of meters based upon manufacturer recommendations	Existing	NA	Older meters will be replaced periodically
18	Water Meter Monitor Loan Program	Promote more prominently	Existing	Ongoing	
19	City Website	Work with IT department to expand water conservation content and make more prominent	Existing	Ongoing	
20	24-hour Water Hotlines	Continue to maintain and promote	Existing	Ongoing	
21	Northglenn Connection "Conservation Corner"	Work with newsletter staff to implement	Spring 2007	Ongoing	
22	Annual July 4th Celebration	Continue to participate. Design and create new water conservation booth	Existing	Ongoing (annual festival)	
23	Community Groups	Promote more prominently	Existing	Ongoing	
24	Water Wise School Program	1. Partner with Adams County School District 2. Initiate First Year Pilot Program 3. Evaluate program for continuation and/or expansion	2007/2008 school year	Unknown	Pilot project success will be assessed at end of program. Program implementation is contingent upon grant funding.
25	Annual Youth Water Festival	Continue to participate and support. Work with schools to optimize number of students attending.	Existing	Ongoing (annual festival)	
26	Xeriscape and Irrigation System Classes	Promote and offer in late-spring/early summer. Tape for showing on local television	Summer 2007	Ongoing	Request input and suggestions for future classes from participants
27	Local Television Educational Programming	1. Work with Channel 8 to scheduling showing of H2O Joe childrens programming 2. After Irrigation system and Xeriscape classes are taped, develop schedule for airing	Fall 2007	Ongoing	
28	Tiered Water Rate Structure and Surcharges	Continue to bill accounts using the tiered water rate structure, implementing surchases as needed during times of water shortage	Existing	Ongoing	Over time rates may be adjust in response to rising water and operating costs
29	Utility Billing Message Blocks	Increase use of utility billing message blocks to promote conservation measures and programs	Existing	Ongoing	
30	Waste of Water Ordinance	Continue to support and enforce	Existing	Ongoing	
31	Water Conservation Coordinator	Maintain this full time staff position	Existing	Ongoing	As conservation activities increase, consider adding additional conservation staff
32	Association Memberships	Maintain memberships	Existing	Ongoing	
33	Drought Mitigation Measures	Implement as needed during times of water shortage	As needed	As needed	

8.2 Develop Plan for Public Participation and Implementation

Public participation is critical to the success of Northglenn's Water Conservation Program. Most of the City's measures and programs rely upon residents to modify their water use patterns and to utilize programs, such as rebates to achieve desired water savings. Public input on the water conservation plan was solicited during a 60-day

public comment period which occurred from May, 2007 through June, 2007. A link to the draft Plan was posted on the official Northglenn website (http://www.northglenn.org/) and copies were made available at City Hall and at the Northglenn branch of the Rangeview Library District at 10530 N. Huron Street. To inform citizens about the draft Plan and the public comment period, notices were posted on the City's website, at the library, at City Hall, in the *Northglenn Connection* newsletter, and the Northglenn-Thornton Sentinel Newspaper. A copy of each of these notices is included in Appendix B.
Comments on the draft Water Conservation plan were requested to be received by June 30th. Comments could be mailed or e-mailed to:

Wayne East
Water Conservationist
City of Northglenn
11701 Community Center Dr.
Northglenn, CO 80233
weast@northglenn.org

The draft Plan was also submitted to City Council for their input during the public comment period. No comments were received. The Water Conservation Plan was then submitted to City Council for approval.

8.3 Develop Plan for Monitoring and Evaluation

The City will document water conservation measures and programs as they are implemented. Gaps in existing data will be identified and the data collection program will be expanded as needed. When possible, data on actual costs and actual or estimated water savings will be recorded.

Total annual system-wide water use and population data will be compared with historical and projected demands to determine overall water savings. Annual and seasonal water use by account type will be examined and climatic factors considered when determining the overall impacts of water conservation activities.

The Water Conservation Specialist will develop an annual report of conservation activities, costs and estimated savings for internal use and documentation. The report will include information on lessons learned; requests/suggestions received from Northglenn residents, businesses and others impacted by conservation activities. It will also document any modifications to measures and programs noting the rationale behind suggested changes.

Table 18 provides a tentative list of data and other information which will be collected for the conservation activities in this Plan. In addition to the specific information listed below, any comments or suggestions received from the Northglenn community regarding specific measures and programs will be recorded and included in evaluation processes.

Table 18: Conservation Activity Data Collection Plan

Measure/Program	Data Collection
Appliance Rebate Program	Number of toilet and washer rebates, when replaced, age of replaced appliance, commercial or residential, rebate applications, costs
Free Conservation Kits	Number of kits, when and where given away, costs
Replacement of Municipal Appliances	Number and location of appliances replaced, when replaced, volume of water used by replaced appliances, costs
Low Flow Toilet Give-Away	Number of toilets replaced, age of replaced toilets, when given-away, if targeted give away keep information on accounts who received them, commercial, school or residential give-away, costs
Municipal Landscaping and Irrigation	Number and location of replaced sprinklerheads, when replaced, volume of water used by replaced sprinklerheads, details regarding location/activity/timing/area/volume affected by other irrigation system or landscaping modifications, costs
Xeriscape Demonstration Garden and Educational Information	Estimate/document number of pamphlets/educational materials taken, costs
Low-Water Use Turf Tests	Type, area, water applied, turf condition, climatic information, costs
Irrigation Audit Program	Number of audits, who received, when audited, estimate of impacted landscaping area, audit results, City follow-up, costs
Irrigation System Design and Adjustment Class	Dates and topics of class(es), number of participants, costs
ET Controller/Moisture Sensor Rebates	Number of rebates, who received, when received, estimate of impacted landscaping area, costs
Commercial Water Audits	Number of audits, who and when received, type of business, potential improvements, audit results, City follow-up, costs
Commercial Pre-Rinse Sprayer Give Away	Number of give-away, who and when received, volume of water used by replaced sprayer, estimate of hours per week sprayer is used, costs
FRICO Exchange Agreement	Volume and timing of water exchanged and returned
Water Treatment Plant Backwash and Waste Water Reuse	Volume of backwash and wastewater
Customer Meter Replacement	Number of meters replaced, replacement model, replaced model, account information, when replaced, estimated life of new meter, costs
Water Meter Monitor Loan Program	Frequency of checkout, length, customer information
City Website	Number of visits/hits to specific conservation related websites
24-hour Water Hotlines	Number of calls, when received, topic
Annual July 4th Celebration	Date of event, cost of new booth, number of conservation kits given away
Community Groups	Number of requests, dates, topics, Number of participants
Water Wise School Program	Number of students participating, data collection as specified by program
Annual Youth Water Festival	Number of students attending, data of festival, cost
Xeriscape and Irrigation System Classes	Dates and topics of class(es), number of participants, costs
Local Television Educational Programming	Dates and topics of programming, costs
Utility Billing Message Blocks	Copies of messages
Association Memberships	List of memberships
Drought Mitigation Measures	Dates, reasons for and measures implemented

8.4 Develop Plan for Updating and Revising the Conservation Plan

Colorado House Bill 04-1365 requires all water providers with annual demands of 2,000 acre-feet or more have an approved Water Conservation Plan on file with the State. In addition the Bill stipulates that water providers review and update their plans no less than every seven years. Northglenn plans to fully review and update this Water

Conservation Plan in 2013 in order to have an updated plan on file by 2014 in compliance with State law.

As described above in section 8.3, water conservation data activities will be monitored and evaluated on an ongoing basis and an annual report compiled. The City will most likely make modifications to measures and programs as a result. Additionally, changes in technology, State and Federal laws, public perceptions, climatic conditions, and financial considerations, among others, may impact the City's Water Conservation Plan. The Water Conservation Plan is not meant to be a static document, but rather a guidance document to enable the City to meet its water savings goals. Modifications made to the City's Plan will be documented in the following year's annual conservation report.

8.5 Define Milestone Dates

After review by City staff, the City of Northglenn's Draft Water Conservation Plan was made available for review by City Council and a public comment period of 60 days. Public notices were placed on the City's web site, at City Hall, the Northglenn Recreation Center, the library, in the Northglenn Connection and in the Northglenn/Thornton Sentinel. Public notices as posted are included as Appendix B. On _____, City Council passed resolution # _____, adopting the water conservation plan. A copy of the resolution can be found in Appendix C.

REFERENCES

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Appendix A

Water Conservation Measure and Program Summary Information

Water-efficient fixtures and appliances	
Conservation Measure/Program:	**Appliance Rebate Program (a): Low Water Use Toilet Rebates**
Target Sector:	Single Family Residential and Commercial/Multi Family
Description:	$75 residential, $50 commercial/multi family rebate for purchasing a low volume toilet
	Up to 150 rebates per year
	Promote program on City website, water bill message block, *Northglenn Connection* newsletter, press releases, Sentinel newspaper, TV channel 8, and mailings
	Residents can get rebates for up to 2 toilets, commercial/multi family accounts can receive rebates for up to 8 toilets/month
	Toilets replaced must be 1994 or older
Assumptions:	Assumes 30% of rebates are commercial/multi family
	Actual historical Northglenn rebate program data used to estimate age and water use for replaced toilets
	Low flow toilets assumed to use 1.6 gallons per flush
	Rebate recipients are responsible for installation
Potential Annual Water Savings:	2,466,750 gallons per year for 150 toilets (average of 16,445 gallons per toilet per year)
Duration of Program:	Ongoing
Staffing Requirements:	Existing Staff: Water Conservation Specialist
City's Annual Implementation Costs:	$10,875 annually ($10,125 rebates, $750 marketing, does not included existing staff time)

Data Source(s): Northglenn program specific data

Water-efficient fixtures and appliances	
Conservation Measure/Program:	**Appliance Rebate Program (b): High Efficiency (HE) Clothes Washer Rebates**
Target Sector:	Single Family Residential
Description:	$100 rebate for purchasing a high efficiency residential clothes washer
	Up to 124 rebates per year
	Promote program on City website, water bill message block, *Northglenn Connection* newsletter, press releases, Sentinel newspaper, TV channel 8, and mailings
	Washer must be on Consortium for Energy Efficiency list
Assumptions:	Actual historical Northglenn rebate program data used to estimate age and water use for replaced washers
	HE washers use 27 gpl
	Average of just under 1 load per day per (3 person) household (357 loads/year)
Potential Annual Water Savings:	1,045,568 gallons per year for 124 washers (8,432 gallons per washer per year)
Duration of Program:	Ongoing
Staffing Requirements:	Existing Staff: Water Conservation Specialist
City's Annual Implementation Costs:	$13,150 annually ($12,400 rebates, $750 marketing, does not included existing staff time)

Data Source(s): Northglenn program specific data

Water-efficient fixtures and appliances	
Conservation Measure/Program:	**Free Conservation Kits**
Target Sector:	Single Family Residential
Description:	Conservation kits include 1 low flow showerhead, shower timers, rain gages, toilet leak detection dye tablets, and educational materials.
	Up to 150 kits given away each year
	Kits given away free at City Hall and community events
	Promote program on City website, water bill message block, *Northglenn Connection* newsletter, press releases, Sentinel newspaper, TV channel 8, and mailings
Assumptions:	Replaced showerheads use 3.0 gallons per minute (gpm)
	New showerheads use 2.0 gpm
	Home owners are responsible for installing new showerheads
Potential Annual Water Savings:	450,000 gallons per year for 150 showerheads (3,000 gallons per showerhead per year). Savings from shower timers, rain gages and dye tablets not estimated.
Duration of Program:	Ongoing
Staffing Requirements:	Existing Staff: Water Conservation Specialist
City's Annual Implementation Costs:	$3,250 annually ($3,000 kits @ $20 each, $250 marketing, does not included existing staff time)

Data Source(s): Vickers, 2001 and City of Northglenn

Water-efficient fixtures and appliances	
Conservation Measure/Program:	**Low Flow Toilet Give Away**
Target Sector:	Single Family Residential/Schools
Description:	Free low flow toilet give aways
	500 toilets
	Possibly partner with Northglenn Lowes to provide discount coupon to purchase supplies needed to replace older toilets.
	Possibly partner with Adams County School District to dedicate a portion of free toilets to replace older toilets in schools. Much of water used in schools
	Toilets replaced must be 1994 or older
	Promote program on City website, water bill message block, *Northglenn Connection* newsletter, press releases, Sentinel newspaper, TV channel 8, and mailings
	Low flow toilet recipients are responsible for installation
	Low flow toilets assumed to use 1.6 gallons per flush
	Approximately 150 of toilets will be dedicated to replace high use toilets in schools
	Water savings per high traffic area school toilet were assumed to be approximately equal to residential savings due to lack of school specific data. Daily water use may be higher due to the number of students per toilet but total hours of use are lower.
Potential Annual Water Savings:	8,222,500 gallons per year for 500 toilets (average of 16,445 gallons per toilet per year)
Duration of Program:	One-time
Staffing Requirements:	Existing Staff: Water Conservation Specialist
City's Annual Implementation Costs:	$40,000 ($37,500 for toilets @ $75 each, $2,500 marketing, does not include existing staff time)

Data Source(s): Northglenn program specific data

Low water-use landscapes, drought-resistant vegetation, removal of phreatophytes and efficient irrigation	
Conservation Measure/Program:	**Irrigation Audit Program**
Target Sector:	Single Family Residential/Schools/Municipal
Description:	Utilize the Center for Resource Conservation's (CRC) "Slow the Flow Colorado" program
	CRC certified water auditors conduct irrigation system audits and provide suggestions to improve system efficiency
	Half of program budget will be spent on audits for HOAs, schools and park and half on single family residences.
	Single family audits will be provided on a first come, first serve basis
	Promote program on City website, water bill message block, *Northglenn Connection* newsletter, press releases, Sentinel newspaper, TV channel 8, and mailings
Assumptions:	Efficient irrigation practices can decrease outdoor water use by 30 to 80%
	Partial acceptance of CRC suggestions results in 25 % savings in outdoor water use
	5 acres of HOA, school and parks will be audited
	32 residential systems will be audited
	Average residential lot is 1/4 acre and that 2/3 (or 1/6 acre) is irrigated
	69,048 gallons per acre annual savings, 11,508 gallons per residential lot annual savings
	Savings per acre based upon analysis of average residentail outdoor water use in Northglenn from 2000 to 2006
Potential Annual Water Savings:	713,491 gallons per year for 32 residences and and 5 acres HOA, schools and parks
Duration of Program:	Ongoing
Staffing Requirements:	Existing Staff: Water Conservation Specialist, Parks and Recreation Employees
City's Annual Implementation Costs:	$5,000 annually ($75 per residential audit, $500 per acre for other audits, $250 marketing, does not include existing staff time or materials required to implement irrigation system modifications)

Data Source(s): J.R. Feucht, Colorado State University Cooperative Extension

Low water-use landscapes, drought-resistant vegetation, removal of phreatophytes and efficient irrigation	
Conservation Measure/Program:	**Evapotranspiration (ET) Controller and Soil Moisture Sensor Rebates**
Target Sector:	Residential/Commercial
Description:	$150 rebate
	Up to 10 rebates per year
	Targeted mailing to specific commerical and single family residential customers (based on assessment of account water use)
	Promote program on City website, water bill message block, *Northglenn Connection* newsletter, press releases, Sentinel newspaper, TV channel 8, and mailings
	Sensor/controller must be on City approved list
Assumptions:	1.0 acre irrigated on average for each ET controller/soil moisture sensor
	Outdoor water use savings of 25% for each controller installed
	51,786 gallons per acre annual savings
	Commercial outdoor water use in Northglenn (per acre) assumed to be similar to residential use. Savings per acre based upon analysis of average residential outdoor water use in Northglenn from 2000 to 2006.
	Recipients of rebates are responsible for installation and ongoing service costs related to ET sensors
Potential Annual Water Savings:	517,860 gallons per year for 10 controllers/sensors covering 10 acres
Duration of Program:	Ongoing, but assume the majority of sensors/controllers will be installed in first 4 years of program.
Staffing Requirements:	Existing Staff: Water Conservation Specialist
City's Annual Implementation Costs:	$1,750 annually ($1,500 rebates, $250 marketing w/targeted mailing, does not included existing staff time)

Water-efficient industrial and commercial water-using processes	
Conservation Measure/Program:	**Low Flow Commercial Pre-Rinse Sprayer Give Away**
Target Sector:	Schools/Commercial
Description:	Give away low water use pre-rinse sprayers to schools and restaurants for use in kitchens
	80 rebates total
	Directly contact schools and restaurants
Assumptions:	Replaced sprayers use 3.0 gallons per minute
	Low fllow sprayers use 1.6 gallons per minute
	Each sprayer is used approximately 2.5 hours per day
	Northglenn's Water Conservation Specialist will install all sprayers
Potential Annual Water Savings:	4,452,000 gallons per year for 80 sprayers (55,650 gallons per sprayer per year)
Duration of Program:	Ongoing
Staffing Requirements:	Existing Staff: Water Conservation Specialist
City's Annual Implementation Costs:	$2,820 to cover most schools and restaurants (80 sprayers at $29 each plus $500 for misc costs, does not included existing staff time)

Source(s): Food Service Technology Center

Water reuse systems	
Conservation Measure/Program:	**Water Treatment Plant Backwash and Waste Water ReUse**
Target Sector:	Overall System
Description:	Capture filter backwash and waste water from drinking water treatment plant and return to plant for treatment
	Requires infrastructure to return water to plant and additional treatment of water
Assumptions:	Annually 85,938,000 gallons of backwash and waste water is released from drinking water plant to the City's sewer system
	85% of backwash and waste water could be recycled
Potential Annual Water Savings:	73,047,300 gallons
Duration of Program:	Infrastructure: One-time project; Operations and maintenance: Ongoing
Staffing Requirements:	Existing Staff: Water Treatment Plant Staff
City's Annual Implementation Costs:	$1,200,000 capital improvement cost (est. 2010 project), $20,000 Annual O&M costs (does not included existing staff time)

Source(s): City of Northglenn

Distribution system leak identification and repair	
Conservation Measure/Program:	**Systematic Leak Detection and Repair**
Target Sector:	Overall System
Description:	Develop plan and schedule to test system pipes for leaks
	Repairs made when leaks identified
Assumptions:	Hire outside contractor with sonic leak detection equipment to perform systemwide survey
	120 miles of pipe tested
	City will make repairs when leaks are identified
	Schools and restaurants are responsible for installation of new sprayers
Potential Annual Water Savings:	Can not quantify water savings prior to completing survey of system.
	2000 through 2006 average of "Real and Unaccounted for Losses" (difference between produced and metered water use) was 179,597,450 gallons.
	If 2% of this could be saved by repairing leaks, would save approximately 3,592,000 gallons annually
Duration of Program:	One-Time (repeat at regulary scheduled intervals)
Staffing Requirements:	Existing Staff: Water Resources Engineer,
City's Annual Implementation Costs:	$50,000 for leak survey, estimated cost of repairs: $50,000 (actual repair costs would depend on survey results), (does not include existing staff time)

Source(s): City of Northglenn, Utility Technical Services, Inc.

Dissemination of information regarding water use efficiency measures, including by public education, customer water audits and water-saving demonstrations	
Conservation Measure/Program:	**Water Wise School Pilot Program**
Target Sector:	Single Family/Multi-Family Residential
Description:	City proposes to pilot the program in 5 classrooms
	School program designed to teach 5th and 6th grade students to use water responsibly
	Includes materials, lesson plans, and home water audit
	As part of program students receive conservation kits including low flow showerhead, kitchen and bathroom aerators, flow rate test bags, rain gage, and toilet leak detection dye tablets.
	Partner with Adams Country School District
Assumptions:	Approximately 150 students will participate in the first year
	Pre- and post-program data will be evaluated to determine program effectiveness and if City wishes to extend to additional classrooms
	See "Free Conservation Kits" table for assumptions related to water savings resulting from kits.
	In first year, Northglenn will cover program costs (in future may ask Adams County School District to contribute)
Potential Annual Water Savings:	Project is educational in nature so actual savings are difficult to estimate.
	Savings from conservation kits provided to students: 366,600 gallons per year (2,444 gallons per kit for 150 kits)
Duration of Program:	Pilot Program: one time with possible continuation and expansion in future
Staffing Requirements:	Existing Staff: Water Conservation Specialist and Adams County Educators
City's Annual Implementation Costs:	$5,400 for pilot year (150 participants @ $36 each, does not included existing staff time)

Data Source(s): Water Wise School, 2006; Vickers, 2001

Appendix B

Public Notices

Water and Environmental Services
11701 Community Center Drive
P.O. Box 330061
Northglenn, CO 80233-8061
Phone 303-451-8326
FAX 303-450-8708

PUBLIC NOTICE

The City of Northglenn is accepting comments on its draft Water Conservation Plan. Copies of the Plan can be picked up at:

City Hall
11701 Community Center Drive

Northglenn Branch of the Rangeview Library District
10530 N. Huron St.

The Plan can also be downloaded from the City's website, www.northglenn.org

Instructions for submitting comments are included in the draft Plan. All comments are due by June 30, 2007.

If you have any questions, please contact Wayne East, Water Conservationist, at 303-450-8782, or by e-mail weast@northglenn.org

This public notice was posted at City Hall, the Northglenn Recreation Center, and at the Northglenn Branch of the Rangeview Library District.

NORTHGLENN-THORNTON SENTINEL
PROOF OF PUBLICATION

State of Colorado }
County of Adams }SS.

I, Mikkel Kelly, do solemnly swear that I am the Publisher of the **NORTHGLENN-THORNTON SENTINEL**; that the same is a weekly newspaper published in the County of Adams, State of Colorado, and has a general circulation therein; that said newspaper has been published continuously and uninterruptedly in said County of Adams for a period of more than fifty-two consecutive weeks prior to the first publication of the annexed legal notice or advertisement; that said newspaper has been admitted to the United States mails as second-class matter under the provisions of the Act of March 30, 1923, entitled "Legal Notices and Advertisements," or any amendments thereof, and that said newspaper is a weekly newspaper duly qualified for publishing legal notices and advertisements within the meaning of the laws of the State of Colorado.

That the annexed legal notice or advertisement was published in the regular and entire issue of every number of said weekly newspaper for the period of 1 consecutive insertions; and that the first publication of said notice was in the issue of said newspaper dated May 10, A.D. 2007 and that the last publication of said notice was in the issue of said newspaper dated May 10, A.D. 2007.

In witness whereof I have hereunto set my hand this 10th day of May, A.D. 2007.

Mikkel Kelly

Subscribed and sworn to before me, a notary public in the County of Adams, State of Colorado, this 10th day of May, A.D. 2007.

Barbara Kay Stolte
Notary Public

My Commission expires October 12, 2008.

8710 Grant Street • Thornton, CO 80229

BARBARA KAY STOLTE
NOTARY PUBLIC
STATE OF COLORADO
My Commission Expires 10/12/2008

Corporate Legals | Corporate Legals

Water and Environmental Services
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Published in the Northglenn-Thornton Sentinel
May 10, 2007
60526525

City Offers Homeowners FREE Irrigation Inspections

Have you wondered how to reduce your water consumption while maintaining an attractive landscape? Have you wanted to fix your old sprinkler system's problem but didn't know where to start?

The City of Northglenn is partnering with the Center for Resource Conservation (CRC) this summer to bring our customers the "Slow the Flow Colorado" program. This is a FREE irrigation inspection program available to Northglenn residents who have automatic sprinkler systems watering turf. A trained irrigation specialist will evaluate your system for irrigation efficiency, identify and list repair items, formulate a site-specific watering schedule, and give you valuable information on how to irrigate more efficiently for your specific landscape.

You must be a City of Northglenn water customer, have an automatic sprinkler system, and be present at the time of the audit.

The CRC is an environmental non-profit organization that provides assistance to residents, businesses, professionals, and policy makers about resource conservation issues. They have been conducting irrigation inspections for the last 3 years for other cities along the Front Range with excellent results. For a FREE irrigation audit, contact the CRC at 303-441-3278 ext. 17 to put your name on the wait list or go to www.conservationcenter.org to schedule your appointment online. Space is limited and available on a first-come, first-served basis, so call soon.

Water Conservation Corner

The City has developed a draft of the Water Conservation Plan and we are looking for your input. You can download an electronic copy of the draft plan from the City's website, www.northglenn.org.
The City will also host a public input meeting at the Northglenn Senior Center, located at 11801 Community Center Dr. on Thursday, May 17, from 7:00 – 8:30 pm. For more information, call 303-450-8782

The City and NNDC have partnered to bring you the following water conservation workshops:

Xeriscape/Waterwise Gardening:
Tuesday, May 22 (tentatively)
from 7:00 p.m. - 8:30 p.m.
Northglenn Recreation Center
(11801 Community Center Dr.)
Learn about planning and implementing low water use gardens.

Irrigation Efficiency:
Tuesday, June 19 (tentatively)
from 7:00 p.m. - 8:30 p.m.
Northglenn Recreation Center
(11801 Community Center Dr.)
Learn how to save money and conserve water by making your home irrigation system more efficient.

Space is limited. Please reserve your spot by calling Kim at NNDC at 303-252-3694.

Building Permits

For your health, and safety, building permits are needed for the following:

Outside:
Any deck
Patio covers, awnings & carports
Patio enclosures
Water/sewer line replacement or repair
Fences
Garages – detached & attached
Gazebos
Retaining walls over 3' from grade
Lawn sprinklers
Pools, hot tubs (electric)
Public sidewalk or curb and gutter replacement
Re-roof
Room additions
Screened porches
Shed - any size
Siding & stucco
Solar panels

Inside:
Basement finishes
Boiler installation or replacement
Gas logs & gas lines
Electric to gas conversions
Electrical modifications
Fireplaces (wood, pellet, or gas)
Furnace installation or replacement
Installation of additional windows or doors
Increase or decrease of window or door size

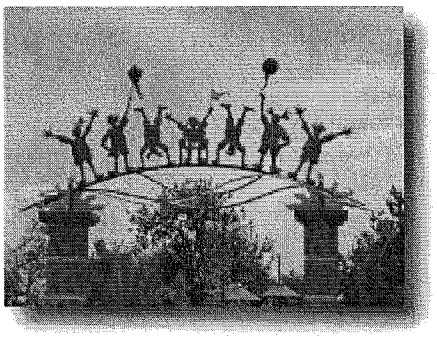
NNDC Unveils Its First

City of Northglenn
center of the future

Business Government Residents Visitors

You are Here : Home > Residents >

Tuesday, May 01, 20(



From tots to teens, the enormous Sensory Playground offers a wide variety of unique activities for all ages, stages and abilities. Creative designs and innovative planning bring an interesting, one of a kind facility that everyone can enjoy. Take a stroll on the Wavy Walk. Become an instant movie star on stage or watch as your loved ones put on a show for you. There are areas of the park specifically designed for every age group, ensuring fun for all. Visit soon!

conservation

The City of Northglenn invites you to review and comment on the c Conservation Plan. Comments are due by June 30, 2007 and can be mailed to:

Wayne East
Water Conservationist
City of Northglenn
11701 Community Center Drive
Northglenn, CO 80233
weast@northglenn.org

Click here to download a draft copy of the Plan.

- 2007 Water Conservation FAQ
- Indoor Water Conservation
- Outdoor Water Conservation
- Toilet and Washer Rebates
- Waste of Water Ordinance
- Water Variance Permit Application

Appendix C

City Council Resolution Adopting 2007 Water Conservation Plan