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STEP 1 – EXISTING WATER SYSTEM PROFILE

INTRODUCTION

The City of Fort Morgan adopted its first Water Conservation Plan in June, 1996. The plan is now being updated pursuant to the requirements of the "Water Conservation Act of 2004", §37-60-126, Colorado Revised Statutes. The updated plan reflects the change from well water use for potable water to Northern Colorado Water Conservancy District Colorado Big Thompson (C-BT) water, meter installation on all service connections, water conservation ordinances implemented and other practices now performed by the City since the adoption of the original plan.

This plan is meant to be flexible and to allow for changes as deemed necessary. This plan allows for the implementation of new measures and regulations, as well as for modifications to existing conditions that affect the use of water. In accordance with Colorado law, if any major changes are to be made to this plan, the City of Fort Morgan shall provide public notice of changes and allow for a public comment period.

The goal of the plan is to prevent and minimize water waste and to promote wise water use within the City of Fort Morgan.

1.1 Service Area and Demand

The geographical area served by the City's water system is approximately 4.0 square miles with an estimated population served of 13,000. The City has one Water Treatment Plant with approximately 50 miles of water mains in the potable water distribution system. The irrigation system for the parks, schools, cemetery and golf course is separate from the potable water system and that water supply is obtained from well water. The non-potable irrigation water supply from wells used in 2005 was 684.8 acre feet with 9 wells as source points. The potable water supply is surface water obtained from the Colorado Big Thompson system with 3,608.94 acre feet used in 2005 and 4,021.07 acre feet used in 2006. The City's total supply capacity of Colorado Big Thompson surface water in a year is 5,526 acre feet. Average daily demand is 11.18 acre feet, maximum day demand is 22.30 acre feet and maximum hour demand is 302,749 gallons per hour.

All City service connections are metered. The main conservation goal of the original 1996 Water Conservation Plan was to meter all service connections. This was a major project for the City which spanned 5 years and was completed in 2000 as the City switched from well water to C-BT water as its source for potable water.

Key water users in the City are the large industrial users – Cargill Meat Solutions, Western Sugar and Dairy Farmers of America. Another large industrial user, Leprino Foods, recently became a water user in November, 2006.

Water sales are not tracked by customer type as all sales are charged the same per 1,000 gallons used, with the exception of the largest industrial user, Cargill Meat Solutions. Service connections by type for the 2006 year are listed as follows:

Table 1a – Existing Customer Connections

Customer Group	Service Connections
Residential single family	3625
Residential multi-family	50
Hotels/Motels	8
Commercial – Restaurants	36
Commercial – Offices	70
Commercial – Retail	237
Commercial – Other	62
Church/Schools	32
Industrial – Cargill	2
Industrial – Leprino	1
Total Connections	**4123**

1.1.a Treatment and Distribution Facilities

Raw C-BT water is received via the Southern Water Supply Pipeline built by the Northern Colorado Water Conservancy District. The raw water is piped from Carter Lake to the City of Fort Morgan. The raw C-BT water is treated at the City of Fort Morgan's Water Treatment Plant located near Wiggins, Colorado. The plant currently treats an average of 3,550,000 million gallons per day (MGD) with a peak capacity of 6,654,000 MGD. There are two 3.5 MG storage tanks near the Water Treatment site. The treated water is piped 11 miles via gravity flow through a 30 inch transmission line to the City with a single pressure reducing valve station located on the main coming into the City. There are approximately 50 miles of water mains distributing water throughout the City. Many of the distribution lines throughout the system are aging, with some as much as 100 years old and have been showing breakage problems. They are being replaced as problems arise.

The wastewater is treated at the City of Fort Morgan's Wastewater Treatment Plant and is released to the South Platte River. The wastewater plant has peak capacity to treat 2.25 MGD. The plant currently treats 1.0 MGD per day. C-BT return flows are claimed and reserved for subsequent use within the Northern Colorado Water Conservancy District boundaries. Therefore, since C-BT water is a "one-use" class of water, recycling the treated wastewater for reuse is not an option for the City.

1.2 Water Sources

There are no imminent or pressing water supply or delivery issues in the City which require immediate conservation action. However, it is recognized that water conservation prolongs the adequacy of existing water resources and delays capital construction of new treatment plants, reservoirs and facilities.

The City of Fort Morgan's potable water system was converted from groundwater wells to surface water supply (Colorado-Big Thompson water) in December, 1999 due to groundwater quality compliance issues with nitrate levels, radioneuclides and extremely high water hardness. The Colorado Big Thompson project diverts and stores clean, high quality runoff from the headwaters of the Colorado River west of the Continental Divide and is managed by the Northern Colorado Water Conservancy District. C-BT water is piped from Carter Lake via the Southern Water Supply Pipeline to the City's Water Treatment Plant located west of Fort Morgan near Wiggins, Colorado. The City owns 5,137 shares of C-BT water and leases 2,712 shares of C-BT water from Riverside Irrigation District and Quality Water District. The yearly amount of water available is determined by a quota set by the Northern Colorado Water Conservancy District. One share of C-BT water equals approximately 1 acre foot of water (325,829 gallons) and provides enough water to supply two homes for one year. The lease of additional C-BT water shares insures additional water supply in case of drought and when the quota is set at a lower amount. In years of sufficient water supply, the C-BT water shares not utilized are leased to other entities. The City's current water demand is 4,000 acre feet of water per year.

Irrigation water for the City's parks, golf course, cemetery and schools is obtained from 9 non-potable wells located within the City. The well usage is augmented under Case No. 92CW081, District Court, Water Division No. 1, State of Colorado through water shares/stock owned in various companies.

1.3 System Limitations

In the past, the City operated fourteen shallow groundwater wells within the City limits which were used as the source for the potable water supply. However, beginning in 1950, the groundwater quality gradually deteriorated to the point where the City had to find another source of water. The City searched for and found an alternative water source in Colorado Big Thompson water. The infrastructure and facilities to receive and treat the C-BT water were constructed in 1999.

The City could have experienced a water shortage in the 2002/2003 drought when the C-BT quota was set at 50%. However, due to water restrictions and tiered water rates implemented by ordinance and resolution, consumption fell and water supplies were sufficient to meet demand. Under normal weather conditions, the City is not in danger of a water shortage. The City's water supply system is not in a designated critical water supply area. The system does not have substantial unaccounted for or lost water. The system is not currently experiencing a high rate of population and/or demand growth. Increases to the wastewater system capacity are not anticipated in the next couple of years.

1.4 Water Costs and Pricing

All potable water supplied by the City of Fort Morgan is metered. City utility bills show the total number of gallons of water used during the billing period. Water rates effective January 1, 2011 – Residential and Commercial are presented in the following table.

Table 1b – Residential and Commercial Water Rates – 2011 Rates

In City Rate	Consumer Charge $/month	Commodity Charge $/1,000 gallons
¾" water meter	$ 35.83	$2.65
1" water meter	$ 61.88	$2.65
1.5" water meter	$134.51	$2.65
2" water meter	$229.87	$2.65
3" water meter	$511.56	$2.65
4" water meter	$884.21	$2.65
6" water meter	$1,993.32	$2.65
Industrial – Excel		$2.65
Well Water – Excel		$1.10
Irrigation (parks, cemetery, schools)		$1.10
Outside City Limits		
¾" water meter	$71.66	$5.29
1" water meter	$123.77	$5.29
1.5" water meter	$269.02	$5.29
Industrial – Western Sugar		$5.29

1.5 Current Policies and Planning Initiatives

The City has adopted ordinances which were designed to assist in conserving water. Municipal Code, Chapter 26, Article I, Sec. 26-9 Waste or Leakage states:

> It shall be unlawful for any person to commit or permit waste, leakage or unnecessary profusion in the use of water, and whosoever shall be convicted thereof shall be subject to the penalties prescribed in Section 26-24. In addition, the Superintendent of Public Works or his or her designee shall, in accordance with Section 26-12, have the authority to discontinue service in the event of a violation hereof.

Municipal Code, Chapter 26, Article II, Section 26-21 Restrictions on Outside Use of Water states: By resolution or resolutions passed from time to time, Council may declare a response to existing conditions concerning future water supplies and implement staged responses to restrictions on use of water. The ordinance is listed as follows:

ORDINANCE NO. 981

AN ORDINANCE AMENDING ORDINANCE NO. 956 ADOPTING WATER CONSERVATION MEASURES AND RESTRICTIONS, WITH PROVISIONS FOR STAGED RESPONSES AND FOR FINES FOR VIOLATIONS, IN THE CITY OF FORT MORGAN, COLORADO.

Whereas, due to drought conditions throughout the State of Colorado, the water supply quota to the City may be reduced from time to time by the Northern Colorado Water Conservancy District which may result in limitations on the availability of CBT water to the City; and,

Whereas, greater or lesser water conservation measures may be required from time to time in the future in order to conserve available supplies; and,

Whereas, the City's water supplies serve as an essential resource for the health and safety of the citizens, local fire protection, residential and commercial landscaping support, and are a critical link in economic development for the community; and,

Whereas, specific water conservation measures and strategies, including Staged Responses to differing conditions, should be adopted at this time to ensure an adequate municipal water supply in the future.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF FORT MORGAN, COLORADO, THAT:

1. Sec. 26-21 of the *Fort Morgan Municipal Code* (1994) is hereby amended to read in its entirety as follows:

Sec. 26-21. Restrictions on Outside Use of Water.

(a) It shall be unlawful and an offense for any person to allow municipally supplied

water for outside sprinkling or irrigation or other outside usages to be run or used at hours and days other than permitted by the provisions of this Chapter as then in effect as provided by Resolution of the Council.

(b) Any person who violates the restrictions imposed by this Section shall be punished by a fine of not less than fifty ($50.00) dollars, but not more than one-thousand ($1,000.00) dollars for each offense. Fines shall be progressive for repeat offenders with a prior conviction or convictions after September 1, 2002.

(c) By Resolution or Resolutions passed from time to time, the Council may declare a Response to the then existing conditions concerning future water supplies and implement one of the following Staged Responses.

Stage 0. No restrictions on outside watering, whether by hose or some other form of automated sprinkler system.

Stage 1. Outside watering, whether by hose or some form of automated sprinkler system, is limited to **three (3) days per week** in accordance with the following schedule:

All premises, residential, commercial and public buildings, bearing even-numbered street addresses shall water only on Tuesday, Thursday and Saturday;

All premises, residential, commercial and public buildings, bearing odd-numbered street addresses shall water only on Wednesday, Friday and Sunday;

No outdoor watering shall be allowed on Monday;

Properties without specific addresses may water only on Wednesday, Friday and Sunday.

From June 1 to August 31 of the calendar year, customers may water only before 9 a.m. and after 6 p.m. in accordance with the foregoing schedule; before June 1 and after August 31, customers may water at any time during their designated watering days.

Stage 2. Outside watering, whether by hose or some form of automated sprinkler system, shall be limited to **three (3) days per week** in accordance with the following schedule:

All premises, residential, commercial and public buildings, bearing even-numbered street addresses shall water only on Tuesday, Thursday and Saturday;

All premises, residential, commercial and public buildings, bearing odd-numbered street addresses shall water only on Wednesday, Friday and Sunday;

No outdoor watering shall be allowed on Monday;

Properties without specific addresses may water only on Wednesday, Friday and Sunday.

Total watering time for each address shall be limited to **three (3) hours** each watering day and must occur before 9 a.m. or after 6 p.m. (from June 1 to August 31) on the designated watering days. Drip irrigation systems, bubblers or soaker hoses may be used for up to two (2) additional hours for each address on the same day and hours designated for hand or sprinkler outdoor watering.

Stage 3. Outside watering, whether by hose or some form of automated sprinkler system, shall be limited to **three (3) days per week** in accordance with the following schedule:

All premises, residential, commercial and public buildings, bearing even-numbered street addresses shall water only on Tuesday, Thursday and Saturday;

All premises, residential, commercial and public buildings, bearing odd-numbered street addresses shall water only on Wednesday, Friday and Sunday;

No outdoor watering shall be allowed on Monday;

Properties without specific addresses may water only on Wednesday, Friday and Sunday.

Total watering time for each address shall be limited to **two (2) hours** each watering day and must occur before 9 a.m. or after 6 p.m. (from June 1 to August 31) on the designated watering days. Drip irrigation systems, bubblers or soaker hoses may be used for up to one (1) additional hour for each address on the same day and hours designated for hand or sprinkler outdoor watering.

Other restrictions: Personal vehicles may be washed only on the watering day designated for the address of the registered owner. Vehicle fleets and vehicles in auto dealerships may not be washed more than once each week. The washing of sidewalks, driveways, patios or similar hardscapes with water is prohibited, unless required by public health regulations. Restaurants may only serve water upon request. Failure to shut off or repair a leaking irrigation system within one (1) hour shall result in a violation.

Stage 4. No outside watering of lawns or turf. No outdoor fountains or residential pools may be filled. Trees, shrubs, perennials and vegetable gardens may be watered by hand or through a drip irrigation system only three (3) days per week in accordance with the Stage 3 Schedule and time restrictions. Hand watering means holding a hose in hand or doing watering with a watering can; it does not allow any form of sprinkling. Other restrictions shall be the same as Stage 3

Stage 5. No outside use of water for any purpose.

(d) A non-renewable special exemption permit to use municipally supplied water to sprinkle newly seeded or newly sodded grass lawns each day before 9:00 a.m. or after 6:00 p.m. for twenty (20) consecutive days may be issued by the Superintendent of Public Works or his or her designee. For such permit a fee in the amount of $25.00 shall be charged to reimburse the City for its expenses in issuing such permit.

(e) Publicly or privately owned buildings and grounds, swimming pools, parks, golf courses and cemeteries or other large sites shall be exempt from the watering restrictions imposed under Stages 1, 2, 3 and 4 of subparagraph (c) hereof, irregardless of the source of water supplied by the City, provided that appropriate watering restrictions are adopted for such properties by the owners thereof. Such restrictions may be more or less restrictive than those in effect under subparagraph (c) hereof and shall be approved by the Superintendent of Public Works.

(f) Warnings to persons found to be in violation of this Sec. 26-21 may be issued by a law enforcement officer, a code enforcement officer or other persons employed by the City. At least one warning shall be issued to a specific property address before a Summons is issued. A Summons or a Summons and Complaint shall only be issued by a law enforcement officer or a code enforcement officer of the Fort Morgan Police Department.

(g) If there are continuing violations of any of the provisions of this Sec. 26-21, in addition to the fines provided for in such cases, the Superintendent of Public Works may order that a flow restrictor be installed on the water supply line to the property or that water service to the property be discontinued as provided in Sec. 26-12. Once service is restricted or discontinued, it shall not be fully restored except by order of the Superintendent of Public Works, after payment of the actual expenses or costs for such restriction or discontinuance and resumption of service, and upon compliance with such terms and conditions as shall be necessary to assure that there will be no further cause for complaint against the offending consumer.

This ordinance can be enacted by resolution of City Council if a water shortage occurs and it is needed. Past water usage data proves the ordinance was very effective in promoting water conservation when water supplies were in a shortage.

Also by ordinance the City of Fort Morgan adopted the 2003 International Plumbing Code which contains specific requirements for water conserving fixtures. All new construction is required to comply with the use of water saving fixtures. The City's building inspector checks for compliance with the code. Table 604.4 in the International Plumbing Code lists water conserving standards for lavatories, showers, faucets, urinals and water closets as follows:

Table 1c – Plumbing Code Standard Water Usages

Plumbing Fixture	Maximum Flow Rate or Quantity
Lavatory, private	2.2 gpm. at 60 psi
Lavatory, public (metering)	0.25 gallon per metering cycle
Lavatory, public other than metering	0.5 gpm at 60 psi
Shower head	2.5 gpm at 80 psi
Sink faucet	2.2 gpm at 60 psi
Urinal	1.0 gallons per flushing cycle
Water closet	1.6 gallons per flushing cycle

Landscaping Guidelines were adopted by resolution by the City in 1998 as follows:

The following general guidelines shall apply to all landscape improvements:

Landscapes should utilize the following xeriscape design principals to facilitate water conservation and reduce the potential of wasting water: 1) well planned planting schemes 2)appropriate plant selection to minimize the use of irrigated turf; 3) use mulch to maintain soil moisture and reduce evaporation; 4) zone plant materials according to their micro climatic needs and water requirements; 5) improve the soil with organic matter (3 to 6 cu yd/1000 sq ft, tilled into the top 6" of soil); 6) provide for efficient irrigation; and 7) proper maintenance and irrigation schedules.

All landscapes should strive to maximize the use of native or adaptable xeric species. Where native material is not appropriate for the intended use or appearance, plant species that are regionally adapted and non-invasive may be used. Landscapes should consist of a variety of species to enhance biodiversity. A partial list of appropriate plant materials is attached for use as a guideline.

In early 2003, a Water Planning and Advisory Board was established to advise City Council on long-term water planning issues. That board was instructive in assisting Council to complete a Water Development Policy to assure that the City would have adequate water rights and resources to serve lands and properties developed as part of the City of Fort Morgan. The Water Development Policy provided for a transfer of water rights from Northern Colorado Water Conservancy District's Colorado Big Thompson Project prior to the issuance of a building permit. The policy also provides for property that was annexed to the City prior to November 1, 2000, to be eligible for a reduced water plant investment fee if a Landscape Plan consisting of no more than 15% of the total lot area be planted to grasses requiring outside irrigation and a Building Plan providing for the use of high efficiency toilets and showerheads and any other available water saving devices. No high water use devices are allowed, including but not limited to a swimming pool, lap pool or hot tub. Under this policy, property is also eligible for a reduced plant investment fee if a dual water system or line to provide outside irrigation using groundwater from City wells is installed and utilized for outside irrigation.

Due to Northern Colorado Water Conservancy District (NCWCD) establishing a quota of available C-BT water of under 50% in 2003, the City implemented a Resolution concerning tiered water rates for residential customers during drought conditions. The tiered water rates were as follows:

Table 1d – Tiered Water Rates at 2011 Rates

Inside City Limits	
0 to 9,999 gallons	$2.65 / 1,000 gallons
10,000 to 18,000 gallons	$3.58 / 1,000 gallons
All usage in excess of 18,000 gallons	$5.30 / 1,000 gallons
Outside City Limits	
0 to 9,999 gallons	$5.29 / 1,000 gallons
10,000 to 18,000 gallons	$7.14 / 1,000 gallons
All usage in excess of 18,000 gallons	$10.58 / 1,000 gallons

The tiered water rate Resolution was rescinded when NCWCD established a quota of over 50%.

During 2003, in conjunction with the water conservation ordinance and tiered water rates, water production was decreased by 958.79 acre feet (312.4 MG) from the previous year.

1.6 Current Water Conservation Activities

Leak Detection and Repair/Unaccounted for Water – Areas of the City's water distribution system are 100 years old and water main breaks in the older part of the system have historically been a problem. However, the water distribution system is monitored annually for evidence of leaks through leak detection surveys and water audits to determine losses. Leaks are promptly

repaired. The City is replacing older water mains and service lines as leaks arise and on a scheduled basis as budgets allow. The annual total amount of water entering the Water Treatment Plant is measured and compared with the total delivered to customers. The difference between these two measurements is considered unaccounted for water. Unaccounted for water includes water system flushing, fire fighting, sewer flushing, street sweeping and treatment plant filter backwash. Historical data for the 2005 year indicates an amount of four (4)% of unaccounted for water and for the 2006 year a six (6)% amount of unaccounted for water.

Water meters are physically audited annually for accuracy and monthly zero read meter reports are prepared and those meters are checked for problems. Fire Hydrants, valve exercising and water mains are systematically checked for leakage. Repair work is initiated when leaks are discovered.

With the installation of electronic remote transmitters (ERTs) over a four year period, automated meter reading has regulated the City's cash flow by replacing estimated reads with consistent, accurate usage data. Real time consumption billed monthly enables the customer to monitor their water usage and enables them to voluntarily reduce their consumption without the City implementing mandatory restrictions for water conservation.

Distribution System Efficiency – Water leaks in the distribution system are promptly repaired. Excessive pressure in the system has been reduced which decreased leakage, open flow through faucets, and stresses on pipes and joints which could result in leaks. The system is monitored for overall pressure. A pressure reducing valve vault was added to the system in late 2006 to maintain an even level of overall pressure in the system.

Public Education - The City provides water conservation information at the City Complex for utility customers to have access to when they come in to pay utility bills. This information is in English and Spanish due to the large percentage of Spanish speaking residents in the City. During National Drinking Water Week, water conservation items are handed out to utility billing customers in the office and a display is set up at the public library with booklets and other items available to the public. The City also provides tours during that week to the area 6th graders of the Water Treatment Plant and supports 6th grade classrooms with water conservation educational material. The City also celebrates Utility Week in October of each year with a free barbeque to the public and during that time provides water conservation materials to the public. The City maintains water conservation information on it's website with links to other sites regarding water conservation. Water conservation classes are given to local industry employees upon request. Water conservation kits consisting of low flow showerheads, water faucet aerator, toilet tank banks, and leak detection tablets have been offered to and purchased

by citizens at a reduced rate through the Utility Billing office and given to citizens during the Utility Week Barbeque open house and during Drinking Water Week.

Xeriscape Demonstration Gardens in City Parks – The City's parks department has three different types of water conservation demonstration gardens in Riverside Park which are labeled for public viewing. One is a specific native plant garden that is never watered. Another is a xeriscape garden that is watered once a month. The third is a drip irrigation demonstration garden.

Landscape Efficiency of City Property - the City has been proactive regarding landscape efficiency and irrigation of its parks. Two thirds of the parks have water efficient landscaping and irrigation systems. The parks irrigation systems are audited on a regular basis for efficiency and watering is based on the evapotranspiration (ET) rate, standard quality turfgrass, which is the most efficient watering system. Mowing in the parks is set at 3.5 inches to allow the grass to have more water storage capacity yet preserves the aesthetic quality of the parks. The parks also fertilize with low water use fertilizer. By the end of 2007, the parks will move to a central irrigation control system which will be based on ET and weather conditions which will further enhance the irrigation efficiency of the parks. The City also follows water conservation practices at the City cemetery. Mowing is set at 4 inches. Grass mowed is mulched and left on the lawns, drought tolerant grasses are planted in bare spots, slow release fertilizers are utilized, chemical is added to the water for absorption, watering is done at night and minimally in areas of low traffic, and irrigation systems are audited on a regular basis. The City golf course also practices water conservation measures by watering according to the ET rate, maintaining irrigation equipment for maximum efficiency and minimal water waste, and maintaining soil and turf health that maximizes water absorption and minimizes water loss to evaporation and runoff. The parks, cemetery and golf course all utilize non-potable well water for irrigation purposes.

The City's largest industrial user, Cargill Meat Solutions, practices water conservation throughout the plant. The company promotes water conservation awareness for all employees from the general manager to the janitors. Water is recycled in different areas such as for the washing of hides and washing of cattle pens. Water use is monitored daily through meters and watched for leaks or unusual activity.

Another large industrial user, Dairy Farmers of America, practices conservation by recycling water obtained from the extraction of cow milk for cleaning purposes.

Water Saved Through Previous Water Conservation Plan – Since the adoption of the original Water Conservation Plan in June, 1996, water meters were installed for all City water customers over a five year period beginning in 1995 and ending in 2000. Billing went from a flat rate to

metered use. Current City utility bills show the total number of gallons of water used during the billing period and the amount of the bill. Customers receive their water bills monthly and all meters are audited yearly for accuracy. The installation of water meters reduced flow to the Wastewater Treatment Plant as follows:

Table 1e – Wastewater Treatment Plant Flow

Year	Average Million Gallons Day
1997	1.389
1998	1.331
1999	1.148
2000	1.018
2001	.909
2002	.924
2003	.925
2004	.925
2005	.923
2006	.923

From the year 1997 to 2006, flow to the plant was reduced 466,000 gallons per day or 170,090,000 gallons per year (522 acre feet).

STEP 2 – WATER USE AND FORECAST DEMAND

2.1 Characterize Current Water Use

Since meters were not installed until 1999, billing and water use data prior to that year is not available for individual users and customer type. However, diligent records have been kept and updated since they have been installed. The water use can be tracked by the date of the meter installation and the changes in population. The historical population changes are tracked in the table below.

Table 2a – City of Fort Morgan Population Change, 1990 through 2006

Year	Population	Rate of Growth
1990	9,068	N.A.
1991	9,384	3.5%
1992	9,568	2.0%
1993	9,649	0.8%
1994	9,855	2.1%
1995	10,016	1.6%
1996	10,150	1.3%
1997	10,273	1.2%
1998	10,180	-0.9%
1999	10,151	-0.3%
2000	11,034	8.7%
2001	10,970	-0.6%
2002	10,991	0.2%
2003	10,995	0.0%
2004	11,559	4.9%
2005	11,661	0.9%
2006	11,700	0.3%

The City's population grew 22% from 1990 through 2006, or at an average annual rate of 1.72%. Annual growth rates for population have fluctuated from a low of 1% population loss to a high of approximately 9% population gain in 2000. [1]

[1] Water Supplies and Demands for Participants in the Northern Integrated Supply Project, Harvey Economics, March 30, 2006, Appendix H, Pages H1-H2.

Historically, water usage predictions were established using population growth projections. For example, if the City were to double its population, it was thought reasonable to assume that water usage would also double. This approach does not take into account the mix of Commercial and Industrial customers, which are historically high water users.

Table 2b – Potable Water Use by Customer Type from 1995 to 2006

Year	Residential (MG)	Cargill (MG)	Commercial, Outside City & Irrig. (MG)	Total Potable (MG)	Annual % Change (MG)
1995	496	503	172	1,171	N.A.
1996	567	575	197	1,339	14.3%
1997	551	559	191	1,301	-2.8%
1998	513	520	178	1,211	-6.9%
1999	422	428	146	996	-17.8%
2000	616	573	205	1,394	40.0%
2001	581	502	186	1,270	-8.9%
2002	537	570	190	1,297	2.1%
2003	284	444	125	853	-34.2%
2004	429	372	279	1080	21.0%
2005	429	529	170	1128	4.3%
2006	475	568	193	1236	8.7%

These figures reflect potable water deliveries to the end user of the City's customers. Reliable historical data exist only at the influent meter measurements at the Water Treatment Plant, reduced by a 1% treatment plant loss and a 6% distribution system loss to arrive at the total potable delivers shown. An analysis of water use for a water rate study prepared in 2000 was used to determine proportions of potable water delivered to residential, commercial and irrigation customers and to Cargill Meat Solutions.

Residential users have historically accounted for about 42% of total potable water deliveries, the largest users next to Cargill Meat Solutions. Total potable water demands rose 19% from 1995 to 2000, the peak year, with a sharp decline in 2003 primarily due to drought restrictions and a shifting of some of Cargill Meat Solutions' demands to non-potable groundwater supplies. A sharp increase in water usage was also noted from 1999 to 2000 when the City switched its water supplies from groundwater to C-BT. Average annual growth in potable water demands from 1995 through 2006 was 0.485%, roughly a third of the population growth. [2]

[2] Water Supplies and Demands for Participants in the Northern Integrated Supply Project, Harvey Economics, March 30, 2006, Appendix H, Page H2.

Table 2c – Potable Gallons per Capita per Day, 1995 – 2006

Year	Residential Use per Capita (gpcd)	Total Water Use per Capita (gpcd)	Total Water Use per Capita, Less Cargill Meat Solutions (gpcd)
1995	136	320	183
1996	153	361	206
1997	147	347	198
1998	138	326	186
1999	114	269	153
2000	153	346	204
2001	145	317	192
2002	134	323	181
2003	71	213	102
2004	102	256	169
2005	101	265	141
2006	111	289	156

From 1995 through 2006, residential and total water use per capita per day (gpcd) averaged 125 and 303 gallons, respectively. Total water use per capita, less Cargill Meat Solutions' usage, averaged 173 gallons. Total water use per tap per day (gptd) was 821 gallons in 2006 and 444 gallons without Cargill Meat Solutions. No trends in per capita or per tap usage were apparent from 1995 through 2006. [3]

2.2 Non-potable Water Demands

Beginning in the year 2000, the City delivered only C-BT water to its customers, including residential, commercial and irrigation users. However in 2001, the City switched its outdoor irrigation for the parks, cemetery, schools and golf course back to non-potable groundwater. Irrigation demands served with non-potable groundwater have been metered since 2001 when the City also began to serve some of Cargill Meat Solutions' water demands with non-potable groundwater. The City continues to use non-potable groundwater to serve these needs. [4] Non-potable groundwater for irrigation is obtained from 9 wells located throughout the City. The City's wells irrigate the parks, schools, cemetery and the golf course in addition to Cargill Meat Solutions' usage.

[3] Water Supplies and Demands for Participants in the Northern Integrated Supply Project, Harvey Economics, March 30, 2006, Appendix H, Page H3.

[4] Water Supplies and Demands for Participants in the Northern Integrated Supply Project, Harvey Economics, March 30, 2006, Appendix H, Page H3.

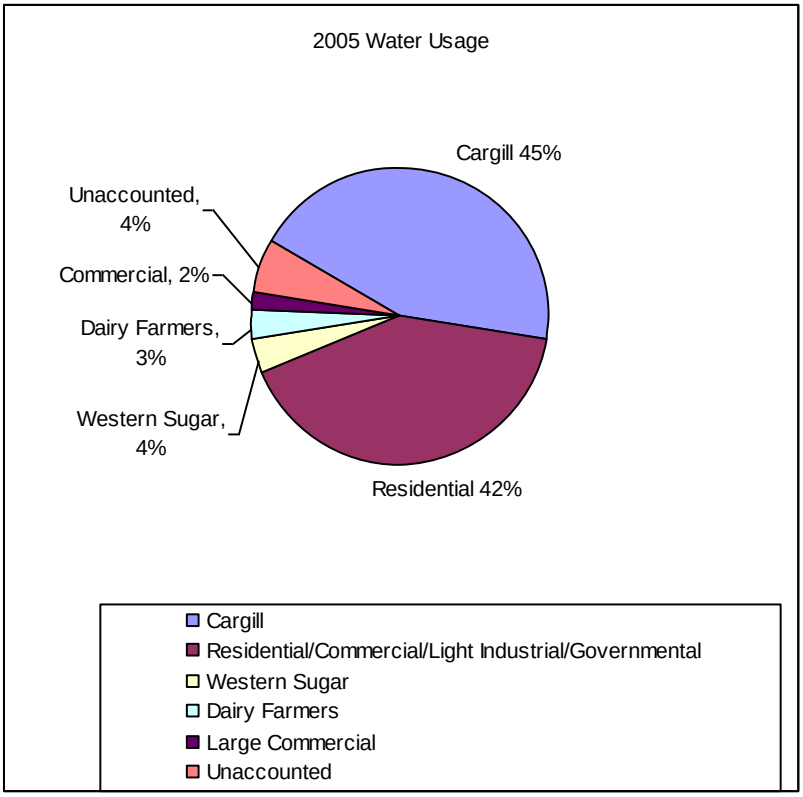
Table 2d – Non-potable Water Demands 2002-2006

Year	2002	2003	2004	2005	2006
Acre/Ft	522.82	959.61	983.81	710.44	636.67

Table 2e – Water Treatment Plant Production 2001 – 2006

Year	2001	2002	2003	2004	2005	2006
Annual MG	1,296,078,700	1,341,226,800	1,028,824,400	1,032,905,400	1,175,896,300	1,310,180,700
Acre/Ft	3,977.79	4,116.35	3,157.56	3,170.09	3,608.94	4,021.07
Daily Average	3,550,901	3,674,594	2,818,697	2,829,878	3,221,634	3,589,536

Figure 2a – 2005 Potable Water Use

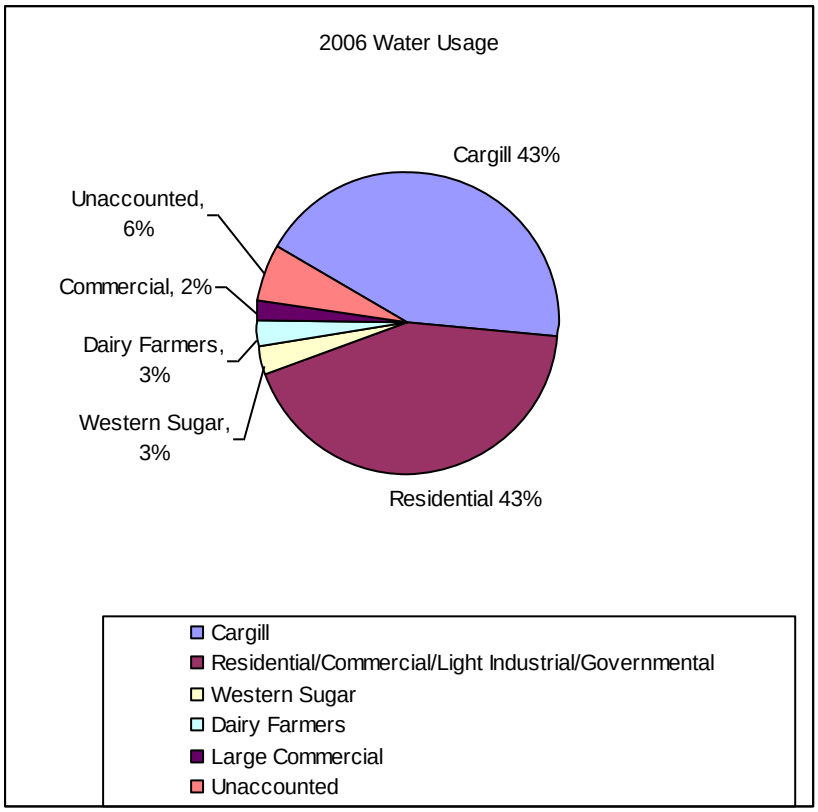


2005 actual water usage statistics based on water production and utility billing records are as follows:

- Cargill Meat Solutions – 45%
- Western Sugar – 4%
- Dairy Farmers of America – 3%
- Large Commercial – 2%

- Unaccounted – 4%
- The remaining 42% of all water used in 2005 was composed of residential, light commercial, light industrial, governmental and all other water users.

Figure 2a – 2006 Potable Water Use



2006 actual water usage statistics based on water production and utility billing records are as follows:

- Cargill Meat Solutions – 43%
- Western Sugar – 3%
- Dairy Farmers of America – 3%
- Large Commercial – 2%
- Unaccounted – 6%
- The remaining 43% of all water used in 2006 was composed of residential, light commercial, light industrial, governmental and all other water users.

2.3 Water Demand Forecast

The City of Fort Morgan's 2003 Comprehensive Plan predicts significant growth in the City over the next 20 years. The City analyzed historical growth patterns and referenced the Colorado Department of Local Affair's population projections from 2000 to 2025 to determine a 1.7% annual increase in population for the City of Fort Morgan. Applying this growth rate, the City projected a 2025 population of 16,817 in the Comprehensive Plan.

Harvey Economics prepared a Water Demands Report for the City of Fort Morgan as part of the Water Supplies and Demands for Participants in the Northern Integrated Supply Project Study completed March 30, 2006. Harvey Economics began its projections for population growth with updated US Census Bureau estimates for the City, which resulted in ultimate population projections that are slightly different from those forecasted in the 2003 Comprehensive Plan.

Table 2f – Population Projections for the City of Fort Morgan, 2005 to 2050.

Year	Population
2005	11,400
2010	12,400
2015	13,500
2020	14,600
2025	15,900
2030	17,300
2035	18,900
2040	20,500
2045	22,300
2050	24,300

Source: Harvey Economics, 2004, US Census Bureau, decennial censuses and annual estimates, 2004, City of Fort Morgan 2003 Comprehensive Plan.

Based on the assumed growth rate, the City of Fort Morgan will grow to 15,900 persons by 2025 and to 24,300 persons by 2050. To project for future water demands, Harvey Economics first projected potable demands from the residential and commercial sectors using these projected population figures. Harvey Economics assumed that these sectors would use 190 gallons, the average total water use per capita per day, which excludes Cargill Meat Solutions. Harvey Economics secondly assumed that Cargill Meat Solutions' potable and non-potable use would remain constant through 2050. Harvey Economics assumed that the 1996 level of Cargill Meat Solutions water use, or 575 MG, which is their highest use in recent history, for long term projections. Third, Harvey Economics assumed that the City would begin serving potable water to Leprino Foods in November, 2006. These forecasts translate into potable water demand projections of 406 acre-feet per year in 2005 rising to 504 acre-feet per year by 2010 when the City would be serving Leprino Foods water. Finally, Harvey Economics assumed that non-potable irrigation water use would increase with the growth in population at 1.7%.

Table 2g – Water Demand Projections for the City, 2005 to 2050, in Acre-Feet

Year	Residential and Other Commercial (af)	Cargill (af)	Leprino (af)	Total Potable (af)	Cargill Non-potable (af)	Irrigation Non-potable (af)	Total Water Deliveries (af)	Total Water Requirements (af)
2005	2400	1800	0	4200	300	550	5100	5400
2010	2600	1800	500	4900	300	600	5800	6200
2015	2900	1800	500	5200	300	650	6200	6600
2020	3100	1800	500	5400	300	710	6400	6900
2025	3400	1800	500	5700	300	770	6800	7300
2030	3700	1800	500	6000	300	840	7100	7700
2035	4000	1800	500	6300	300	910	7500	8100
2040	4400	1800	500	6700	300	990	8000	8600
2045	4800	1800	500	7100	300	1100	8500	9100
2050	5200	1800	500	7500	300	1200	9000	9600

Source: Harvey Economics, 2004.

An additional 7% was added to all potable demands to account for treatment and distribution system losses, and an additional 6% was added to all non-potable demands to account for those same distribution system losses. Total water requirements for the City are projected to increase 78% from 2005 through 2050, or 4,200 acre feet.[5]

A Treated Water System Master Plan for the City was completed in 2006 by McLaughlin Rincon, Ltd[4]. The City's 2003 Comprehensive Plan's future land use categories, which created a new urban growth boundary, were used in preparing the Treated Water System Master Plan. A service boundary of approximately 10,000 acres was established in the Comprehensive Plan. The acres within that service boundary were divided and assigned to a land use category. Water usage projections were then determined using the Comprehensive Plan development categories and the City's present customer base. Usage numbers and factors established for estimating future water demands were developed after an extensive study of current City customers. Future water demands were estimated for the City at planned build-out conditions. The unit average daily demands were assigned to each development category as follows:

[5] Water Supplies and Demands for Participants in the Northern Integrated Supply Project, Harvey Economics, March 30, 2006, Appendix H, Page H5.

Table 2h – Projected Potable Water Demands

Development Category	Average Unit Demand	Total Average Daily Demand/ gal/day
Single Family Residential	329 gal/EQR/day	2,865,238
Multi-Family Residential	219 gal/res/day	786,608
Commercial/Service/Retail	1200 gal/acre/day	964,026
Agricultural	329 gal/EQR/day	211,578
Parks/Open Space	959 gal/acre/day	473,746
Public/Institutional	500 gal/acre/day	187,764
Downtown Historic	603 gal/acre/day	33,271
Light Industrial	575 gal/acre/day	451,906
Manufacturing/Industrial	603 gal/acre/day	428,067
	TOTAL	**6,402,205 gal/day**

Source: 2006 Treated Water System Master Plan

Total projected potable water demand is estimated to be 6,400,000 gallons per day once the City grows to the capacity of the boundaries set forth in the 2003 Comprehensive Plan.[6] This projected demand based on future development plans is estimated to be 7,172.25 acre feet of water. The City's current supply of C-BT water is 5,137 acre feet. The maximum amount an entity can own of C-BT water units is 7,000 units.

The City has been a participant in the Northern Integrated Supply Project (NISP) which is managed by the Northern Colorado Water Conservancy District. The NISP Project is an 11 year project which begins in 2007 to increase quantity and reliability of future water supplies for the participants. The project goal is to provide up to 40,000 acre feet of new reliable municipal water supply annually. The City of Fort Morgan's yield request is 3,600 acre feet which composes 9% of the project. The cost to the City for the entire project is estimated to be $36,369,000.

[4] 2006 Treated Water System Master Plan, McLaughlin Rincon, Ltd.

STEP 3 – PROPOSED FACILITIES PROFILE

3.1 Potential Facility Needs

System requirements recommended by the Treated Water System Master Plan for future demand is to construct two additional 2.5 MG water storage tanks (for an alternative water feed other than the current 30 inch transmission main from the Water Treatment Plant), eliminate dead ends in the system in areas of high demand, maintain an ongoing replacement program of undersized/corroded/failing mains, and to install recommended size pipelines in new development. Improvements to the Water Treatment Plant would have to be considered in the future for increased raw water storage and treatment capacity to meet the needs of the predicted growth. The water master plan estimated the required peak day treatment capacity is 12.81 MGD. To provide a safety factor and to allow for optimum operation at less than design flow rates, the recommended total treatment capacity should be in the range of 14 to 15 MGD. The Plant's current rated capacity is 10 MGD. However, the City's capacity in the SWSP pipeline is only 6.1 MGD. The City requested a *Water Rate Study, (McLaughlin Rincon, 2006)* to address the impending financial burden of purchasing C-BT shares.

3.2 Cost Analysis for Anticipated Water Supply Facilities

In the Treated Water System Master Plan developed in 2006, the preliminary cost estimates for the potable water distribution system requirements recommended by the plan are as follows:

2.5 MG tank plus appurtenances and controls -	$1,750,000
5040 l.f. 24 inch main @ $120/ft -	$ 605,000
6040 l.f. 20 inch main @ $100/ft -	$ 604,000
5130 l.f. 30 inch main @ $150/ft -	$ 770,000
Interstate Crossing -	$ 100,000
South Platte River Crossing -	$ 100,000
Engineering -	$ 983,000
8,500 l.f. 12 inch main in Platte Avenue -	$1,063,000
2,500 l.f. 20 inch main in Main Street -	$ 320,000
2,500 l.f. 14 inch main in Main Street -	$ 270,000
TOTAL:	**$6,560,000**

This plan did not cover costs to increase future treatment capacity at the Water Treatment Plant or costs to increase future treatment capacity at the Wastewater Treatment Plant. The most immediate needs of the water distribution system as listed above were only addressed in the plan.

In the Water Treatment Plant's Five Year Capital Improvement Plan, personnel have estimated costs for projects anticipated to be constructed in the next five years as follows:

Purchase 100 acres for additional raw water storage -		$ 200,000
Construction of raw water storage area -		$5,500,000
Design and build of SWSP pumping station -		$1,850,000
NISP participation next 5 years -		$3,098,000
	TOTAL:	**$5,698,000**

The Wastewater Treatment Plant's Five Year Capital Improvement Plan, personnel have estimated costs for projects anticipated to be constructed in the next five years as follows:

Replace/upgrade UV system -		$60,000
Replace digestor aeration piping -		$40,000
Major repair/replacement of clarifier mechanisms		$80,000
Replace aeration piping systems on A-basins		$45,000
	TOTAL:	**$225,000**

The total projected costs for all anticipated water supply facilities are estimated to be **$12,483,000**.

3.3. Cost timeline of capital projects

The facilities improvements discussed in the Treated Water System Master Plan for the near future (within ten years) are items determined necessary to correct existing problems or to serve new development now in the planning stages. The NISP raw water supply project addresses the water demand needs of the City. The timeline will depend upon the City's ability to finance the projects. Raw water supply has taken priority to non-emergency facility improvements.

The City of Fort Morgan will be purchasing NISP shares equivalent to 3,600 AF of firm yield. This project will consist of two phases. The first phase will involve constructing the Glade Reservoir; the second being the South Platte Water Conservation Project. The present schedule estimates start of construction of the Glade Project in 2010, with construction completed in 2019. At year 2019, the South Platte component could start – but may also be deferred if demand due to growth does occur. Northern's most recent projections of Fort Morgan's investment requirement for Glade construction is shown below.

Table 3a – Glade Project Projections

Year	$ Required to Northern
2007	203,000
2008	567,000
2009	585,000
2010 - 2013	23,724,000
Total Fort Morgan Share	**$24,877,000**

Rate design/financial planning is needed to determine how to pay for the first three years' planning costs. A bond issue is required to finance the nearly 25 million dollar 2010 investment. The projected total cost to Fort Morgan for the South Platte second phase is $11,493,000. This investment would be made between 2014 and 2019, unless that portion is deferred.

3.4 Capital Replacements/Miscellaneous Improvements

Planned Capital Improvements/Replacements for the supply system during the next 5 years include:

Table 3b – Water System Improvement Estimates

Item	Approximate Cost
1. Purchase land for raw terminal reservoir	$200,000
2. Modify plant to better utilize storage	$50,000
3. C-BT units purchase program	$2,500,000
4. Security fence at tanks and plant	$100,000
5. Allowance for expansion of existing terminal reservoir	$1,000,000
6. Contingency Allowance	$250,000
Total – 5 year estimate	$4,100,000
Total – 5 year estimate (less C-BT purchased)	$1,600,000*
For design year - use	**$320,000/yr**

*Commentary. It is recommended that near-future C-BT unit purchases be limited to the amount sold – thus creating a "wash" fund with neither costs nor income included in the design budget. It is intended that the design rate income for the pro-forma year assume a low growth rate. This above budget for replacement/minor capital improvements is minimal and would probably need to be increased to accommodate a significant number of new customers. In effect then, the assumed growth rate and capital requirements are consistent – and should yield conservative results.

CAPITAL PROGRAM – WATER DISTRIBUTION

Fort Morgan has had prepared a *Treated Water System Master Plan* (McLaughlin-Rincon, Ltd. December, 2006). This Plan includes all potable water facilities downstream of the plant product transmission line, which feeds the system.

The Capital program budgets may depend significantly on actual development rate. Growth rates were projected from 0 to 1.7% per year (Harvey Economics, Nov. 30, 2006). However, it can be assumed that the City will individually evaluate extensions of service for new development to assure that a positive economic benefit will result. Therefore, the planned

capital improvement program to be funded only includes these items needed to assure reliable service for existing customers. From the Treated Water System Master Plan, these are:

1. Construction of one new 4.0 MG storage tank on the north side. This project must include a 24"/20" connection transmission line from the existing system across the South Platte to the tank.

   The estimated project cost is $4,920,000.

   The storage described is needed to provide reliability; at this time any problems with the 7 mile transmission line from the existing tanks would result in total outage for the entire community. An added advantage is that storage on the opposite side effectively doubles the practical capacity of the transmission line. Further, the project opens up the area north of the river for water sales. For these reasons, it is our opinion that this improvement should be included in the near-future capital program; however, the City has determined that this is too expensive at this time. This project will be deferred until developer commitments on the north side are made, or until adequate City funds are available. In the interim, reliability will be attained with availability of wells and an interconnect with Morgan Quality Water.

2. Replacement of lines identified in the Plan:

4100 l.f. 12" main in Platte Ave.	$500,000
Other misc. Replacements (5yr) identified by staff:	$120,000
2500 l.f. 14" main Main St.	$270,000
Est. Cost	$900,000

CAPITAL PROGRAM – SUMMARY

The design program year capital revenues are summarized following:

- Existing outstanding debt service (5yr average) $2,206,600

- Additional Debt Service $1,125,000

(approximately $25 million to finance the Glade Project)
This estimate assumes that the capital repayment portion can be deferred so as to mesh with the outstanding schedule.

- Water Supply/treatment improvements $320,000
- Water Lease Payments $448,550
- Planned Distribution Replacements $200,000

Total Year Desirable Capital Budget (Minimal growth scenario) Approximately: $4,300,000/yr**

*****Allow for New Debt in 2011 since larger than early payments – Early NISP not additional.

The average capital requirement for the next 5 years is $3,669,000. After 2014, the projected amount (without inflation and with low growth) is about $4,200,000. Since there is a realistic possibility of enough additional customers by 2015 to cover that amount, the setting of a pro forma design capital budget of $3,700,000 is reasonable.

STEP 4 – IDENTIFY CONSERVATION GOALS

Water conservation can benefit the citizens of Fort Morgan by preserving water resources, lowering long term water costs, reducing demand on the wastewater system, and extending the life of existing facilities. Ongoing water conservation programs are distinguished from drought related measures. Water conservation measures are those programs that are consistently applied every year to reduce water demands or to increase supplies. These measures are distinguished from drought restrictions that are special, more severe measures that are implemented temporarily to avoid a true water shortage.

The City has reduced water use by implementing relatively inexpensive water savings measures such as public education, low-flow fixture requirements, landscaping regulations for new construction, and leak audits. In the case of an individual family, this might mean turning off the water while brushing one's teeth, using a hose nozzle when washing the car and limiting outdoor watering. For that same family to achieve greater savings, it might be necessary for them to purchase more efficient appliances or re-landscape using native plants. These reductions would come at a significant cost to the family or to the City if it offered rebates. Thus, once waste is reduced, other savings are likely to involve structural changes that are more costly. Subsequent conservation measures produce incrementally less savings at greater cost.[7]

Challenges

In 2003 when water consumption dropped due to watering restrictions, revenue in the water enterprise fell sharply. The loss of revenue affected the ability of the enterprise to pay monies due on bonds etc. Revenue decreased that year $734,046 from the previous year – a 6.4% decrease. Revenue the year following was also down by .91% due to continued water conservation by customers.

The challenge to the City of Fort Morgan is to balance water conservation with the need to keep revenue at a point to pay bond debt, pay for capital improvements and to pay for operating and maintenance expenditures.

4.1 Areas to Be Managed Through Water Conservation

The highest water users in the City are the industrial users. 2005 figures indicate industrial usage accounted for 52% of all water produced in 2005 with industrial usage at 49% in 2006.

[7] Water Supplies and Demands for Participants in the Northern Integrated Supply Project, Harvey Economics, March 30, 2006, Page 24.

Each of the industrial users currently has in place water conservation/recycling management plans. Economics play a large role in the management of water use for the industrial users.

The remaining water users, commercial, residential, public or governmental accounts for 44-45% of all water produced. Since the industrial users already utilize best management practices of water conservation and recycling, this remaining group of users provides the greatest potential for long-term water savings achieved through conservation measures and efforts. Therefore the goals of this plan will mainly target these users.

4.2 Process Used to Develop Water Conservation Goals

City staff including the Director of Utilities, Water Treatment Plant Superintendent and Water Collection Superintendent, considered various potential conservation measures not already in place to determine the goals for the plan. Water savings were estimated and costs were developed for additional measures or programs. Benefits and costs were compared to determine which measures/programs produced cost effective savings.

STEP 5 – IDENTIFY CONSERVATION MEASURES AND PROGRAMS

5.1 Demand Side Conservation Measures

Water Efficient Fixtures and Appliances – The City adopted the 2003 International Plumbing Code which contains specific requirements for water conserving fixtures. All new construction is required to comply with the use of water saving toilets, urinals, showerheads and faucets.

The use of water saving appliances and plumbing fixtures reduces the rate of water consumption primarily for residential and commercial customers. As growth within the City continues and natural replacement of old plumbing fixtures occurs through repairs and remodeling, increased efficiency will be achieved through the use of modern fixtures.

Landscape Efficiency – The City's current Water Development Policy contains a provision for a Landscape Plan of no more than 15% of the total lot area be planted with grasses requiring outside irrigation. In 1998 the City adopted Landscaping Guidelines to facilitate water conservation and reduce the potential of wasting water. The City also provides brochures regarding efficient irrigation and management of landscape. The City practices landscape efficiency and irrigation management at its parks and practices water conservation management at the golf course and cemetery.

The City will begin providing irrigation audit services to residential customers to evaluate the efficiency of irrigation systems, practices and timing in conjunction with its mandatory backflow inspection program. These services will be offered to residents every three years on a rotational basis or upon request.

Industrial and Commercial Efficiency - The City can perform water audits for large volume users including commercial, institutional and industrial users. Audits of buildings and sites by qualified personnel would identify water savings that are highly cost effective for facility owners. Water audits of these users could include process, sanitary, domestic, heating, cooling, outdoor and other water uses. Candidates for increased efficiency include food service and dishwashing equipment and procedures, cooling tower water recycling and adjustment of blow-down cycles, car wash recycling, cleaning and sanitation equipment (e.g., steam sterilizers, autoclaves, floor washing etc.) recycling of process water, boiler and steam generator water recycling and optimization, and ice making equipment.

Water Reuse and Recycling Systems – Water reuse is not an option for the City as C-BT water as it is a one use only type of water. However, recycling systems can be considered. Water recycling refers to a direct application of water to an additional use after an initial use, with no or

minimal treatment. An example is the increasing practice in commercial laundries of using rinse water from one cycle as wash water for another cycle. The City can work with industrial and commercial customers to identify potential areas for recycling.

5.2 Supply Side Conservation Measures

Distribution System Efficiency – The City systematically checks for leakage in the distribution system. Repair work is initiated when leaks are discovered. A pressure reducing valve vault has recently been added to the water distribution system to maintain an even level of overall pressure in the system. Historical data indicates the City has a 4% water loss in 2005 and a 6% loss in 2006. The City does not have an issue with phreatophytes (plants that obtain water from the water source or conveyances) as the City's water supplies are all conveyed via pipelines.

5.3 Demand Side Conservation Programs

Education/Information Dissemination – The City distributes conservation information in news releases, newspaper ads, radio and in utility bills. Brochures and pamphlets are available to citizens in public offices and distributed during Drinking Water Week and Utilities Week. The City promotes water conservation programs in the middle school during Drinking Water Week and distributes water conservation kits to citizens at a reduced rate.

Customer Water Use Audits – The City performs water use audits for customers upon request. The City will be offering residential water conservation surveys in conjunction with its mandatory backflow inspection program which will focus on plumbing fixtures, lawn and garden water practices. Those surveys can be used to make immediate simple repairs and retrofits such as changing water faucet heads. All water surveys will include a written report to the customer that includes specific ideas for conservation if needed.

Rate Structures and Billing Systems Designed to Encourage Efficiency – All water users are metered and the amount of water used is shown on the utility bills. Utility bills reflect real time consumption and are sent out monthly. Real time consumption enables the customer to monitor their water usage so they can voluntarily conserve according to their bill.

Regulations/Ordinances - The City has regulations and ordinances in effect regarding water conservation as set forth previously in this document.

Incentives and Rebates - In 2007, the City budgeted $5,000 to provide citizens with a $50 rebate for water efficient toilets. This program is monitored by the Water Collection Department. The City has also budgeted for fixture giveaways such as showerheads and faucet heads, leak

detection tablets and replacement toilet flapper valves. The City will continue to budget for toilet rebates and fixture giveaways.

5.4 Supply Side Conservation Programs

Metering is a very fundamental tool of water system management and conservation. All City service connections are metered. Meters are tested on a regular basis for accuracy. The City keeps an accounting of water losses and has a loss prevention program consisting of pipe inspection, cleaning and other maintenance efforts to improve the distribution system and to prevent leaks and ruptures from occurring.

STEP 6 – CONSERVATION MEASURES AND PROGRAMS SELECTED

6.1 Estimated Costs and Water Saving Programs

1. The City will continue to promote water use best management practices within the City's parks, golf course, and cemetery departments as an example for the community. The City will continue to maintain xeriscape demonstration gardens as a model to citizens.

- No additional cost is expected with this practice.

2. The City is implementing a schedule of residential water audits to be performed on a regular basis.

- The estimated cost of implementing this program is 1/3 of 3489 residential connections = 1163 x $25 per ½ hour = $29,075 per year.

3. The City will promote water efficient processes and provide water conservation audits for the City's industrial and commercial water users.

- The estimated cost of implementing this program is 143 users (1/3 of 430 connections) x $50 per hour = $7150 per year.

4. The City will continue to provide adequate funding for existing operation and maintenance of the City's distribution system to keep the unaccounted lost water to a minimum of 6%.

- The estimated budgeted amount is $200,000 per year.

5. The City will continue to provide public education regarding water conservation in the schools, as informational inserts in utility bills, provide pamphlets in public areas, on the City's website and at events put on by the City.

- The estimated budgeted amount is $1000 per year.

6. The City will continue to budget for giveaways during Drinking Water Week and Utility Week such as low flow showerheads, faucets, leak detection tablets and replacement toilet flapper valves.

- The estimated budgeted amount is kits for 150 residents @ $100 each = $1500 each year.

7. The City is budgeting for and setting up a rebate program for residents for the replacement of old toilets with water efficient models.

- The estimated cost for the rebate program is $5000 per year @ $50 per toilet – with an expected 100 toilets. This will increase administration costs by $2000.

6.2 Comparison of Benefits and Costs

Benefits of implementing this Conservation Plan would include the deferral of capital expenditures and the operating costs associated with them and savings to the annual system operating costs. The Plan represents commitment and effort by the City to implement the proposed water efficiency programs. In addition to the programs included in the recommendations, the City will need to monitor and evaluate its overall water conservation effort in relation to its water supply and water and wastewater facility capacity needs.

6.3 Evaluation Criteria of Water Saving Programs

When completing the Treated Water System Master Plan, future water needs were calculated assuming the installation and practice of water saving features with all new construction. Gradually the existing residents will replace their fixtures with water efficient models and will reduce the amount of usage. However, the indoor usage is not the driving factor for water conservation. Summer irrigation and outdoor washing are the practices that double the summer water usage from that seen in the winter.

The City of Fort Morgan would not benefit from water reuse since their water rights portfolio does not allow for it. Therefore, internal system changes and improvements were considered the most beneficial use of implementation dollars. A summary of the dollars spent is shown in the table below.

Table 6a – Summary of Implementation Costs

Conservation Measure	Cost of Program
Park Irrigation BMPs	No additional dollars
Residential Water Audits	$29,075 per year
Commercial/Industrial Audits	$7,150 per year
Water System Maintenance	$200,000 per year
Public Education	$1,000 per year
Customer Giveaways	$1,500 per year
Toilet Rebate Program	$7,000 per year
Total Expected Yearly Costs	**$246,000**

The items listed above are representative of the costs incurred by the City to promote water conservation among its customers. The daily average water usage was seen to drop approximately 10% when outdoor watering restrictions were placed. Having watering restrictions and water use surcharges permanently in place is being considered by the City.

STEP 7 – INTEGRATE RESOURCES AND MODIFY FORECASTS

7.1 Revised Demand Forecasts

The water conservation practices proposed in this plan along with outdoor watering restrictions are estimated to reduce water consumption by 10%. This was evident in the water use reduction seen during years with watering restrictions in place. The modified demand forecast is demonstrated in the following table.

Table 7a – Water Demand Forecast

Line	Item	Current Year (MGD)	Year 20 (MGD)
1.	Avg. day demand before conservation	3.4	6.4
2.	Avg. day demand after conservation		5.9
3.	Reduction in average-day demand		0.5
4.	Max. day demand before conservation	5.9	12.8
5.	Max. day demand after conservation		11.5
6.	Reduction in maximum-day demand		1.3
7.	Ratio max-day to avg-day demand before cons.	1.8	2.0
8.	Ratio max-day to avg-day demand after cons.		1.9

7.2 Project Specific Savings

The purchase and need of future water is solely dependent upon demand and growth of the Fort Morgan area. The implementation of water saving practices will not delay the purchases required to join the NISP project. The timeline for the project is in conjunction with construction and need of the other participants. Where the effects of the water saving will be evident is in City infrastructure, treatment and storage. It is recommended that the City construct two additional water storage tanks on the north end of the service area. One tank is necessary for reliability and maintenance of the system. However, the reduced need for water would delay or possibly eliminate the need for the second new tank. This would present a cost savings of approximately two million dollars.

A treatment plant expansion or construction of a new water treatment plant is necessary for the proposed future demands. Water saving practices would also delay the construction costs for expansion/construction for treatment. The same theory applies for recommended increases in transmission and distribution lines.

Since the results of wide spread implementation of conservation practices in the City of Fort Morgan are not known, it is difficult to quantify either the cost or water savings that will be seen.

We can only estimate and have optimistic expectations for the efforts made by both the City and the customers.

7.3 Effects on City Revenue

With the impending participation in the NISP project, the City of Fort Morgan can not afford a reduction in water sale revenue. A Rate Study was completed this year to address the need to increase water rates and impose use surcharges to account for water conservation practices already seen with the outdoor watering restrictions. This rate study is expected to be relevant for at least five years; however, if the reduction in use is greater than anticipated, the rates will have to be re-evaluated. The extreme debt that will be seen with just the supply projects are going to control all future rate schedules for at least the next 30 years. Water cost savings for treatment, storage and distribution will be minimal in the near future compared with the debt held by the City. Implementation of the water saving practices will ensure that all future water use is in the best interest of the City and the environment.

STEP 8 – IMPLEMENTATION PLAN

This section provides a preliminary schedule for implementation of the selected conservation measures and proposed public participation and monitoring processes.

8.1 Implementation Schedule

Conservation Measures/Programs	Action	Beginning Date
Landscape and Irrigation Efficiency for Parks		
• Maintain xeriscape demonstration gardens • ET rate irrigation • Central irrigation control system • Regularly scheduled irrigation audits • Non-potable well water used for irrigation	Continue to establish low water use landscapes and drought resistant vegetation where appropriate in City parks. Continue irrigation practices and monitor irrigation systems.	Existing measures
Residential Water Audits		
• Perform residential water audits	Implement schedule of residential water audits to be performed annually completing one third of the residential connections each year	2008
Industrial and Commercial Water Audits		
• Perform industrial and commercial water audits and promote water efficiency processes	Implement schedule of water audits to be performed annually completing one third of the connections each year	2008
Distribution/Treatment System Efficiency		
• Leak Detection Program	Continue leak detection program on annual basis	Existing program
• Leak repair	Continue leak repair program	Existing program
• Water accounting	Continue water accounting of lost/unaccounted water	Existing program
• Water distribution system pressure	Continue to monitor pressure in the water distribution system	Existing program
Metering and Billing		
• Volume billing	Continue to bill customers based on amount of water used	Existing Program
• Water meters	Continue to annually audit meters for accuracy	Existing Program
• ERT automated meter reading	Continue to utilize ERT's for meter reading to provide real time consumption	Existing Program
Public Education		
• Provide water conservation information to the public	Continue to provide information on the City's website, utility billing office, in utility bills and at City events	Existing program

• Water conservation kits	Continue to budget for water conservation kits and items to be given to residents at City events	Existing program
• Toilet rebate program	Continue to budget $5,000 annually for toilet rebate program	Existing program
Regulations/Ordinances		
• Water waste ordinance	Continue to enforce water waste ordinance	Existing program
• Water conservation and restrictions ordinance	Enact ordinance if water shortage occurs	Existing program
• Landscaping guidelines	Promote guidelines for landscape improvements	Existing program
• Water development policy	Landscape plan no more than 15% planted to grasses/no high water uses/high efficiency water saving devices	Existing program

8.2 Public Participation in Implementation

The citizens of Fort Morgan will play a key role in the effectiveness of this water conservation plan. Overall public awareness of water conservation activities will increase the success of the plan. The City of Fort Morgan will need to continue to educate the public why water conservation is important. The drought of the past few years, the water restrictions that were in place during the water shortage and the issues pressing to the whole State of Colorado have made citizens more aware of the need to save water.

The citizens of Fort Morgan will have an opportunity to provide input on the proposed water conservation plan. The plan will be presented at a City Council work session and will be made available for public review on the City's website, at City offices and the public will be given a timeframe for input into the plan.

8.3 Monitoring and Evaluating the Plan

Many of the measures and programs in the water conservation plan have already been in effect. However, data on water conservation savings on measures and programs already in effect were limited. Increased monitoring and evaluation will take place with the implementation of the plan. As the City begins to acquire more data, trends between demand and conservation measures/ programs may be established, improving the ability to assess the effectiveness of individual conservation measures/programs.

The collection and organization of data is instrumental in the success of monitoring the plan. Information will continue to be collected on the following:

- Raw water received from NCWCD at the water treatment plant;
- Monthly wastewater and water treatment production;
- Monthly potable metered demands for customer billing categories (residential, commercial, industrial);
- Monthly non-potable water use (irrigation of parks, schools, cemetery, golf course).

The following will also be monitored:

- Annual costs of each conservation measure/program;
- Annual data on development abiding by the Water Development Policy within the City;
- Annual record of efforts by the parks, schools, cemetery and golf course to conserve water. This may include changes to the irrigation schedule, ET controller installation, acreage of new xeriscaping, acreage of new irrigated landscaping, etc.
- Feedback from the public. This may include comments at open houses concerning conservation, e-mail/mail correspondence, etc. that provides valuable information on the public's perception of the conservation measures/programs.

Most of the information gathered regarding water production and metered demand is monitored on a monthly basis. The overall data listed above will be monitored on an annual basis and a report will be provided to City Council and the citizens of Fort Morgan.

The report will include an analysis of the following:

- Accounting of water distribution system – treated water production and metered water usage will be compared to evaluate system losses and unaccounted for water annually.
- Annual and monthly metered water use for large industrial, commercial and residential.
- Annual and monthly metered non-potable irrigation water use for parks, schools, cemetery and golf course.
- Evaluation of estimated water conservation savings.

An action plan addressing concerns for the year following the report will also be included.

8.4 Updates and Revisions to the Plan

The “Water Conservation Act of 2004” § 37-60-126 C.R.S. requires that the plan be revised at least every 7 years. The City of Fort Morgan will prepare a comprehensive revision of the plan again in 2014. However, information will be reviewed on an annual basis as indicated above with reports prepared annually for City Council and the public. As additional measures and

programs may be incorporated or new water developments occur such as the City's participation in NISP, the plan will be revised to include the same.

8.5 Approval of the Plan

The City of Fort Morgan, a Colorado home rule municipality, by and through the *Charter of the City of Fort Morgan,* (1914) and governed by its Mayor-Council form of government, adopted the Water Conservation Plan on *(date).* The resolution adopting the plan is attached.