

3.0 RAW WATER SUPPLY

3.1 Background

Prior to 1997, the City's municipal drinking water was supplied from alluvial wells drilled around the western edge of the City. This well water was used for domestic use as well as irrigation of parks and open space areas. In early 1997, the City shifted its water supply from well water to Colorado Big Thompson (CBT) water when it constructed a three (3) filter skid water treatment plant (WTP) with a throughput of around 2.55 MGD. The City of Hudson participated in 1/6th of this WTP construction. In 2001, the City expanded the WTP to include five (5) filtration units for a combined throughput of 4.25 MGD. Hudson did not participate in the enlargement.

The City encountered a unique water quality problem when it transitioned to CBT water. The well water that was historically delivered through the water distribution system had high hardness levels. As a result, this caused a buildup of minerals along the inner pipe walls. When the City changed to the much softer CBT supply in 1997, the softer mountain water caused the historic build up of mineral deposits to begin to permeate back into the water supply, thus impacting water quality. From 1997 through the summer of 2005, the City blended sufficient well water with the CBT to maintain an acceptable level of hardness in the finished water supply to prevent this from occurring. The City performed a water quality study in 2005 and ceased the use of groundwater for blending in June 2005 and is currently on 100% CBT water. The City is now adding minimal levels of Zinc Phosphate into the CBT supply to keep the buildup intact while providing an improved water supply to its constituents. As the City replaces outdated infrastructure within its distribution system in the future, the use of Zinc Phosphate will reduce and eventually be eliminated. The City continues to use its wells for non-potable irrigation of its parks, schools, open space areas, and its golf course. It also supplies a local power plant (Thermo) with well water.

The Thermo Power Plant is operated by Thermo Cogeneration Partnership and was annexed into the City in 1994. Thermo provides electric power through Public Service throughout the State of Colorado. Thermo uses City well water for cooling of its electric generators. A portion of the water delivered to Thermo is also delivered to the Colorado Greenhouse (CGH) facility to grow vegetables. The total non-potable use from Thermo and CGH nearly equals the City's total potable water use.

3.2 Sources of Water

The City has three primary sources of water: 1) well water, 2) irrigation water, and 3) mountain water. Each source is described below with a description of its current use.

Well Water

The City is currently using six alluvial wells. Water pumped from these wells is currently used to irrigate parks, open space areas and the golf course and to provide for water uses at Thermo. Historically, these wells were also used to supply domestic water to City residents. Wells 1, 3, 4, 5, and 13 are connected to a manifold system that supplies water for irrigation and to serve

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water supply needs at Thermo via a one million gallon (MG) raw water tank. Well 18 is located on the west side of the South Platte River and is used to irrigate Pearson Park and for minor indoor uses at the City’s wastewater treatment plant (WWTP).

The City also owns four additional wells that are not currently operated. These wells are included in the City’s pending Water Court case, which reserves the City’s right to use these wells in the future as the City grows.

The following table is a summary of the City’s wells.

Table 3.1 – Well Information

Well #	Well Permit #	Legal Description	Pumping Capacity (gpm)	Approximate Age (yrs)
1	19493-1/RF-151	NE1/4, SE1/4, Sec 6, T1N, R66W	1297	45
3	19493-3/RF-545	NE1/4, NE1/4, Sec 6, T1N, R66W	1096	38
4	12626-R	NW1/4, NE1/4, Sec 6, T1N, R66W	996	50
5	20026-R	SE1/4, SE1/4, Sec 6, T1N, R66W	1095	65
13	15273-R	SE1/4, SW1/4, Sec 32, T2N, R66W	996	60
18	6588-RF/34329-F	SE1/4, NW1/4, Sec 6, T1N, R66W	500	56

Each of these wells is approximately 50 to 60 feet deep except Well 18, which is 30 feet deep. The wells were originally drilled in the 50’s and 60’s and range from 38 to 65 years old. The wells are drilled into the South Platte alluvium. The groundwater level in this aquifer has remained relatively level for the last 25 years because of recharge from precipitation, irrigation and return flows from upstream municipalities. The water is available year-round and is a highly productive, reliable resource. However, the groundwater in this area is high in total dissolved solids and nitrates and use of the well water requires augmentation. Augmentation is the one-for-one replacement of water to the stream system for groundwater that is consumptively used.

Surface Irrigation Water

The City has 211.9 shares of Fulton Ditch water. Each share of Fulton Ditch water delivers approximately 3.8 ac-ft and has an estimated historic consumptive use value of 1.75 ac-ft per share. The Fulton Ditch water is used for irrigation of the golf course and cemetery and is also used for augmentation of the City’s wells. The City delivers the majority of its Fulton water directly back to the South Platte River between April and October each year to replace the depletions associated with pumping its wells.

Mountain Water

The City uses both CBT and Windy Gap water for its potable water supply. CBT and Windy Gap share storage and infrastructure within the CBT system. Because the CBT system has storage, both CBT and Windy Gap water can be delivered year-round. Fort Lupton uses its CBT water primarily in the summer months and its Windy Gap water primarily in the winter months. Since CBT is one-time use only water, this raw water supply is ordered and delivered in the summer months when the effluent percentage is low. The effluent percentage is the percentage of water delivered out of the WTP that eventually shows up at the WWTP. In the summer months, the majority of the water delivered from the WTP is used for outdoor lawn irrigation. Because a large portion of the water never makes it to the sewer system, only 35% to 40% is collected in the sewer systems and delivered to the WWTP. Conversely, in the winter months, little water is used outside. As a result, the water used in the winter effluent percentages reach up to 90% in the wintertime. Since Windy Gap is fully consumable, using Windy Gap in the winter months maximizes the reusable component of Windy Gap. There are great efficiencies to operate the system this way. The reusable Windy Gap effluent generated at the City's WWTP is used for winter augmentation of the City's wells. To maximize the City's water supplies, any excess CBT or reusable effluent is leased out to third parties.

3.3 Current Potable Water Supply Portfolio

The City currently owns 3,106 units of CBT. Over the years, Fort Lupton has received more CBT water through dedication than allowed by the Northern Water District (NWD) regulations. Resolution D-962-02-95 from NWD deals with limitations on ownership issues and is summarized as follows:

For municipalities and domestic water purveyors, the limitation on unit ownership will be calculated and determined as the lesser of the following:

1. *(Demand x 2) – (Average Yield of Native Supplies) = Max. No. of CBT Units Allowed to be Owned*

or

2. *(Demand) – (Firm Yield of Native Water Supplies) = Max. Volume of Firm Yield CBT Water Allowed to be Owned*

The maximum number of CBT units allowed to be owned shall be determined by dividing the volume of CBT water allowed to be owned by 0.5 for variable-quota contracts and 0.7 for fixed-quota contracts

Demand is based on a 10-year average of per-tap usage times the total number of taps currently supplied and taps committed to supply in the future.

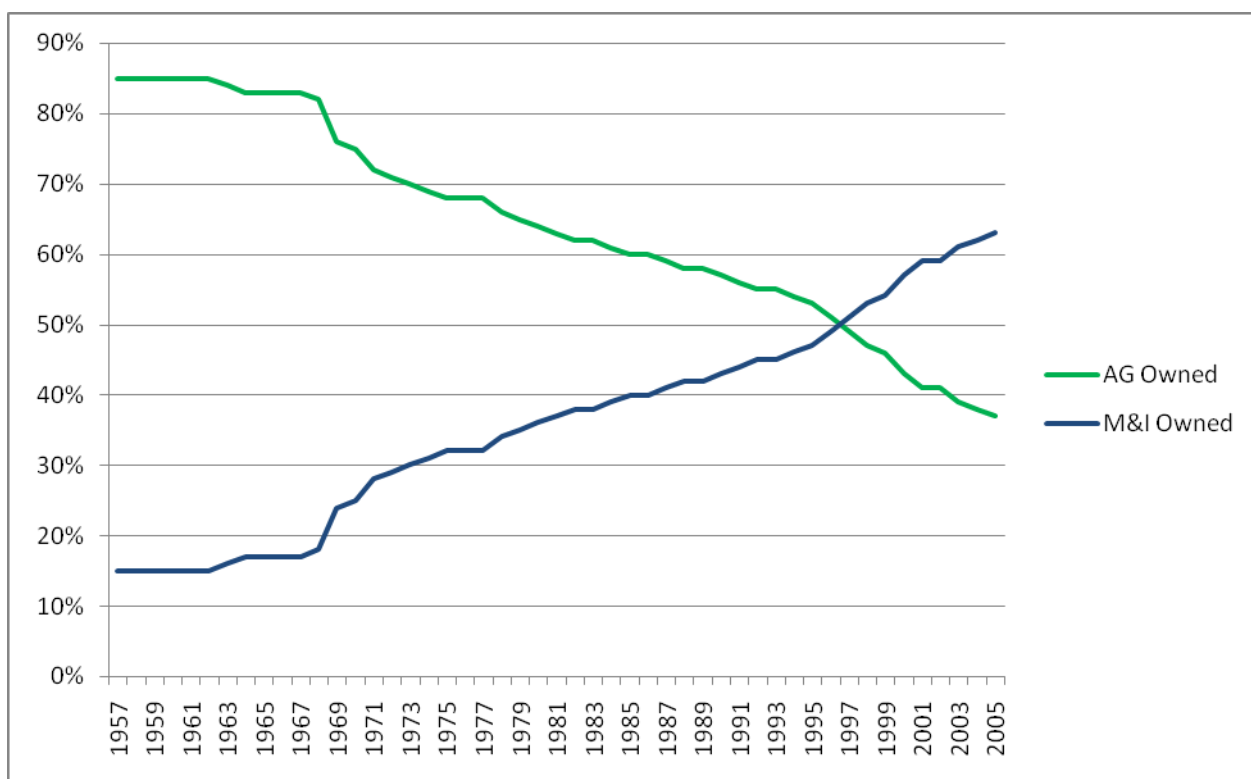
This Resolution was established to preserve the CBT system and prevent speculative purchases of its water. The CBT system was originally designed as a supplemental supply to native water rights with agriculture as the primary user. The quota was established based on water demand.

In a dry year when water demands are high, the quota would be set higher, up to 100%. In a wet year, when native supplies are plentiful and demands are low, the quota would be set lower, i.e. 50%. The years 2002 and 2003 were an exception when, for the first time in the system’s history, the quota was set based on limited supply.

Because Fort Lupton has exceeded its CBT ownership per the above Resolution, the City is “capped” and cannot purchase additional CBT supplies through the open market. Therefore, the City must rely on CBT acquisition through dedication from new development. This NWD requirement puts a burden on the City to figure out other sources of domestic supply since it cannot purchase additional CBT water.

CBT water is in great demand and is converting from agricultural use to municipal/industrial (M&I) use rapidly. In the late 1950’s, CBT ownership was 85% agricultural owned and 15% M&I owned. Today, the estimated ownership is 65% M&I and 35% agricultural. The chart below shows the ownership transition.

Figure 3.1 – CBT Ownership Transition



Because of this transition, the market for CBT water has become very competitive. Fort Lupton must be prepared with other sources of water when CBT is no longer available.

3.3.1 Windy Gap

Windy Gap water is delivered through the CBT system infrastructure, and thus can be delivered to the City via the Southern Water Supply Pipeline. However, currently Windy Gap water is junior to CBT water. Thus, if storage in the CBT system spills, the Windy Gap account spills first. NWD is in the permitting process to construct Windy Gap firming storage. Although several alternatives are being evaluated, Chimney Hollow near Carter Lake is the preferred alternative.

The true benefit of Windy Gap, once it is firming, is that the water is also fully consumable and thus can be used and reused to extinction. Similar to CBT, Windy Gap water is sold in units. One unit of Windy Gap yields 100 ac-ft.

The City purchased three units of Windy Gap in 2003. The 300 ac-ft of Windy Gap water serves two purposes for the City:

1. It runs through the CBT system and thus is treated and used for domestic supply.
2. The reusable component of the Windy Gap water generated as effluent at the City's WWTP is used for augmentation.

Since the City will continue to irrigate parks, schools, the golf course, and open spaces areas with well water, Windy Gap will be an important component of the City's water portfolio. The water can be used initially for domestic needs, and the reusable component can be used for augmentation.

3.4 NISP Participation

The Northern Integrated Supply Project (NISP) will consist of two reservoirs, Glade and Galetton Reservoir. Permitting of NISP is anticipated to occur in 2007/2008 with construction slated to begin in 2010. The City is currently planning to participate in 3,100 ac-ft of NISP but these numbers will require further analysis as permitting of NISP continues. It is estimated that NISP delivery will begin in 2015. The current cost of NISP is estimated at \$10,100 per ac-ft. Thus, the total cost for the City's 3,100 ac-ft is \$31.31 million. Construction for NISP is anticipated to begin in 2010. A substantial amount of the total project cost will be due at that time.

3.5 Water Dedication Policy

The City of Fort Lupton accepts 100% cash-in-lieu for raw water dedication associated with new development. This was a creative way to allow growth to buy into Fort Lupton's excess CBT supplies, which allowed the City to generate revenue for water acquisition. This policy has allowed the City to reduce the debt service associated with its Windy Gap purchase without having to sell its CBT. However, as the City grows and is allowed to acquire additional supplies, it may wish to change policy to allow delivery of CBT units. We recommend the City revisit this policy in the not-too-distant future, preferably before summer 2008.

3.6 Current Water Supply vs. Demand

The City currently owns 3,106 units of CBT. In an average CBT quota year, which yields 70%, the City has sufficient water supplies to meet its demand. Receiving 0.7 ac-ft per CBT unit in most years provides Fort Lupton with excess supplies, which it leases to other users on an annual basis.

The following table shows the current water supply versus demand for the City with varying levels of CBT quota.

Table 3.2 – Current Water Supply vs. Demand under Varying CBT Quota Scenarios

	70% Quota Scenario	60% Quota Scenario	50% Quota Scenario
CBT Ownership =	3,106 units	3,106 units	3,106 units
CBT Quota =	0.7 ac-ft per unit	0.6 ac-ft per unit	0.5 ac-ft per unit
CBT Water (ac-ft) =	2,174 ac-ft	1,864 ac-ft	1,553 ac-ft
Current Potable Water Demand =	2,000 ac-ft	2,000 ac-ft	2,000 ac-ft
Windy Gap Use =	300 ac-ft	300 ac-ft	300 ac-ft
Remaining CBT w/o Carryover =	474 ac-ft	164 ac-ft	-147 ac-ft
CBT Carryover =	621 ac-ft	621 ac-ft	621 ac-ft
Remaining CBT w/ Carryover =	1,095 ac-ft	785 ac-ft	474 ac-ft

Notes:

CBT Water = CBT Ownership*CBT Quota

Current Water Demand is estimated based on 2006 and 2007 CBT usage

CBT Carryover equals lesser of (90%*Oct 31st Account Balance) or (20% of CBT Units Owned). 20%*CBT units used.

Because the City maximizes its carryover each year, Fort Lupton has more supplies than water demand under the various quota scenarios. This is due to the fact that some developments have pre-dedicated CBT supplies to the City before their water demands have occurred. As these developments are constructed, this excess will gradually be used. At some point in the future, the City will need to consider how to safeguard itself from a severe drought situation as in 2002. As shown in Table 3.2, several consecutive 50% quota years would put the City in a potential water shortage situation. Water conservation and water storage are two effective measures to combat drought.

3.7 Fort Lupton's Future Raw Water Supplies

Potable Supplies

The City is on the cusp of much growth. As this growth occurs, it is important that the City continue to evaluate its water acquisition policies. These policies are dynamic given the constant changes in NWD, acquisitions of CBT, CBT policies, NISP, Windy Gap, etc., etc. These policy questions will require direction from Council and include, but are not limited to:

1. With the increasing demand for CBT, which is a finite resource, when should the City reevaluate its cash-in-lieu policy? Based on our analysis, we recommend the City revisit this issue in 2008.
2. How much NISP should the City participate in? Our evaluations have been based on the 14.4 CFS carrying capacity of the SWSP as the limiting element for City growth. The proposed 3,100 ac-ft of NISP, in combination with the City's other raw water supplies would exceed the 14.4 CFS carrying capacity of the SWSP.
3. How much NISP can the City afford today to position the City for growth in the future, substantial payments for which begin in 2010?
4. How much Windy Gap storage does the City need?
5. How much terminal (i.e. storage at or near the WTP) storage should the City strive to attain?

Non-Potable Supplies

The City is in an ideal situation overlying an alluvial aquifer that is renewable. The water levels in the aquifer have remained constant for the last several decades due to surface water recharge. As the City grows and develops new irrigated parks and open space, we recommend the City use well water for this irrigation. The cost to drill a well at the point of use, i.e. at the location of the park, is much cheaper than treating and using mountain water. Non-potable irrigation with a renewable source extends the life of the City's existing potable water supplies. CBT, Windy Gap and NISP are finite mountain water sources, so the City should avoid using this for irrigation if possible.

As discussed above, well pumping for irrigation requires augmentation. The City should consider a new dedication policy that requires developers to dedicate Fulton Ditch water for lands irrigated within the City. Fort Lupton can continue to obtain CBT, Windy Gap or NISP for potable demands associated with a new development, but the Fulton Ditch water dedication will allow new irrigated areas to be irrigated with wells.

Non-Potable Utility

As previously stated, if possible, the City should avoid using the finite mountain water sources (CBT, Windy Gap and NISP) for irrigation of new irrigated parks and open space. Similarly, the same argument holds true for use of mountain water on residential lawns. We recommend that as part of the City's analysis of future supplies, the City consider the allowance of non-potable water systems. These systems could utilize well water or Lupton Ditch water and significantly extend the capacity of the City's water utility.