



**Platte River**  
Power Authority

Estes Park • Fort Collins • Longmont • Loveland

**2021**

**Platte River Power Authority**  
**Water Resources Reference Document**

**Fifth edition**

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A report outlining Platte River Power Authority's water supply, background, activity, agreements and operational historical performance.





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## Platte River Water Resources Reference Document

### Introduction

The Platte River Power Authority (Platte River) Water Resources Reference Document (Document) was originally drafted in 2016 as part of an overall assessment of Platte River's water resource assets and to support development of an official water resources policy. This Document provides a brief background on water resources at Platte River, including the history behind Platte River's various assets and operating agreements, a summary of current water-related operations and projects at Platte River, and estimates of Platte River's future water demands and operations. This Document is updated annually to include the most current operational data and reflect any changes in Platte River's water policy or asset ownership. While this Document is intended to accurately distill a large volume of information, readers should refer to the underlying reports and agreements for comprehensive details.

### Section I – Background and history

#### 1. Why Platte River needs water

Water and energy systems are intrinsically linked. This essential relationship between electricity and water is used in various ways throughout the power sector. Water is required throughout energy production and conversion processes including fuel extraction and processing (fossil and nuclear fuels as well as biofuels), site operations such as dust suppression, fire water and potable water needs, and electricity generation (thermoelectric, hydropower and renewable technologies). This Document focuses on Platte River's water needs for reliable operations.

The Rawhide Energy Station (Rawhide) includes coal, natural gas and solar generation resources. Currently the primary need for water is to support Rawhide Unit 1, a coal-fired unit which uses steam to generate power. Coal-fired electric generation requires a reliable supply of water for a variety of purposes that can be generally grouped into two main categories – cooling water and process water. Before returning to the boiler, steam must be cooled to a liquid after exiting the turbine in the condenser using cooling water. At Rawhide, cooling water is stored in Hamilton Reservoir – a reservoir that covers 500 surface acres and has a capacity of 16,000 acre-feet (af)<sup>1</sup>, and consumes an average of 3 million gallons of water per day (approximately 9 acre-feet/day) as evaporation into the atmosphere. Based on pumping data collected over the past 10 years, an average of 3,432 acre-feet of water is needed annually to maintain the reservoir level. However, the annual amount of water pumped can range from 2,500 to 4,500 acre-feet of water. The pumping needed to replenish the water can vary, depending on many conditions including the evaporation rate (affected by air temperature, wind conditions, humidity, reservoir temperature, etc.), precipitation and plant performance. The evaporation rate of a

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<sup>1</sup> An acre-foot is 325,851 gallons, or the volume of water that would cover one acre of land to a depth of one foot.

cooling reservoir is higher than the natural evaporation rate in a regular lake or reservoir, due to the increased temperature of the water. The annual average temperature of Hamilton Reservoir is 70 degrees. In addition, the generally windy conditions at Rawhide also contribute to the increased evaporation rate of Hamilton Reservoir. The water stored in Hamilton Reservoir is treated reusable effluent pumped from the City of Fort Collins' Drake Water Reclamation Facility via a 24-inch pipeline to Rawhide.

When Platte River was first contemplating resource plans in the 1970s, the Rawhide Energy Project Environmental Impact Analysis was completed in 1978 and contemplated various types of cooling systems, including a cooling pond, wet cooling towers, wet/dry cooling towers and dry cooling. Based on water requirements and the total cost for each option at a designed total capacity of 750 megawatts (MW) (three coal units), the decision was made to cool Rawhide Unit 1 with the cooling pond which is now referred to as a cooling reservoir.

In addition to the water used for cooling, water is needed for purposes which treated reusable effluent is unsuitable for, such as boiler water makeup, site service water, fire water and drinking water. This water is called process water and is pumped to Rawhide in a separate 10-inch pipeline directly from Horsetooth Reservoir in an amount of approximately 435 acre-feet per year. In the past, this amount had varied up to 950 acre-feet per year, but conservation efforts and equipment upgrades over the past several years have reduced the amount of process water needed at Rawhide.

Water conservation is a key element of plant operations. All of the water that is used on-site is recycled as much as possible and used in other plant processes. The entire Rawhide site is a zero discharge facility, meaning that the effluent and other plant water is used to extinction. The water that can be used at Rawhide needs to be fully consumable and reusable water which is a very specific type of water under Colorado water law.

## **2. Water supply sources**

### **Windy Gap Project**

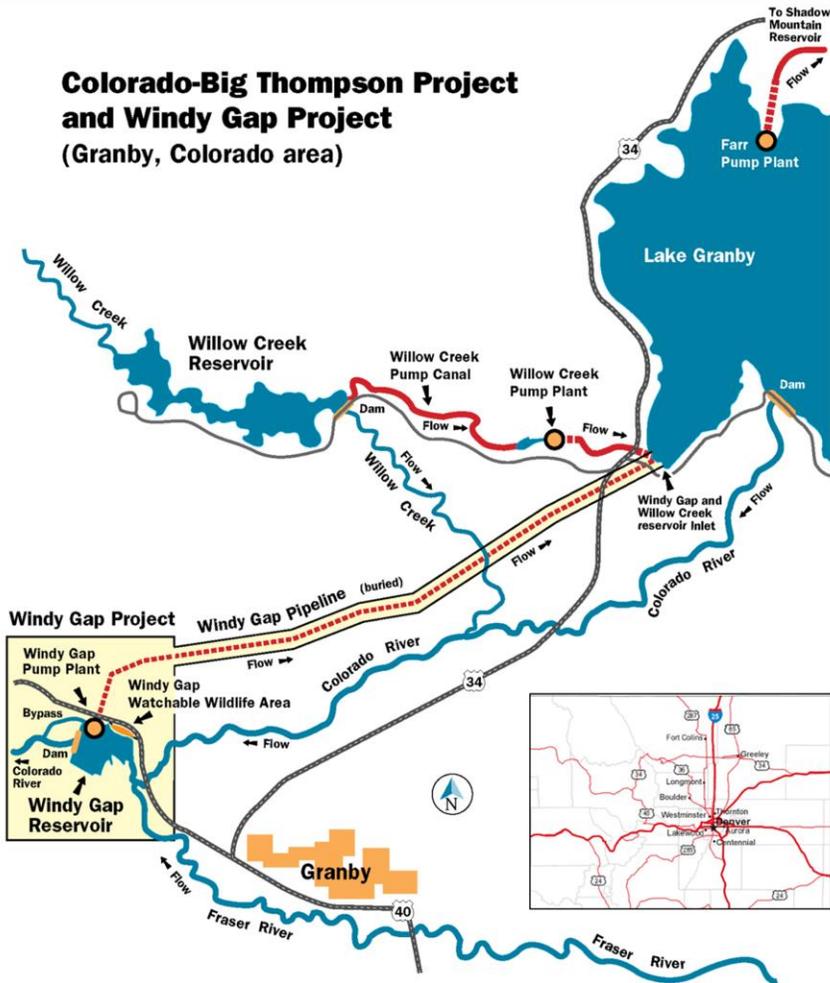
Platte River is a participant in the Windy Gap Project, which delivers water from the west slope of Colorado to the Front Range. Platte River originally owned a contract allocation of 160 units (out of a total of 480 units) of the Windy Gap Project and currently owns 110 units. One unit yields 100 acre-feet of water during years of full Windy Gap Project production. Platte River acquired its original allocation of Windy Gap water from three of its owner communities in 1974. These allocations included 40 units from the Town of Estes Park, 80 units from the City of Fort Collins and 40 units from the City of Loveland.

The Windy Gap Project was first contemplated in 1967 when the water rights on the Colorado River were filed. Following the completion and approval of an Environmental Impact Statement (EIS) and acquisition of 23 permits and licenses, the Windy Gap Project construction began in

July 1981. The project was completed in the spring of 1985 and began delivering water to allottees later that year in July.

The Windy Gap Project consists of a diversion dam on the Colorado River, a 445 acre-foot reservoir, a pumping plant and a six-mile pipeline to Lake Granby. Windy Gap water is pumped to Lake Granby during high flow months, typically April-July. The water is stored in Lake Granby until needed and is subsequently delivered beneath the Continental Divide through the Adams Tunnel under a carriage contract with the U.S. Bureau of Reclamation (Reclamation) for delivery through the Colorado-Big Thompson (C-BT) Project’s facilities, including Carter Lake and Horsetooth Reservoir. The Northern Colorado Water Conservancy District (Northern Water) and Reclamation jointly operate and maintain the C-BT Project (maps shown in Appendix A). Northern Water’s Municipal Subdistrict (Municipal Subdistrict) is a separate conservancy district which was formed by several municipalities to build and operate the Windy Gap Project. The current Windy Gap Project participants are listed below, with a project map following.

Windy Gap Project participants	Units	Acre-feet (max)	Percentage
Platte River Power Authority	110	12,000	22.9%
City of Longmont	80	8,000	16.7%
City and County of Broomfield	56	5,600	11.7%
City of Greeley	49	4,900	10.2%
City of Loveland	40	4,000	8.3%
City of Boulder	37	3,700	7.7%
Town of Erie	20	2,000	4.2%
Little Thompson Water District	19	1,900	4.0%
Superior Metropolitan District No. 1	15	1,500	3.1%
City of Fort Lupton	13	1,300	2.7%
City of Louisville	9	900	1.9%
Town of Berthoud	8	800	1.7%
Town of Frederick	7	700	1.5%
Town of Firestone	5	500	1.0%
City of Dacono	5	500	1.0%
Town of Estes Park	3	300	0.6%
City of Lafayette	3	300	0.6%
Central Weld County Water District	1	100	0.2%
<b>Total</b>	<b>480</b>	<b>48,000</b>	<b>100%</b>



Northern Colorado Water Conservancy District  
<http://www.northernwater.org/waterprojects/CBTWindyGapmaps.aspx>

Windy Gap water is provided as a “contract allotment” from the Municipal Subdistrict. This means that Platte River does not own Windy Gap water rights but has a contractual right to require the Municipal Subdistrict to deliver Windy Gap water to the extent that it is available. For example, during years of full production Platte River’s 110 units can produce up to 11,000 acre-feet of Windy Gap water per year. However, during years with less production, the actual yield will be less. Annual yields may therefore range anywhere from zero acre-feet per unit up to 100 acre-feet per unit.

A benefit to Municipal Subdistrict allottees is that allotment contract holders are granted total consumptive use of their Windy Gap water. Allottees can use and reuse Windy Gap water because it is imported water not native to the South Platte Basin. After first use within subdistrict boundaries, participants may use, lease, transfer or sell the reuse or successive use rights for the use of return flows within or outside of subdistrict boundaries. This type of fully consumable water is needed at Rawhide, due to the nature of it being a zero-discharge facility.

Typically, Platte River places an annual Windy Gap order of 5,000 to 6,000 acre-feet, of which 4,200 acre-feet is provided to the City of Fort Collins in exchange for reusable effluent, which is pumped to Rawhide for cooling purposes. The balance of the order meets Rawhide’s process water needs, augmentation needs, contingency and Windy Gap Project shrink.

**Cache la Poudre River decrees**

In addition to its Windy Gap allotment, Platte River holds two junior water rights on the Cache La Poudre River which, when in priority, allow Platte River to pump Poudre River water credits to Rawhide in its 24-inch pipeline, via exchange. Below are the specifics of the rights.

Flow rate (cubic feet per second, cfs) <sup>2</sup>	Flow rate conversion to acre-feet (af)/day	Date of adjudication
1.60 cfs	≈ 3.17 af/day	Dec. 31, 1982
15.19 cfs	≈ 30.08 af/day	Dec. 1, 1977

Because these rights are junior (recent) in priority, the water is not available every year and cannot be counted on as a firm, reliable supply. In recent history, the Poudre River decrees have yielded anywhere between 0 and 2,800 acre-feet of water per year and have averaged 1,403 acre-feet over the past 10 years.

**3. Water agreements**

In addition to the contract allotments for Windy Gap water, Platte River is party to other agreements and decrees that are instrumental to the exchange, receipt and storage of the water used for cooling. There are four key agreements that are fundamental to Platte River’s water operations.

**Reuse agreement**

When the construction of Rawhide was first being contemplated, it was known that the generation station would require water for cooling and other purposes. Platte River recognized the fact that the Front Range of Colorado is an arid region and from day one, a primary

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<sup>2</sup> One cubic foot per second (cfs) equals 1.98 acre-feet/day.

objective was to use water in a responsible and sustainable way. In 1978, an innovative agreement was developed, in which fully consumable and reusable water would first be used by the City of Fort Collins and the reusable return flows, in the form of treated effluent, would be pumped to Hamilton Reservoir at the plant and used for cooling purposes. The purpose of this arrangement was to ensure that Rawhide's use of the water would have no detrimental effect on any existing water user or upon existing water supplies. This innovative use of reusable effluent was incorporated into the original plant design.

The Agreement for the Reuse of Water for Energy Generation (Reuse Agreement) is a three-way agreement between the City of Fort Collins (Fort Collins), Water Supply and Storage Company (WSSC) and Platte River. The agreement and associated Decree W-9322-78 are based on a series of exchanges that use "new foreign water"<sup>3</sup> supplied by Fort Collins and WSSC to produce 4,200 acre-feet of reusable effluent for Platte River's use each year. Under this arrangement, WSSC commits an estimated 4,581 acre-feet of its new foreign water and Fort Collins commits an estimated 3,055 acre-feet of its new foreign water to create a supply of new foreign water of up to 7,636 acre-feet, annually for the plan. The new foreign water is used by Fort Collins to generate reusable effluent return flows of 4,200 acre-feet that are provided to Platte River. To compensate Fort Collins and WSSC for this reusable effluent, Platte River transfers a total of 4,200 acre-feet of Windy Gap water to Fort Collins annually, and subsequently Fort Collins transfers 1,890 acre-feet of C-BT water from the Fort Collins C-BT account to WSSC. Included in WSSC's compensation is a 25% "processing charge" assessed on WSSC by Fort Collins for processing the water contributed by WSSC. In addition, there is an obligation to preserve the historic regimen of the Poudre River by assuring that a continuation of water flows equal to historic return flows. As described in Decree W-9322-78, one method to meet this obligation is to release 550 acre-feet, annually, to the Poudre River. This obligation is split between Fort Collins (467 acre-feet) and Platte River (83 acre-feet).

In addition to the 4,200 acre-feet of effluent provided from the Reuse Agreement, Platte River is also entitled to the return flows from the Windy Gap water supplied to Fort Collins. The estimated return flows from the use of the Windy Gap water are approximately 2,310 acre-feet, or an average of 55%. Consequently, the total water available to Platte River under the Reuse Agreement, prior to the Memorandum of Understanding (MOU) as described below, includes 4,200 acre-feet of reusable effluent plus approximately 2,310 acre-feet of Windy Gap return flows, for a total of 6,510 acre-feet.

### **Memorandum of understanding**

When Anheuser-Busch, Inc., now Anheuser-Busch InBev (AB InBev), located to Fort Collins, it needed approximately 4,200 acre-feet of fully consumable water annually. This was, coincidentally, the same amount of water provided in the Reuse Agreement. Platte River and

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<sup>3</sup> New Foreign Water is water introduced into the Cache La Poudre Basin from the Colorado and Michigan River Basins and whose return flows historically have not been used by others, as defined in the agreement.

Fort Collins entered into an MOU with AB InBev in 1988. The MOU allows Fort Collins to designate up to 4,200 acre-feet of the Windy Gap water owed to Fort Collins under the Reuse Agreement for use by the AB InBev brewery. AB InBev employs a land application to process brewery waste and, therefore, does not send as much wastewater to Fort Collins’ Drake Water Reclamation Facility as would an average Fort Collins’ customer. This means that when the Windy Gap water is designated to support AB InBev’s treated water use, less effluent is produced for Platte River. Under the MOU, Platte River agreed to accept less Windy Gap return flows, approximately 800 acre-feet instead of the approximately 2,310 acre-feet of effluent expected under the Reuse Agreement. In return, AB InBev agreed to pay Platte River’s annual variable operating costs on 4,200 acre-feet of Windy Gap water and accepts certain other responsibilities, in the event that Windy Gap water is in short supply. AB InBev also has the option of providing a substitute supply of reusable water instead of Windy Gap effluent. When AB InBev uses all of the 4,200 acre-feet of Windy Gap water, the net result is that Platte River receives reusable water available under the Reuse Agreement and MOU in an amount of approximately 4,200 acre-feet plus 800 acre-feet of return flows from AB InBev, annually. When AB InBev does not use the full 4,200 acre-feet of Windy Gap water, AB InBev can proportionally reduce their 800 acre-foot return flow obligation. The remaining Windy Gap water not used by AB InBev is used by other Fort Collins customers and Platte River receives the generated return flows. Independent of the amount of Windy Gap water actually used by AB InBev under normal reuse operations, AB InBev is still responsible for paying the operating costs on the full 4,200 acre-feet of Windy Gap water. In most years, the total amount of reusable effluent available to Platte River is approximately 5,431 acre-feet per year, as shown in the table below. This is sufficient to meet all of Platte River’s cooling water needs for Rawhide, at this time, with some reserve water available for future generation or other uses.

**Average annual reusable effluent water available to Platte River**

Reusable effluent water sources	Annual quantity (af)	Comments
Reuse agreement exchange	4,200	Contractual quantity
MOU: Windy Gap return flows	1,231	Estimate
Total reusable effluent available	5,431	Estimate

**North Poudre storage agreement**

Platte River has an agreement with the North Poudre Irrigation Company (North Poudre) that allows Platte River to utilize North Poudre’s Fossil Creek Reservoir Inlet Ditch and temporarily store the reusable effluent in Fossil Creek Reservoir, when space is available and would cause no injury to North Poudre. This agreement, which expires in 2024, makes use of exchanges and is necessary to avoid a loss of the treated effluent when it cannot be pumped to Rawhide at the same rate that the effluent is delivered by Fort Collins to the Drake Water Reclamation Facility.

This agreement allows Platte River to store and withdraw treated effluent from Fossil Creek Reservoir. Upon the expiration of this agreement, Platte River would no longer be able to store and withdraw treated effluent from Fossil Creek Reservoir without a contract extension, but would maintain the perpetual right to use the Fossil Creek Inlet Ditch.

The water held by Platte River in Fossil Creek Reservoir is subject to loss when the reservoir spills which typically happens on an annual basis. To avoid uncompensated loss of this water, the board authorized the lease of unpumped reusable effluent, beginning in 1994. When Platte River leases water out of Fossil Creek Reservoir, a percentage of the proceeds are shared with North Poudre.

### **Soldier Canyon outlet agreement**

Platte River has an agreement with Fort Collins for a portion of the capacity of the Soldier Canyon outlet from Horsetooth Reservoir. This agreement was entered into in 1981 for 3 cfs of capacity, for the purpose of pumping process water from Horsetooth Reservoir to Rawhide via the 10-inch pipeline. The agreement allows Platte River to connect to and operate a tap from the existing Fort Collins raw water delivery system, at a point on the system below where the system connects to the Soldier Canyon outlet from Horsetooth Reservoir. From that point, the water is pumped via Platte River's 10-inch pipeline from the tap to Rawhide.

### **Other water-related agreements**

There are currently two additional water agreements of significance to Platte River.

#### Larimer County agreement – Strang Gravel Pit augmentation

The Larimer County agreement was entered into in 1993 and allows the county to receive up to 100 acre-feet of reusable effluent provided by Platte River under the MOU for augmentation of the county's Strang Gravel Pit, annually. The county notifies Platte River each year of the actual quantity of water needed for the augmentation requirement. While the request from the county in the agreement is for 100 acre-feet, the actual augmentation needs have typically been less than 12 acre-feet per year.

#### Carter Lake outlet agreement

The Carter Lake outlet agreement is part of the Southern Water Supply Project and is an allotment contract executed in 1994 that provides Platte River with a delivery capacity of up to 10 cfs<sup>4</sup> from the Carter Lake outlet. In 2001, there was an additional allotment contract of 8 cfs of capacity, bringing the total capacity allotment to 18 cfs<sup>5</sup>. After

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<sup>4</sup> The capacity of ten cfs would equate to 19.8 acre-feet/day.

<sup>5</sup> The capacity of 18 cfs would equate to 35.7 acre-feet/day.



assessing the potential water needs associated with a future generation resource on the southern end of the Platte River system, 13 cfs of outlet capacity was sold to other project participants and 5 cfs<sup>6</sup> of capacity was retained. This capacity is not in use at this time but could be of value for either delivering water to a future generation resource on the southern end of Platte River's system or for leased Windy Gap water to be delivered out of Carter Lake in the future.

## **Water decrees**

There are also a number of water rights and decrees that are instrumental in the exchange, delivery and storage of water for Platte River. Two key decrees are the Reuse Decree which authorizes the exchanges necessary for the Reuse Agreement and the Hamilton Reservoir Storage Decree which allows the storage and operation of the 16,000 acre-foot cooling reservoir at the Rawhide Energy Station. The 24-inch pipeline that supplies water to Hamilton Reservoir has several associated exchange decrees which provide flexibility in pumping water through the pipeline. A complete list of agreements, rights and decrees is shown in Appendix B-1.

## **4. Current annual water use**

### **Cooling water**

Platte River currently uses an annual average of approximately 3,432 acre-feet of reusable effluent for cooling purposes. However, cooling water use at Rawhide can vary from 2,500 to 4,500 acre-feet, annually, depending on weather and operating conditions. Once the effluent is pumped to Rawhide, it is further treated in a phosphorus removal facility at the plant, prior to entering the cooling reservoir.

### **Augmentation water**

Each year, approximately 203 acre-feet of additional reusable effluent is provided to Fort Collins and the Cache La Poudre River, in order to meet augmentation requirements related to the Reuse Agreement, the Rawhide Energy Station property (Rawhide Creek), Platte River's headquarters property (headquarters well), and the Larimer County Augmentation Agreement.

### **Process water**

Platte River also pumps an average of 435 acre-feet of Windy Gap water directly from Horsetooth Reservoir to Rawhide via the 10-inch pipeline from the Soldier Canyon outlet. This water is used for process water at the plant (boiler water, site service water, fire water and drinking water). The treatment system for this water is considered a non-transient, non-

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<sup>6</sup> The capacity of five cfs would equate to 9.9 acre-feet/day.



# Platte River

Power Authority

community public water supply and is regulated by the Colorado Department of Public Health and Environment (CDPHE) under PWSID CO0235668. It is operated by certified Class A and B water treatment and Class 1 distribution system operators.

## Platte River’s water use summary

Platte River water use	Average annual quantity (af)	Type of water	Comments
Rawhide cooling water: 24-inch pipeline	3,432	Reusable effluent	Estimate based on a 10-year average – includes some 10-inch line water from Horsetooth Reservoir that spilled to reservoir
Augmentation requirements <ul style="list-style-type: none"> <li>• Reuse Agreement (83 af)</li> <li>• Rawhide Creek (100 af)</li> <li>• HQ well (26 af)</li> <li>• Larimer County Agreement (≈12 af)</li> </ul>	203	Reusable effluent	Can vary up to 309 af. The quantity of 203 af is based on the 10-year average amount needed for the HQ well and Larimer County agreement.
Rawhide process water: 10-inch pipeline	435	Windy Gap	10-year average is 435 af (process water only) – does not include any water spilled to the reservoir
<b>Total use</b>	<b>4,070</b>		<b>Total annual average</b>

A diagram showing the general arrangement for Rawhide water supply and use follows.



**Rawhide Energy Station water supply**

Horsetooth Reservoir



**Windy Gap  
transfer to  
Fort Collins**

**Process water  
10-inch pipeline**



Fort Collins water system

**Reusable  
effluent  
24-inch pipeline**

Rawhide Energy Station



**Zero-  
discharge  
facility**

## 5. Water costs – capital and operating expenses

The following table is a summary of Platte River’s average annual water costs. These figures do not include pumping costs through the 24-inch and 10-inch pipelines to Rawhide or the costs to treat water at Rawhide. The amounts shown are Platte River’s typical costs, excluding the amounts allocated and charged to AB InBev.

### Platte River’s net annual water cost summary

Capital costs	Estimated annual amount	Comments
Windy Gap Project debt service	\$0	The annual debt service payment was approximately \$3,300,000, but the bonds were defeased in 2016. There will be capital costs for the Windy Gap Firming Project (Firming Project), but those bonds have not been issued yet.
<b>Operating costs*</b>		
Windy Gap pumping cost	\$14,000	Pumping of up to 500 af annually if Windy Gap Project pumps (approx. \$28/af).
Windy Gap carriage costs	\$50,895	Carriage costs for use of C-BT system to convey up to 500 af of Windy Gap water annually (\$101.79/af**) to Horsetooth Reservoir.
Windy Gap assessment costs (operations and maintenance expenses)	\$244,800	Annual assessment of 6,800 af*** of Platte River’s 11,000 af allocation. This price is currently set at \$36/af of Windy Gap water allocation whether it is pumped or not.
Windy Gap excess capacity charge/in-lieu borrowing charge	\$17,304	Assessed on water delivered or exchanged to East Slope (\$34.61/af**); up to 500 af
<b>Average operating costs</b>	<b>\$326,999</b>	<b>Estimate</b>
<b>Average total costs</b>	<b>\$326,999</b>	<b>Estimate</b>

\* Platte River’s net costs are shown, excluding the charges covered by AB InBev through the MOU.

\*\* Cost associated with a new carriage contract with Reclamation that took effect in 2020. An inflationary escalator of 1.79% will be applied annually beginning in 2021.

\*\*\* Of Platte River’s 11,000 acre-feet, Platte River pays the O&M expenses for 6,800 acre-feet and AB InBev pays for 4,200 acre-feet.

With respect to Windy Gap Project capital costs, the final debt payment made was in 2016. The final payment on the last Windy Gap Project outstanding bonds was originally scheduled to be made in December 2017. However, in March 2016, it was determined that there was enough



money in project reserve funds to fund an escrow account to retire the principal and interest on the remaining debt when it came due. On April 14, 2016, the outstanding debt was defeased by resolution of the Municipal Subdistrict's Board of Directors. Funding of the escrow account was at the end of April 2016. At that time, the Windy Gap Project bonds were considered to be discharged and the Windy Gap Project free of debt. Since 2017, only the operating costs have been required.

## Section II – Current activity

### 1. The critical nature of water supply to generation operations and Windy Gap Project performance

Platte River requires a minimum of 4,200 acre-feet of Windy Gap water per year in order to complete the water exchange activities contemplated under the Reuse Agreement and MOU. Without Windy Gap water to exchange, Platte River receives a significantly reduced amount of reusable treated effluent from the Reuse Agreement and MOU. There is also a need for approximately 500 to 600 acre-feet of Windy Gap water each year for direct pumping to Rawhide as service and process water. Both of these sources of water are critical to the reliable operation of Rawhide. An additional complication is that both the cooling water and the process water need to be fully consumable and reusable water under Colorado water law. Historically, Platte River’s annual Windy Gap order has been approximately 5,100 acre-feet, based on the following breakdown.

#### Platte River’s average annual water requirements and contractual obligations

Windy Gap Project order components	Average annual quantity (af)
Reuse Plan, contractual requirement	4,200
Process water, 10-inch pipeline pumped to Rawhide	600
Windy Gap Project shrink (a 10% shrink factor is applied to Windy Gap balances in Lake Granby on March 31)	300
<b>Total average annual order</b>	<b>5,100</b>

Because Windy Gap water is the primary water source held by Platte River, it is essential that this water be available every year. Although Platte River has always depended heavily on Windy Gap deliveries, during the early years of operation, the volumes delivered to the other project participants were relatively small. Platte River’s annual Windy Gap water order of approximately 5,100 acre-feet was the largest order for many of those early years. As the Windy Gap Project began to be more fully utilized, delivery issues emerged. These issues arose not only from the junior nature of the Windy Gap water rights but also from limitations inherent in the C-BT Project through which Windy Gap water is stored and delivered.

There are two primary reasons that Windy Gap Project participants have not been able to rely on Windy Gap water deliveries. In dry years, the Windy Gap water decrees are not in priority and, thus, the Windy Gap Project will not pump. Because of the project’s junior water rights, Windy Gap water cannot be diverted in years of low runoff. Counterintuitively, the Windy Gap Project also faces issues during wet years. There have been several years when the Windy Gap Project was in priority to pump but was unable to due to a lack of storage availability. Currently,

Lake Granby is the only storage available for Windy Gap Project water. However, water conveyed and stored for the C-BT Project has priority over water conveyed and stored for the Windy Gap Project. Therefore, in wet years, when the C-BT system is full, there is no conveyance or storage capacity for Windy Gap Project water. This prevents the Windy Gap Project from storing water in wet years that could be used in subsequent dry years. This lack of storage space during wet periods has occurred numerous times over the life span of the Windy Gap Project and as recently as 2015, 2016, 2017, 2019 and 2020. In addition, if Lake Granby spills due to wet year inflows and there is Windy Gap Project water in storage, it is the first to spill from the reservoir. This happened several times in the late 1990s, in 2011 and 2014, and, most recently, in 2019 when approximately 11,789 acre-feet of stored Windy Gap water spilled because the C-BT system filled and overflowed.

Because the Windy Gap Project is unable to provide reliable yields in both wet and dry years, the project's current firm yield is zero. Firm yield is typically defined as the amount of water that can be delivered on a reliable basis, in all years, and is typically determined by yield in a critical drought period. Specific to the Windy Gap Project, lack of available storage space in wet years also negatively impacts firm yield.

To address the issue of sporadic deliveries, a protocol entitled the "Criteria for Integrated Operations of the Colorado-Big Thompson and Windy Gap Projects" (Integrated Operations), was developed in 1991. Through Integrated Operations, C-BT Project water may be delivered to Windy Gap participants in lieu of Windy Gap water. Replacement of C-BT Project water attributable to such in-lieu deliveries is required from Windy Gap water, pumped in subsequent periods. Windy Gap Project participants who request in-lieu deliveries may be required to incur additional expenses or to make other water available, if needed, to assure that C-BT Project beneficiaries are not injured as the result of such in-lieu deliveries.

In extremely dry years, even Integrated Operations may not allow the use of in-lieu Windy Gap water. This situation occurred during the 2002-2003 water year, when the C-BT system did not have sufficient unallocated reserve water in storage to support the in-lieu program. During that period Platte River had to look elsewhere for water and obtained a lease for reusable water from a Front Range municipality. This water was used for the critical process water needs and enabled Rawhide Unit 1 to continue operations. Fortunately, a large snowfall in March of 2003 provided enough water to enable the Windy Gap Project to pump and Windy Gap water became available. Had this snow event not occurred, it is uncertain how water would have been obtained for Rawhide operations.

The 2012-2013 water year was similar to the extreme dry year of 2002-2003, with no Windy Gap water available in the C-BT system. However, Platte River was able to obtain water utilizing the in-lieu process. Leased C-BT water was used as collateral to provide Windy Gap water for the critical process water. Had the reserves in the C-BT system been depleted, or if C-BT water was unavailable on the rental market, Integrated Operations would not have been an option. In 2012-2013, 2015-2017, 2019 and again in 2020, Platte River and the City of Fort Collins were



able to work out a special arrangement, during these Windy Gap short periods, to provide water for the MOU and cooling water which was very beneficial to Platte River. The 2012-2013 drought period would have been much more costly to Platte River had this agreement not been in place and had the Windy Gap Project not pumped in the late spring of 2013. This enabled Platte River to revert back to normal operations halfway through the year. Acquiring reusable water through the rental market can be uncertain, unreliable and, at times, very expensive.

Although rental water is easier to acquire in wet years, the availability and pricing is subject to market volatility. Rental water is first sought from the owner communities. However, if water is not available from the owner communities, Platte River will reach out to others for leasing C-BT water. Recently, Platte River secured long-term C-BT lease agreements and rights of first refusal to lease C-BT water when available from other municipalities. These resources provide additional security and are typically sufficient to supply the process water needs at Rawhide.

The following table lists the amount of C-BT water that was used in lieu of Windy Gap water from 2012 through 2020.

**Water leased for Platte River use in 2012-2020**

Water year	Total C-BT collateral water provided (acre-feet)
2012*	3,518
2013*	1,970
2014	1,071
2015	1,162
2016*	2,196
2017*	2,114
2018 * **	500
2019	1,195
2020	1,775

\* Water short years which also included a special arrangement with Fort Collins for the Reuse Agreement.

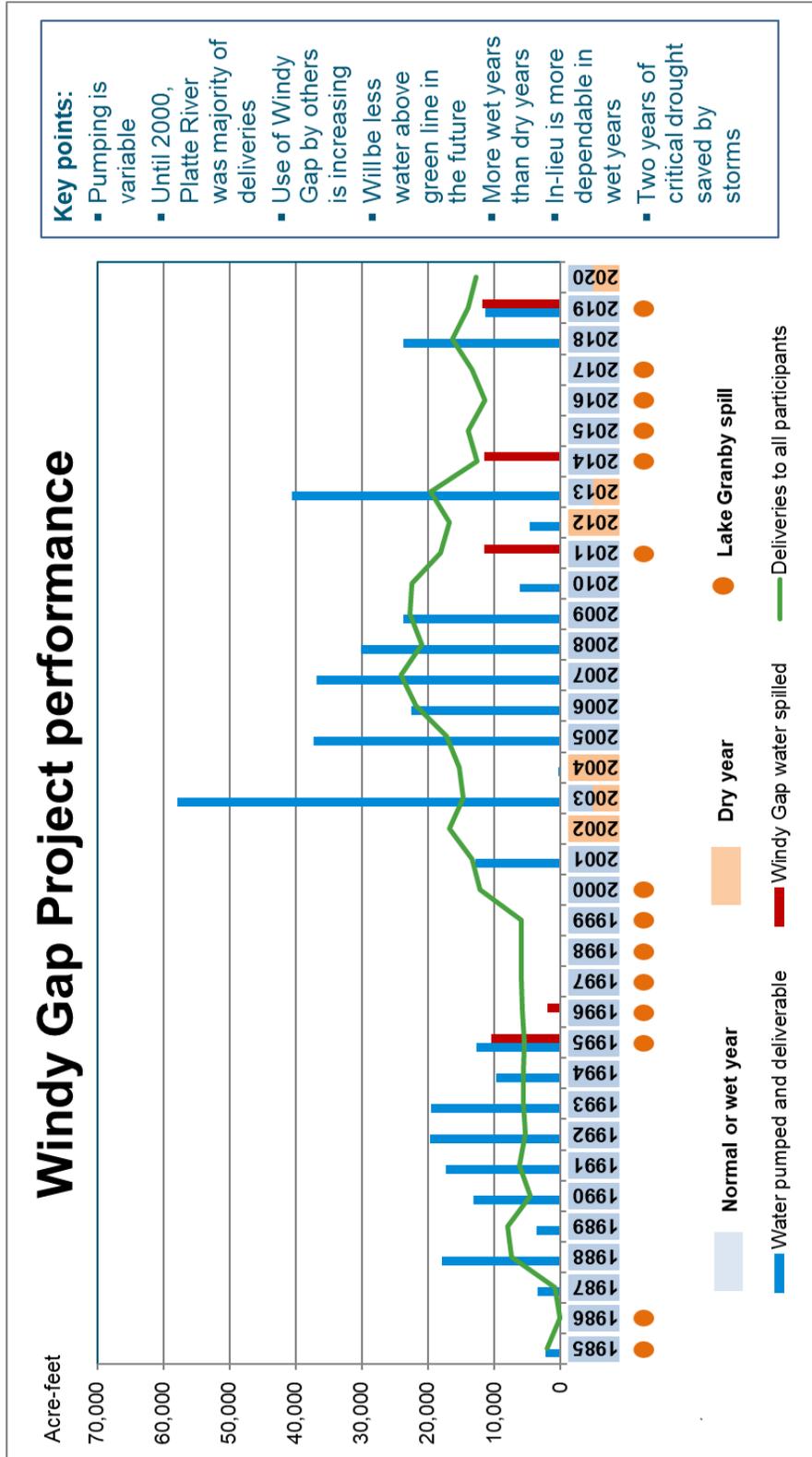
\*\* Lease option for 500 acre-feet exercised to provide collateral for in-lieu operations but Windy Gap Project pumped and canceled the in-lieu debt.

During its lifetime, the Windy Gap water supply has proven to be less reliable than initially anticipated. Weather conditions such as severe drought or extreme snowpack limit Windy Gap water availability. There have been numerous occasions, including every year from 2016-2021, when Platte River was operating in alternative mode or a “water short” situation (a special arrangement with Fort Collins), which severely limits the ability to produce the water necessary for Rawhide operations. Although Rawhide has never been curtailed due to a lack of water

supply, continued dependence on weather events to secure Platte River's water supply is not a reliable long-term strategy.

In the original Windy Gap Project EIS, the Windy Gap Project was estimated to yield 48,000 acre-feet per year. Because each unit of Windy Gap water is entitled to 1/480<sup>th</sup> of the annual yield of the project, a unit was expected to produce a yield of up to 100 acre-feet per year. The actual Windy Gap yield between 1985 and 2020 averaged approximately 13,200 acre-feet per year, versus 48,000 acre-feet per year, which is an average annual yield to the project participants of approximately 25 acre-feet per year for each unit, or 25% of the projected yield of 100 acre-feet per year. However, this actual average yield is somewhat limited due to the demand of the participants being less than available in supply in some years. Because of this, and as stated in the EIS for the Firming Project, a study was conducted to see what the average yield of the Windy Gap Project would have been if Windy Gap unit holders used all available Windy Gap water. In this scenario, it was calculated that the average long-term yield (using hydrology from 1950 to 1996) would have been approximately 55 to 60 acre-feet per unit. It is important to note, however, as stated above, that the firm yield of the project is still considered to be zero.

The chart on the following page shows the historical Windy Gap Project performance and the associated impacts of both wet and dry years, as discussed above.



## **2. History and status of the Windy Gap Firming Project/Chimney Hollow Reservoir Project**

The Windy Gap Project was completed in 1985, and, as noted above, deliverability issues led to the adoption of the Integrated Operations protocols six years later. Participants recognized that Integrated Operations could provide relief, under certain conditions, but would be ineffective during periods of extreme weather. Discussions of a firming project began during the mid-1990s.

At that time, Platte River commissioned a study of water supply alternatives. This study was completed in 1999 and confirmed that participation in the Firming Project was the most effective means to further secure Platte River's water supply. The Firming Project is simply a new reservoir, named the Chimney Hollow Reservoir, into which Windy Gap water would be pumped in wet years and stored for use in dry years when the Windy Gap Project does not pump. Such a storage arrangement would significantly improve operational reliability and reduce water cost volatility. Due to the critical nature of a water supply for Rawhide, a firm yield of water is essential for reliable operations. A firm yield is defined as the maximum quantity of water that can be guaranteed, with some specified degree of confidence, during a specific critical period. In July 2000, Platte River signed an interim agreement with Northern Water and the Municipal Subdistrict to continue its participation in studies of the Firming Project.

### **Project milestones**

**2003:** A total of 13 Windy Gap water participants began the federal permitting process for the Firming Project in 2003. A report was produced that compared 170 potential firming options.

**2005:** Reclamation, the lead agency for the project, published the "Purpose, Need and Alternatives" report in 2005. As part of the National Environmental Policy Act (NEPA) process, the Municipal Subdistrict engaged in a collaborative negotiation with west slope entities to develop mitigation and enhancement measures that would offset the environmental impacts of the Firming Project.

**2008:** A draft EIS was issued by Reclamation in 2008. This report outlined the purpose and need of the project, environmental impacts and proposed mitigation measures.

**2009:** The Municipal Subdistrict offered benefits to the west slope to facilitate project implementation.

**2011:** The mitigation and added enhancement measures were reviewed by the Colorado Wildlife Commission as well as the Colorado Water Conservation Board and were unanimously

accepted in the summer of 2011. Following this, in November 2011, Reclamation published the final EIS.

**2012:** A 1041 permit was filed with Grand County. Grand County (west slope) and the Municipal Subdistrict's Board of Directors approved agreements to create improvements to the Colorado River. This 1041 permit was approved by Grand County on Nov. 20, 2012. The Northern Water board and Municipal Subdistrict board accepted the permit, in principal, on Nov. 26, 2012. This permit includes an intergovernmental agreement (IGA) that ensures enhancements agreed to during the EIS process will be implemented.

**2014:** Reclamation issued its Record of Decision (ROD) and signed a carriage contract to transport water to Chimney Hollow Reservoir. Negotiations on the carriage contract, which is an agreement that outlines the terms and conditions for Windy Gap water to be transported through the C-BT system and stored in Chimney Hollow Reservoir, began in late 2013. On Dec. 19, 2014, officials from Northern Water, Northern Water's Municipal Subdistrict and Reclamation signed a new carriage contract and the ROD. The ROD identifies and confirms Chimney Hollow Reservoir as the Firming Project's preferred alternative. The new carriage contract will apply to all Windy Gap water, including the proposed Firming Project water, and the term of the contract has been extended to 2054 which was previously set to expire in 2025. This adds a level of certainty to the entire project for years to come. The ROD was the final approval needed for the NEPA process. The signing of the ROD and the new carriage contract were major milestones for the Firming Project.

**2016:** The Municipal Subdistrict submitted the application for the 401 water quality certification to the State Water Quality Control Division in late 2015, and the final 401 Certification (certification that the project will comply with applicable water quality standards) was awarded on March 28, 2016.

**2017:** The U.S. Army Corps of Engineers approved a Section 404 (wetlands mitigation) permit for the project in May 2017. This was the last major federal permit required for construction. In October of 2017, a lawsuit was filed in the U.S. District Court which challenges the adequacy of the environmental reviews and approvals issued by Reclamation and the Army Corps of Engineers. While not named in the original lawsuit as a respondent, the Municipal Subdistrict did intervene in the case in order to be directly involved. The Municipal Subdistrict and the Firming Project participants will monitor the case closely.

**2019:** Final project design and the associated design review were completed in February 2019. In general, the review team was highly complimentary of the design and offered only minor comments as a result of the review process. After a thorough selection process, a general contractor was selected for the construction of the Chimney Hollow Reservoir Project and pre-construction activities commenced.

**2020:** In February 2020 the Colorado Division of Water Resources Dam Safety Division issued the final construction approvals for construction for both the main dam and the saddle dam. In August 2020 the water rights decree was formally stipulated by the Division 5 (Colorado River Basin) water court.

In order to incorporate the Firming Project into the operations of the Windy Gap system, the original water right decree for the Windy Gap Project required an amendment. As part of the process to amend the water right, objectors are given the opportunity to raise any issues or concerns that they may have with the project, from a water rights perspective. The IGA that the Municipal Subdistrict and several west slope parties agreed to, as part of the 1041 permit process, will help ensure that there will be fewer objectors to the application. Within the IGA, the parties agreed to incorporate several mitigation and enhancement projects into the overall Firming Project. In exchange, the west slope entities agreed to support the proposed project and the amendment to the water rights. The water rights amendment was filed in September 2017, and after incorporating input from the west slope parties and going through the legal court process, it was completed by mid-2020.

PFM Financial (PFM) has been contracted by the Municipal Subdistrict to provide municipal advisor (MA) services and investigate the various financing options available for the project. In addition to acting as MA for the overall project, PFM also provides MA services to individual project participants, including Platte River, although these services are provided through a different office than those of the overall project MA team. The primary options that PFM is investigating include individual and group financing. In May 2018, Platte River received a Private Letter Ruling from the IRS which stated that Platte River's arrangement under the MOU will not affect its tax-exempt status for individual or group financing.

In November, allotment contracts between Northern Water and the project participants were finalized and signed. As part of the contract, each participant was asked to indicate a preliminary plan for project financing. However, given the uncertainty of the project schedule at the time, the contract stipulated that participants will be allowed to make changes to their designations once the project financing process is underway. Based on the information received from PFM and an internal staff analysis, Platte River initially elected to finance its portion of the project through \$27 million of cash contributions and the remainder through the group financing option. This financing election will be reevaluated once the group financing process is underway.

In December, the 2017 federal lawsuit was dismissed. In its ruling, the court concluded that Reclamation and the Army Corps of Engineers were in compliance with federal law with respect to the project EIS and the issuance of the associated record of decision. Subsequently, in February 2021, Firming Project participants were informed that there would be an appeal of the ruling.

Throughout 2020, the project construction team worked to complete as many pre-construction activities as possible in advance of full project construction. These activities focused on value engineering initiatives, material submittals and approvals, and the fabrication of long-lead items for construction.

### **3. Next steps for the Firming Project/Chimney Hollow Reservoir Project**

By the end of 2020, the majority of pre-construction activities were completed and the project construction team assumed a standby approach toward the project in anticipation of the resolution of the appeals process. A typical appeal timeline would see the associated legal briefs being filed by mid-2021, oral arguments in the fall of 2021 and a final ruling in early 2022. However, the timeline is subject to a number of factors that could lengthen or shorten the overall schedule.

### **4. Firming Project schedule**

Until the federal appeal is resolved, financing and project construction will be delayed. Once construction activities commence, the project will be complete and ready to begin filling within four years.

### **5. Determination of firming storage requirements**

The Municipal Subdistrict conducted studies, in conjunction with Boyle Engineering, based on each participant's Windy Gap Project allocation, projected Windy Gap water use, the historical hydrology of the C-BT system and Windy Gap Project supply over the past 46 years. In addition, Platte River contracted Heather Thompson, P.E., senior water resource engineer with Ecological Resource Consultants, Inc., to identify Platte River's optimal firming level. This study revealed that 13,000 acre-feet of firming storage would provide the necessary ratio of storage-to-demand to enable Platte River to obtain the annual requirement of Windy Gap water in a reliable manner for a typical year. After further internal evaluation, Platte River staff recommended a reduction in Firming Project participation. On April 16, 2008, Platte River staff recommended to the board of directors that the Firming Project storage level be reduced to 12,000 acre-feet. This level of firming was thought to provide a balanced approach to meeting operational needs while still positioning Platte River to fulfill contractual obligations at reduced costs, based on historical hydrology. The board of directors accepted this recommendation and Platte River's share of the firming storage level was reduced to a participation level of 12,000 acre-feet, which would provide a firm supply of approximately one-third that amount.

In August 2014, Ms. Thompson was contracted to conduct additional modeling analyses in order to evaluate various levels of demand and Windy Gap storage for Platte River. Four different levels of storage were evaluated, ranging from 13,000 acre-feet up to 16,000 acre-feet, as only data for 12,000 acre-feet had previously been modeled. For each level of storage, four

levels of Windy Gap ownership were evaluated including 100, 120, 140 and 160 units. Additionally, a separate analysis was conducted outside of the Firming Project model to determine the demand that could be met under a synthetic two-year and three-year drought, assuming that no Windy Gap water would be pumped for two and three years in a row, respectively. Probability plotting was used to estimate the frequency of these synthetic droughts.

Based on the model results, as well as internal staff research, it became apparent that a participation level of 12,000 acre-feet would have been insufficient to meet the 5,100 acre-feet/year current water resource needs/obligations (listed in § II.1). In July 2016, staff recommended an increase in Firming Project participation to a minimum level of 14,000 acre-feet and up to an optimal level of 16,000 acre-feet. The board of directors approved participation in the Firming Project up to 16,000 acre-feet. In 2017, Platte River's participation increased to 14,136 acre-feet and, in March 2018, Platte River reached a final participation level of 16,000 acre-feet.

In 2020, following the announcement of the planned 2030 Rawhide Unit 1 retirement, and in light of changes in the overall distribution of Windy Gap unit ownership and Firming Project storage levels, Ms. Thompson was asked to revise her previous modeling to include these changes and to evaluate a wider range of unit ownership and storage levels for Platte River. This updated model analysis also incorporates updated operational parameters of the Firming Project which have evolved since the 2014 analyses. The highlights of the model analyses are shown below.

Between the initial study and the update, Platte River completed a series of transactions that decreased its overall Windy Gap ownership from 160 units to 120 units. Consequently, the revised study included ownership levels ranging from 120 units down to 60 units and included Firming Project storage levels between 8,000 acre-feet and 16,000 acre-feet. Hydrologic scenarios included the historic data from the Windy Gap Project site as well as drought conditions where water does not pump for two and three consecutive years. For each modeled combination of unit ownership, storage and drought conditions, the annual firm yield was determined. For drought scenarios, the firm yield represents the amount of water available in each year of the drought period.

Model results indicate that Platte River's current Firming Project participation level of 16,000 acre-feet provides a firm supply sufficient for current operations at Windy Gap unit ownership levels of 80 units and above for historic hydrologic conditions as well as for the 1 in 57-year drought (two consecutive years of no Windy Gap pumping). The 1 in 250-year drought (three consecutive years of no Windy Gap pumping) would result in reduced firm yields and would likely require modified water operations, which could include less pumping to Hamilton Reservoir or leasing additional effluent for pumping. The complete model analysis summary memo and the entire table which shows all the scenarios of firmed water at various storage levels and various ownership units is provided in Appendix B-3.

**Firming Project model analysis (based on 60-120 units)\***

Firming Project storage (af)	Windy Gap unit ownership level	Annual firming Windy Gap (af) <i>Historic hydrology: 1 in 50 years</i>	Annual firming Windy Gap (af) with two years of no pumping <i>Occurrence interval: 1 in 57 years</i>	Annual firming Windy Gap (af) with three years of no pumping <i>Occurrence interval: 1 in 250 years</i>
8,000	60 - 100	3,050 - 3,415	2,875 - 2,985	2,060 - 2,140
10,000	60 - 100	3,545 - 4,150	3,365 - 3,735	2,410 - 2,675
12,000	60 - 100	3,955 - 4,750	3,910 - 4,445	2,800 - 3,180
14,000	100 - 120	5,265 - 5,595	4,970 - 5,230	3,560 - 3,745
16,000	60 - 120	4,410 - 6,110	4,410 - 5,755	3,575 - 4,120

\* All scenarios are based on the provisions of the updated carriage contract that includes prepositioning, diversion shrink, carryover shrink and environmental impact mitigation measures.

Looking forward, Platte River has begun to assess the water needs associated with its future energy generation mix. Upon the retirement of Rawhide Unit 1, the total water needs at the Rawhide site will likely change, however the magnitude and direction of that change will be unclear until a future generation mix is established. As shown in Appendix B-2, potential water demands for future generation can vary significantly depending on the generation type. As Platte River moves toward implementing a new resource mix, the Firming Project will ensure that water supply will not be a limiting factor in its planning. Ultimately, Chimney Hollow Reservoir will change the total Windy Gap Project’s reliable annual total yield from zero acre-feet of water to about 30,000 acre-feet, thus improving the reliability of water deliveries to participating entities. There is a significant value to a firm and reliable water supply, whether it is for immediate needs or future needs.

## 6. Firming Project participants

Firming Project participants	WG units	Storage (af)	Percentage of project	Ratio of volume/units Years to fill*
City and County of Broomfield	56	26,464	29.4%	4.7
Platte River Power Authority	110	16,000	17.8%	1.5
City of Loveland	40	9,587	10.7%	2.4
City of Greeley	49	9,189	10.2%	1.9
City of Longmont	80	8,000	8.9%	1.0
Town of Erie	20	6,000	6.7%	3.0
Little Thompson Water District	19	4,850	5.4%	2.6
Superior Metropolitan District No. 1	15	4,726	5.2%	3.2
City of Fort Lupton	13	1,103	1.2%	0.8
City of Louisville	9	2,835	3.1%	3.2
City of Lafayette	3	900	1.0%	3.0
Central Weld County Water District	1	346	0.4%	3.5
<b>Total</b>	<b>415</b>	<b>90,000</b>	<b>100%</b>	<b>Avg = 2.56</b>

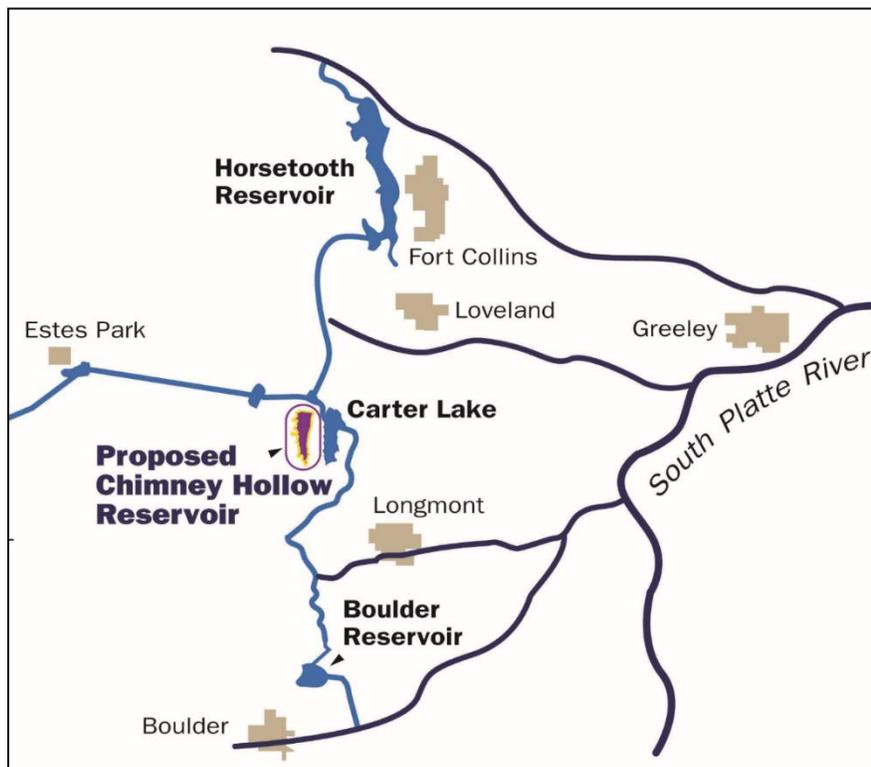
\* Based on the assumption of full Windy Gap Project pumping and allocation.

## 7. Firming Project costs

Early estimates of the Firming Project reservoir were based on size and not a specific location. In 2006, the first preliminary estimates were approximately \$221 million for the reservoir. Once the EIS process had identified Chimney Hollow as the candidate firming reservoir location, in 2011, the costs were further refined to \$275 million for a reservoir size of 87,000 acre-feet. In 2017, the total project estimate was \$407 million based on a conceptual engineer estimate, not including escalation or contingency. Currently, the total project cost estimate is \$654.5 million based on the final design, and includes mitigation and enhancements, updated construction costs, estimated project escalation costs and owner's cost estimates. With an updated total planned capacity of 90,000 acre-feet of storage, this cost equates to approximately \$7,272 per acre foot of storage space. The project cost will continue to fluctuate as the project design is finalized, construction conditions become more certain and legal issues are resolved. Of the current cost estimate, Platte River's current obligation for 16,000 acre-feet of storage is estimated at approximately \$116 million, or 17.8% of the total project cost.

## 8. Operation of the firming reservoir

Prior to construction of Chimney Hollow, a set of operating guidelines will be developed. At the present time, it is anticipated that Chimney Hollow will fill and discharge water via gravity flow. However, a pumping scenario that includes Flatiron Reservoir, during filling, has been considered as well. The operating guidelines will cover routine operation, scheduling water in and out of Chimney Hollow, and evaporation/seepage loss calculation methodology. A general map of the proposed Chimney Reservoir follows with a more detailed map shown in Appendix A-6.



Northern Colorado Water Conservancy District  
<http://www.northernwater.org/waterprojects/CBTWindyGapmaps.aspx>

## Section III – Water policy and operations

Prior to 2017, Platte River operated without a formal water policy in place. Instead, water management was guided by a series of board resolutions that laid out a general approach for securing water resources, future planning and conducting water transactions.

Board guidance was in the form of direction on topical issues, such as the adoption of resolutions regarding the lease of water or Windy Gap units and the periodic approval of continued participation in the Firming Project. In general, three important principles were evident from board action. These principles included: (a) securing and protecting a water supply sufficient for Platte River's current operational needs, (b) planning for Platte River's future water supply needs while contemplating the future needs of the owner communities, and (c) leveraging the value of water resources through leasing unpumped reusable effluent water and leasing Windy Gap units.

### 1. Background

#### a. Securing and protecting a water supply for Platte River's operational needs

As described in § II.1, Platte River has a current water need/obligation of approximately 5,100 acre-feet per year. This water supply adequately meets operational needs when water and weather conditions are normal. In years with extreme wet or dry conditions, the water supply needs have been met either through the leverage achieved from the Windy Gap units, being that Platte River's pro-rata allocation is higher based on contract allotment ownership level, or through alternative arrangements and sources. Participation in the Firming Project will provide additional supply security.

#### b. Planning for Platte River's future water supply needs

The primary consideration for determining the future at Platte River would be the water requirements associated with future generation resources and what the resource plans forecast for an overall generation portfolio. Additionally, consideration was given to future uncertainties such as climate impacts, future legislation and environmental regulation.

**Water requirements for future generation resources.** When Rawhide Unit 1 was initially constructed, there were projections for a second and third coal unit at Rawhide. Based on engineering studies at that time, it was determined that each additional unit (Units 2 and 3) would each require 2,030 acre-feet of water each year for cooling and process water, for a total additional requirement of 4,060 acre-feet. Water requirements for future generation are dependent upon location and type of resource.

A wide variety of power generation methods, ranging from emerging technologies to mature processes, could satisfy Platte River’s strategic initiatives and future load growth. Over the past decade, several shifts in the energy industry have arisen that could influence the mix of future resources used by electric utilities to produce power.

A few key events could affect how utilities generate and deliver power to their customers in coming years:

- Potential federal regulation of greenhouse gases
- Decreases in the price of solar generation and wind resources
- Sustained low natural gas prices
- Advancement in battery energy storage
- Growth of distributed energy resources

Platte River has considered a variety of generation technologies in recent planning efforts and through work on its integrated resource plans. In general, most future generation sources would require considerably less water than traditional coal-fired units. More specific research on future resource water requirements will be conducted but the identified reserve of approximately 4,060 acre-feet is expected to be more than adequate to meet the needs of any future resource that Platte River might consider.

General reference data for water consumption for various types of generation is shown in Appendix B-2.

**Water for future uncertainties.** There are many potential items facing Platte River in the future such as: potential new legislative or regulatory impacts, climate impacts, new water agreements or changes to existing water agreements, water usage, water rights appropriation and others. Additionally, the concept of the energy-water nexus will continue to be evaluated. This concept refers to the relationship between the water used for energy production and the energy consumed to extract, purify, deliver, heat/cool, treat and dispose of water and wastewater. The relationship is not truly a closed loop, as the water used for energy production need not be the same water that is processed using that energy. However, all forms of energy production require some input of water, making the relationship connected and complex. Looking forward, resiliency and the concept of a firm water supply becomes even more important. Platte River’s participation in the Firming Project is a prime example of working toward a sustainable water supply and resilient infrastructure.

### **c. Leveraging the value of water resources through leasing**

It has been the practice of Platte River to maximize the value of water resources through leasing activities within limits defined by the board.



**Unpumped reusable effluent water.** The most frequent type of water lease Platte River enters into is for unpumped reusable effluent generated under the Reuse Agreement and MOU. The amount of unpumped reusable effluent can vary but averages approximately 1,796 acre-feet annually, based on a typical supply of 5,431 acre-feet and a typical use of 3,635 acre-feet of effluent pumped to Rawhide plus augmentation requirements. Platte River does not deliberately accumulate unpumped water but there is inevitably some water accumulated each year that either can't be pumped or doesn't need to be pumped, with the exception of water short years. Variations in unpumped reusable effluent occur based on the availability of water under the Reuse Agreement, the amount of return flows from Fort Collins and AB InBev and the amount of water needed at Rawhide to maintain the level in the reservoir. The unpumped effluent is stored in Fossil Creek Reservoir, when space is available, and can be stored to pump at a later time. Or, a portion of that reusable effluent may available for lease.

**Summary of Platte River’s reusable effluent supply and use**

Water supply and use – reusable effluent	Annual quantity available (af)	Annual quantity used (af)	Total (af)
<b>Supply</b>			
Reuse Agreement	4,200		
Windy Gap return flows	1,231		
<b>Total supply</b>	<b>5,431</b>		
<b>Use</b>			
Pump to Rawhide		3,432	
Augmentations		203	
<b>Total use</b>		<b>3,635</b>	
<b>Unpumped reusable effluent (annual)</b>			<b>1,796</b>

\*This table reflects normal water use and availability.

Historically, reusable effluent has only had a few markets with modest value, mainly agriculture and industrial augmentation, and for a period, this water gained value for use by the oil and gas industry. Recently, the oil and gas lease market slowed down and lease opportunities have again been focused on more traditional entities.

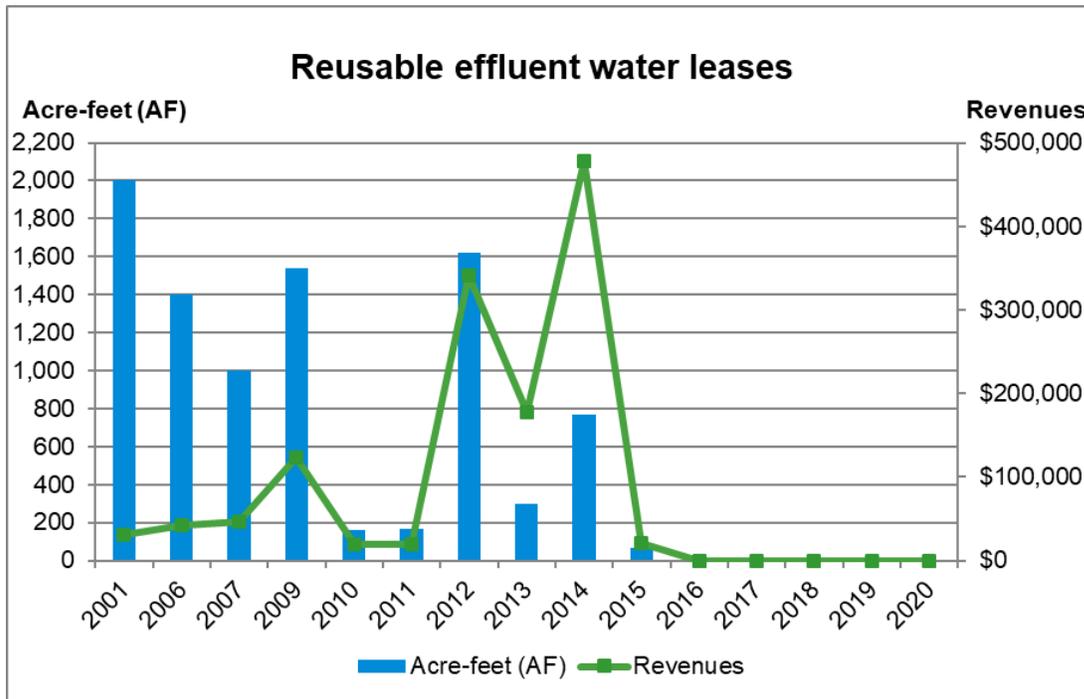
Platte River has leased reusable effluent to several entities within the northern Front Range of Colorado and lease opportunities are actively pursued when there is the availability of unpumped effluent. Since 1997, Platte River has leased almost 9,000 acre-feet of unpumped reusable effluent. Due to the extreme drought conditions in early 2013, Platte River temporarily ceased leasing reusable effluent to others but did trade reusable effluent for C-BT water that



was used to produce in-lieu Windy Gap water to be pumped to Rawhide as process water. Leasing unpumped effluent resumed in 2014 but ceased again beginning in 2016 due to a lack of Windy Gap water. The following table provides a history of the leases and their associated revenues. One note of significance is the period of time when there was a high demand in the region for reusable water for use by the oil and gas industry, during the 2012 to 2014 water years. In 2012, Platte River was approached by an oil and gas water provider and was presented with a leasing opportunity. With the approval of the board, Platte River successfully entered into four leases of unpumped reusable effluent water for oil and gas development. The revenues from leasing unpumped effluent for all markets are itemized in the following table and chart.

**Platte River’s reusable effluent water leases to others – all markets**

Windy Gap year	Volume (AF)	Unit price (\$/AF)	Total revenues	Comments	Total annual volume (AF)	Total annual revenues
1997	9	\$30	\$270		9	\$270
2001	2,000	\$15	\$30,000		2,000	\$30,000
2006	1,400	\$30	\$42,000		1,400	\$42,000
2007	1,000	\$47	\$47,000		1,000	\$47,000
2009	1,538	\$81	\$124,578		1,538	\$124,578
2010	163	\$119	\$19,397		163	\$19,397
2011	167	\$119	\$19,873		167	\$19,873
2012	121	\$251	\$30,371		1,621	\$341,771
2012	840	\$300	\$252,000	Oil & gas		
2012	660	\$90	\$59,400	Ag/oil & gas partnership		
2013	97	\$252	\$24,444		297	\$176,844
2013	200	\$762	\$152,400	Oil & gas		
2014	61	\$300	\$18,300		631	\$452,640
2014	570	\$762	\$434,340	Oil & gas		
2015	67	\$300	\$20,100		67	\$20,100
2016	0	n/a	\$0		0	\$0
2017	0	n/a	\$0		0	\$0
2018	0	n/a	\$0		0	\$0
2019	0	n/a	\$0		0	\$0
2020	0	n/a	\$0		0	\$0
<b>Totals</b>					<b>8,893</b>	<b>\$1,274,473</b>



**Lease of Windy Gap units.** The second and less frequent type of lease is the lease of Windy Gap units. This type of lease involves first-use Windy Gap water that would not otherwise be used for Platte River’s current operational needs. The amount of water that each unit produces varies from year to year depending on conditions. It could range anywhere from zero acre-feet up to the full yield of 100 acre-feet per unit.

Operationally, the Windy Gap units are useful to Platte River from a leverage perspective. Without the Firming Project, the firm yield of Windy Gap water is considered to be zero. However, because Platte River owns 110 units of Windy Gap out of a project total of 480 units, it is entitled to 23% of all Windy Gap water available annually, up to the amount of the Platte River order. In years when Windy Gap water is in short supply, this “leverage” helps Platte River meet its annual order.

Despite the benefits of leverage, there is a cost associated with the ownership of the Windy Gap units. Until needed for future use, efforts are made to lease these units to help offset the operational costs of the units and future water related capital costs. Depending on the number of units leased, there is some loss of leverage so that is carefully factored in when making decisions regarding leasing Windy Gap units.

In 2012, Platte River leased 10 Windy Gap units to a Front Range municipality. The lease was for a three-year term with the option of two, one-year extensions, with the approval of Platte River’s Board of Directors. Both extensions were executed and the lease was extended through 2017.

## Section IV – Current water policy

First developed in December 2016 and updated in February 2020, Platte River’s board-approved Water Resources Policy directs and authorizes the general manager/CEO to:

**1. Maintain adequate water supplies for all existing and projected future operations.**

- a. Maintain Platte River’s participation level in the Windy Gap Firming Project at a storage level of 16,000 acre-feet.
- b. Lease water required for Platte River operations and contractual commitments when needed.
- c. Participate in resource planning efforts to incorporate planning for future water needs, with considerations for type and location of future generation resources.
- d. Continue to research and explore alternative water supply opportunities.
- e. Review and modify existing water agreements and pursue new agreements to improve operations, increase reliability and maximize the value of water resources assets.

**2. Manage water as an asset.**

- a. Lease water to others when available (effluent and/or Windy Gap units).
- b. Sell Windy Gap units (maintain a minimum level of 100 units) – compensation may be monetary, may involve storage rights, or may involve some other consideration that provides value to Platte River.
- c. Maintain a minimum of five (5) cfs of Carter Lake Outlet Capacity (may lease as long as five (5) cfs can be made available for operational needs when required).

The complete Water Resources Policy document is included in Appendix C for reference.

This Water Resources Policy positioned Platte River to pursue activities that will increase the reliability of water deliveries to meet contractual commitments as well as the operational need of the organization. In addition, it enabled Platte River to maximize the operational and economic value of its water resources.

In late 2017, Platte River completed a series of transactions that increased its Firming Project capacity from 12,000 acre-feet to 14,136 acre-feet; sold 23 Windy Gap units; secured short-term C-BT lease water options; and generated total income revenue of approximately \$39 million. In

early 2018, Platte River was able to acquire additional storage which resulted in a total and final participation level of 16,000 acre-feet.

In 2019, Platte River completed additional transactions that resulted in the sale of 17 additional Windy Gap units and 13 cfs of surplus Carter Lake outlet capacity. The successful outcome of these agreements also generated additional revenue of approximately \$37 million to help offset future Platte River project costs and secured C-BT water lease options, which will provide additional water security until the Firming Project is complete.

In 2020, Platte River completed two transactions, each of which included the sale of five Windy Gap units at a price of \$13.5 million. The combined total of \$27 million of revenue was earmarked as the cash contribution toward the Firming Project.

Altogether, these water transactions have provided Platte River with the additional storage capacity needed to reduce operational risks during periods of drought, generated revenue of approximately \$103 million to offset project costs, and strengthened the relationships and partnerships that Platte River has within the Northern Colorado water community.

In addition and as part of the water supply planning process, Platte River began working with the Burns & McDonnell engineering firm in late 2018 to explore options for additional raw (untreated) process water storage at Rawhide. Recent maintenance operations at the Soldier Canyon outlet and aging infrastructure highlighted Platte River's need for additional on-site storage. The study and the project alternatives report was completed in early 2020. However, with the recent announcement of the retirement of Rawhide Unit 1 by 2030, this project may no longer be needed. The report will be retained in the event that a future need for additional on-site water storage becomes necessary.

## Section V – Going forward

Since the original development of the Water Resources Reference Document in 2016, Platte River has taken steps to actively assess, manage and optimize its water resources portfolio. The most notable result of this effort was the development and adoption of the Water Resources Policy and the resulting series of transactions that included the sale of Windy Gap units and the acquisition of additional storage in the Firming Project/Chimney Hollow Reservoir to reach a final participation level of 16,000 acre-feet. This combination of assets gives Platte River a more balanced and firm water resources portfolio necessary for reliable operations.

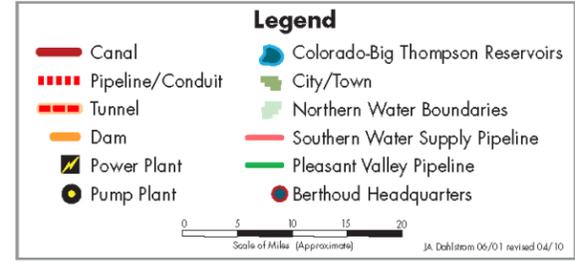
Aside from the Windy Gap Project and the Firming Project, Platte River will continue to assess the various aspects of its water resources portfolio. In particular, the current Fossil Creek Reservoir storage agreement is likely to receive additional consideration in the near term. The Fossil Creek Reservoir storage agreement with North Poudre is set to expire in 2024 and will likely be extended or revised for future operations.

## **Appendix A – Maps**

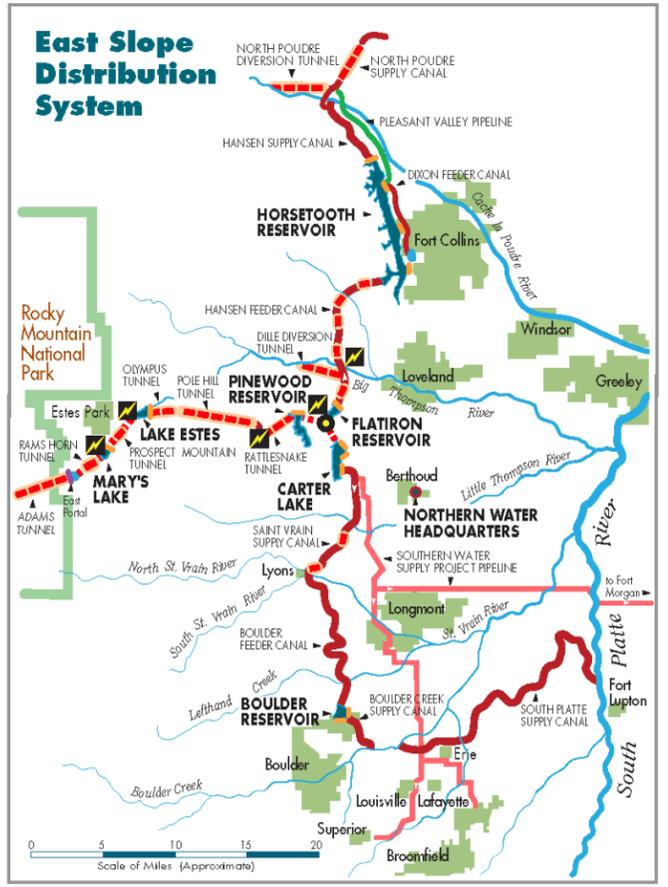
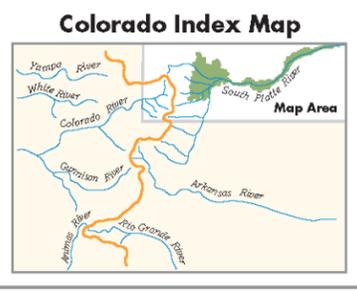
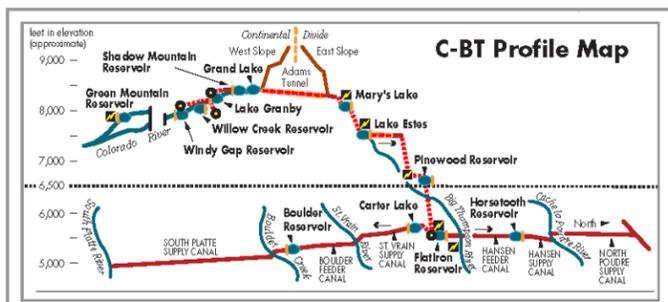
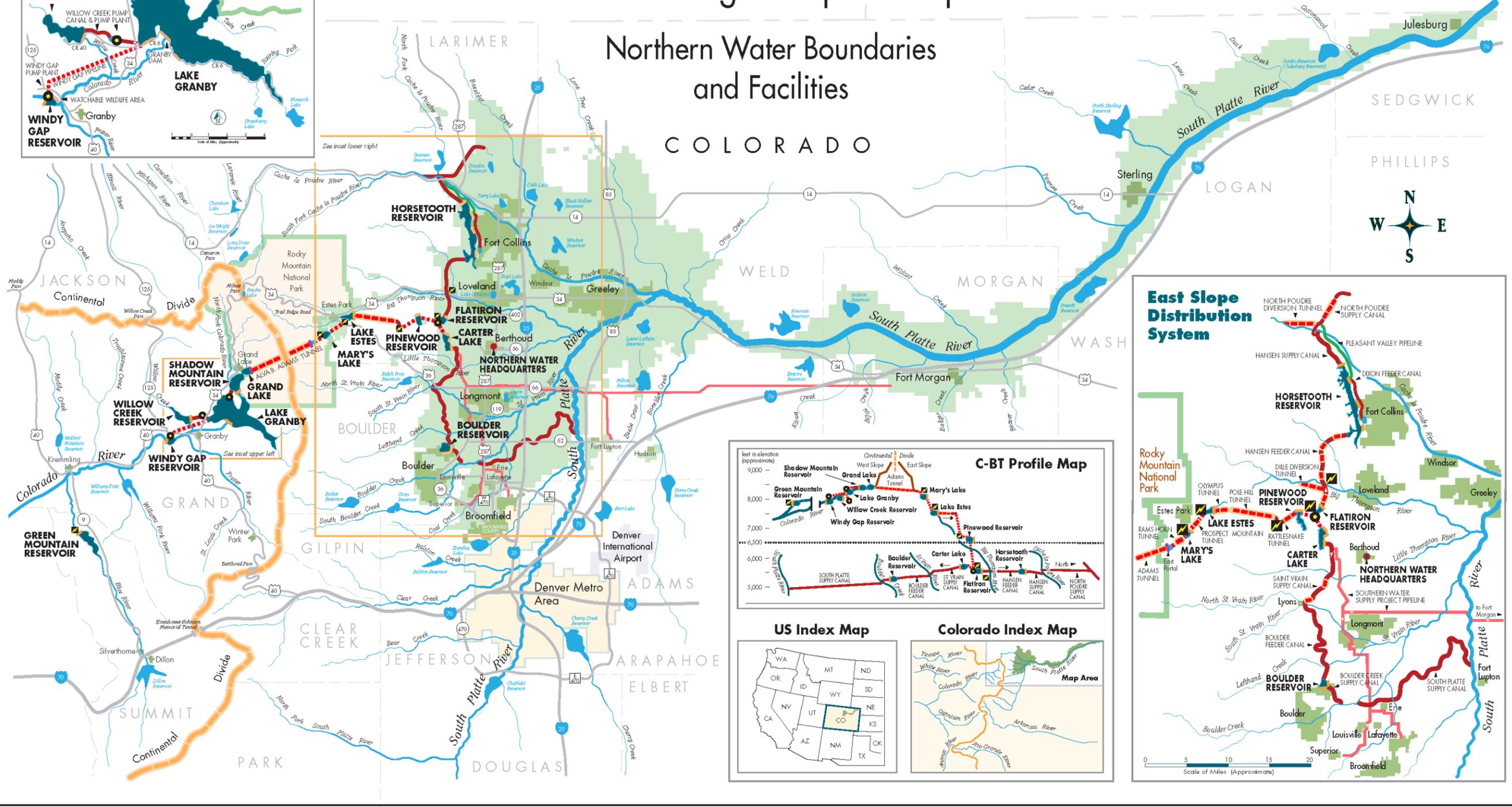


# Northern Water

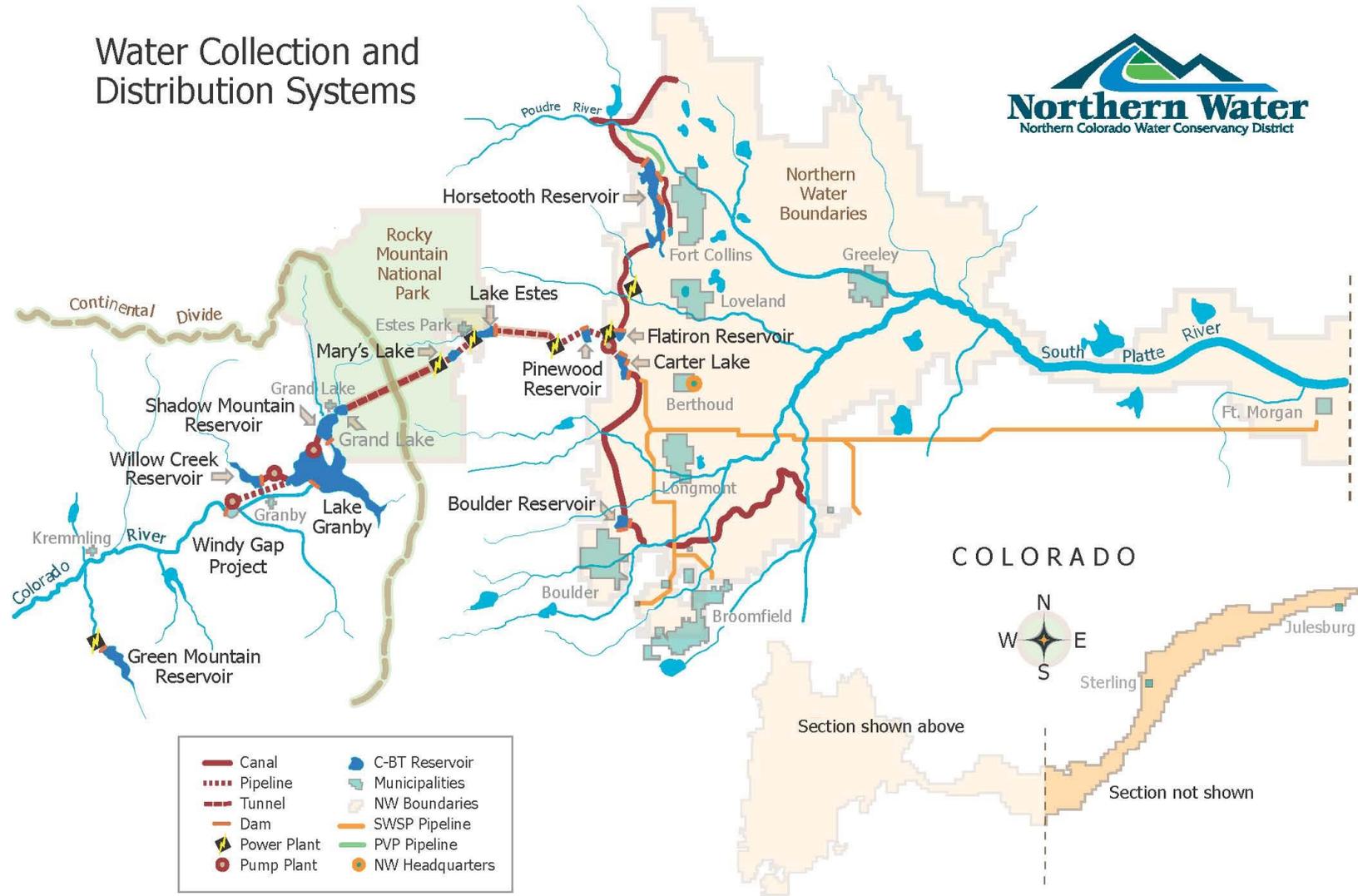
## Colorado-Big Thompson Project



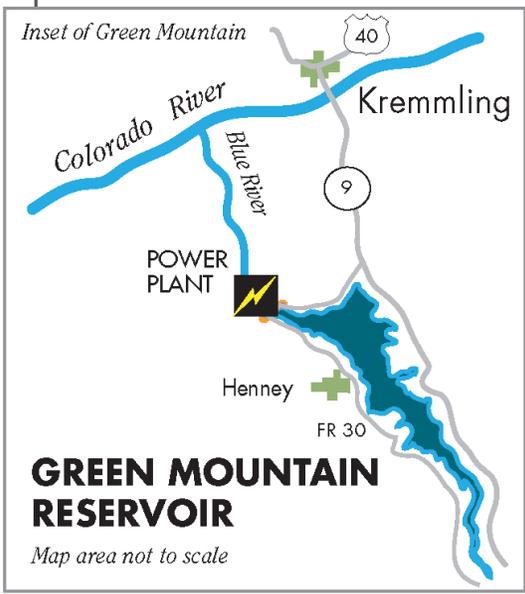
### Northern Water Boundaries and Facilities



# Water Collection and Distribution Systems



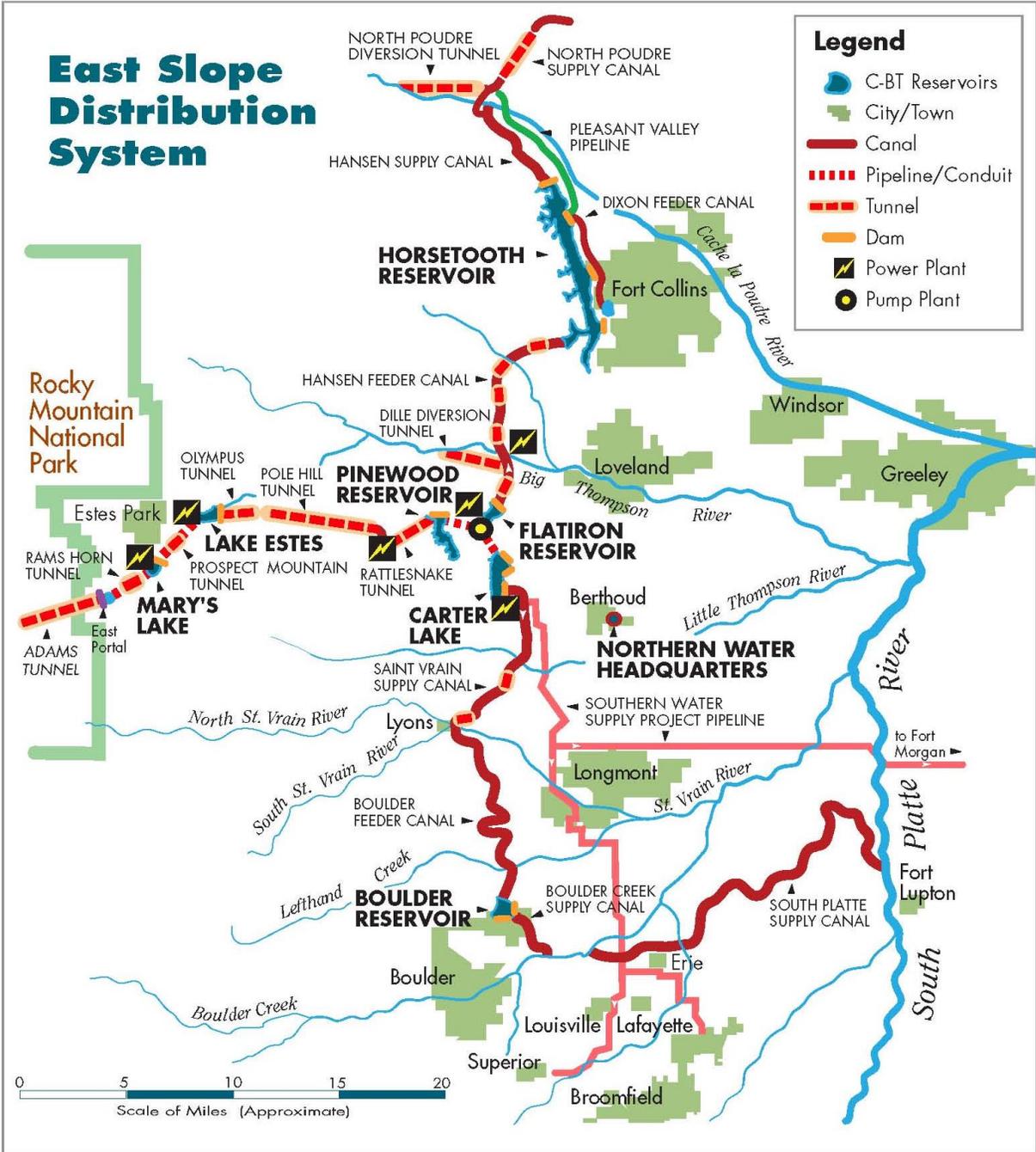
# West Slope Collection System



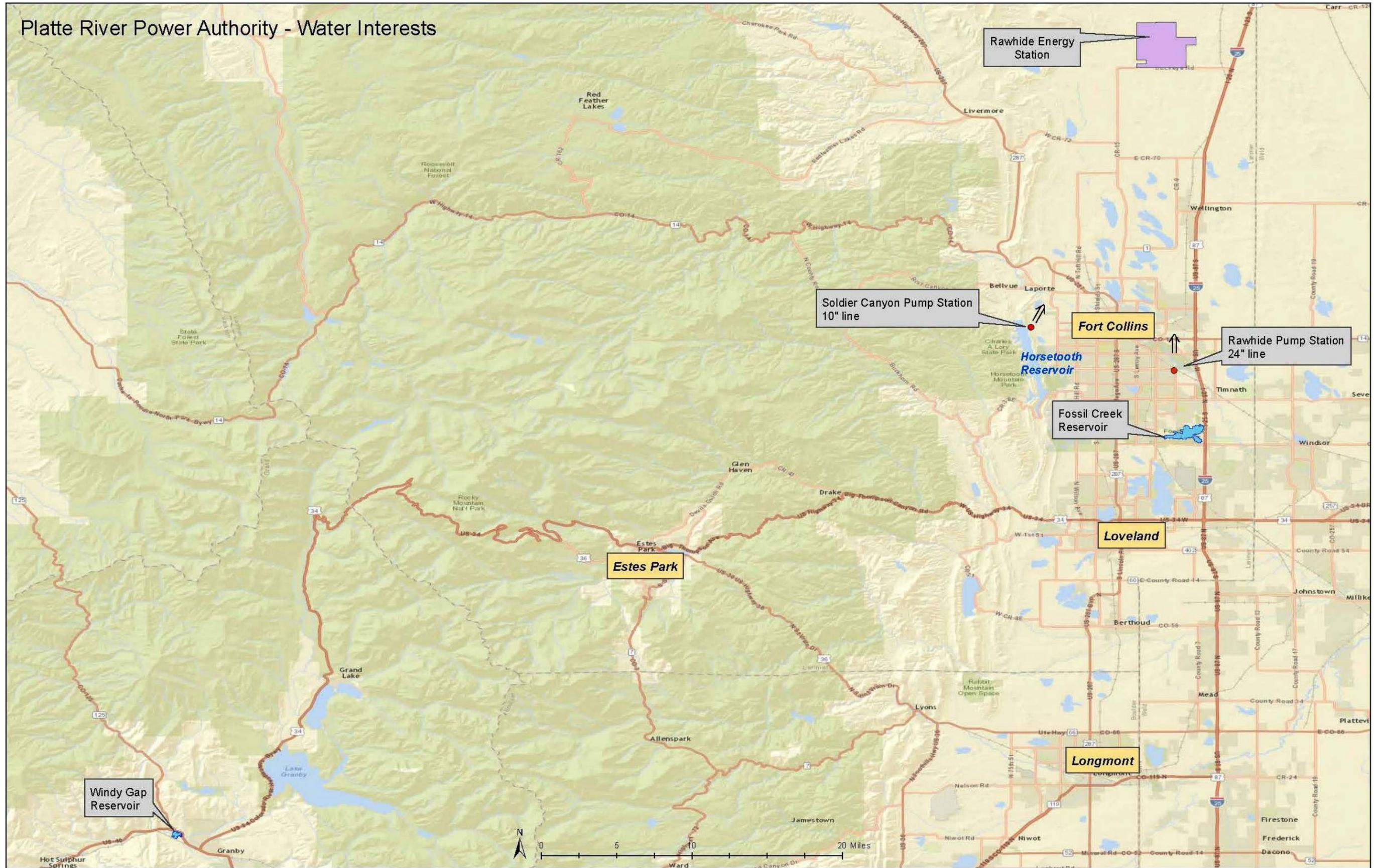
**Legend**

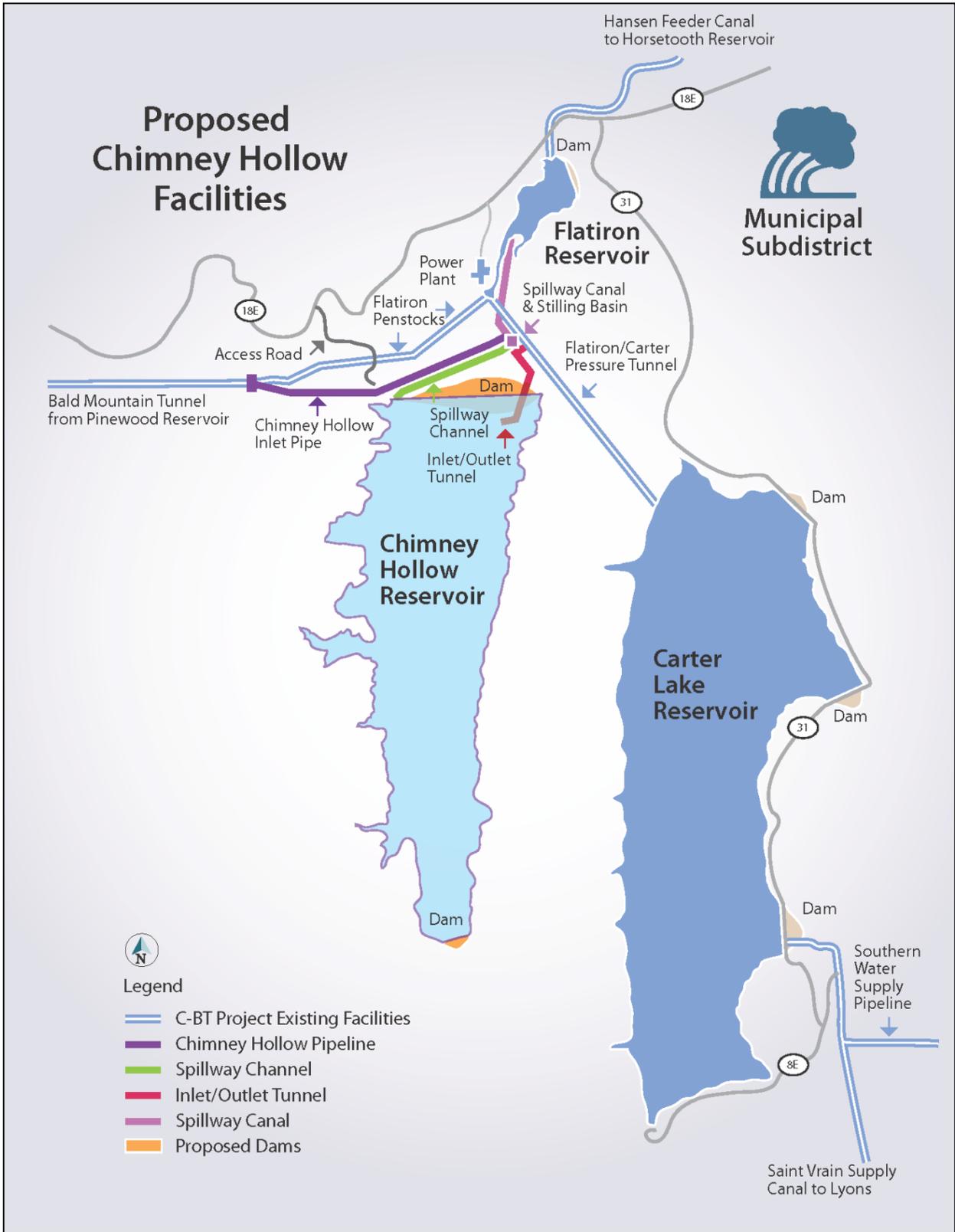
- C-BT Reservoirs
- City/Town
- Canal
- Pipeline/Conduit
- Tunnel
- Dam
- Power Plant
- Pump Plant

*Map not to scale*



# Platte River Power Authority - Water Interests





## **Appendix B – Reference materials**

## Platte River Power Authority water agreements

Agreement	Parties	Description	Starting date	Ending date
Reuse Agreement	Platte River, City of Fort Collins, Water Supply and Storage Company	Agreement is based on a series of exchanges in which Platte River supplies 4,200 af of Windy Gap water in exchange for 4,200 af of effluent (produced by the City of Fort Collins from new foreign water source), plus return flows of the Windy Gap water.	August 1978	In effect as long as water is required for electric generation (either at Rawhide or another location that return flows can be delivered to by Fort Collins).
Memorandum of Understanding (MOU)	Platte River, City of Fort Collins, Anheuser-Busch (AB InBev)	AB InBev can use up to 4,200 af of the Windy Gap water supplied to Fort Collins from Platte River. Platte River will receive the return flows from that use and will be compensated by AB InBev for the variable operation and maintenance costs.	April 1988	In effect as long as the AB InBev Fort Collins brewery and Rawhide Energy Station are operative.
North Poudre Storage Agreement	Platte River, North Poudre Irrigation Company	Allows Platte River to temporarily store reusable effluent in Fossil Creek Reservoir. There has been one amendment to this agreement to facilitate leases and specify accounting of Platte River's water balance in the event of a reservoir spill.	November 1979  1 <sup>st</sup> Amendment: September 2009	Dec. 31, 2024
Soldier Canyon Outlet Capacity	Platte River, City of Fort Collins	Provides Platte River with a 3 cfs tap from the Fort Collins raw water delivery system below the Soldier Canyon outlet from Horsetooth Reservoir.	February 1981	Perpetual so long as water is needed for power generation or related purpose.
Larimer County Augmentation Agreement	Platte River, Larimer County	Larimer County receives up to 100 af of reusable effluent from the MOU annually for augmentation of the County's Strang Gravel pit.	October 1993	Perpetual so long as Platte River's Rawhide Energy Station and the Strang Pit operate.
Carter Lake Outlet Agreement	Platte River, Northern Water	Provides Platte River with the delivery capacity of up to 10 cfs from Carter Lake outlet.	August 1993	Perpetual
Allotment Contract for Additional Carter Lake Outlet Capacity	Platte River, Northern Water	Provides Platte River with an additional 8 cfs capacity from Carter Lake outlet for a total of 18 cfs.	September 2001	Perpetual
Amendment to Allotment Contract for Carter Lake Outlet Capacity	Platte River, Northern Water	Amends the allotment contract to reflect the transfer of 13 cfs capacity to other entities. Platte River's final allocation is 5 cfs in total.	September 2018	Perpetual
Fort Collins Windy Gap Assignment Agreement	Platte River, City of Fort Collins	Assigns Fort Collins 1/6 share of Windy Gap to Platte River	July 1974	Perpetual
Estes Park Windy Gap Assignment Agreement	Platte River, Town of Estes Park	Assigns half of Estes Park 1/6 share of Windy Gap to Platte River	1974	Perpetual
Loveland Windy Gap Assignment Agreement	Platte River, City of Loveland	Assigns half of Loveland's 1/6 share of Windy Gap to Platte River	July 1974	Perpetual
Warren Lake	Platte River, Warren Lake Reservoir Co.	Fractional share as headquarters well back up		

Platte River Power Authority water rights/decrees, conditional exchanges are in blue

Decree	Description of water rights	Uses	Date of appropriation	Volume/flow rate	Outcome of original water court case	Absolute?	
W-9322-78	<b>Reuse component</b>	"All domestic, municipal, irrigation, and industrial purposes associated with the operation of a power plant and the development and maintenance of lands surrounding the power plan" & "fully consumable" See Page 9	December 1977	FC/WSSC - 7636 (average) AF of NFW PRPA - 4200 AF of effluent	Approved	Absolute	
	<b>Rawhide Pipeline</b>	Rawhide Pipeline is also referred to as the 24-inch pipeline		15.19 cfs	Conditional	Yes(82CW318)	
	<b>Rawhide Reservoir</b>	Rawhide Reservoir is also referred to as Hamilton Reservoir		13,600 AF	Conditional	Yes (83CW126; 87CW078)	
	<b>Exchanges</b>		For use in the reuse plan (which Court calls an "augmentation plan")				
	*Number correlates with number from pages 30-31 of decree						
	-1						
	Long Draw to Joe Wright					Conditional	Yes (83CW126)
	Joe Wright to Long Draw					Conditional	Yes (83CW126)
	-2						
	Long Draw to Horsetooth Reservoir					Conditional	Yes (83CW126)
Joe Wright to Horsetooth Reservoir					Conditional	Yes (83CW126)	
Horsetooth to Long Draw					Conditional	Yes (83CW126)	
Horsetooth to Joe Wright					Conditional	Yes (83CW126)	

Platte River Power Authority water rights/decrees, conditional exchanges are in blue

Decree	Description of water rights	Uses	Date of appropriation	Volume/flow rate	Outcome of original water court case	Absolute?
	-3					
	Joe Wright and:					
	<i>North Poudre Munroe Canal</i>				Conditional	Yes (83CW126)
	<i>Main Canal of North Poudre</i>			50 cfs	Conditional	Yes (03CW324)
	<i>Larimer and Weld Canal</i>				Conditional	
	<i>Larimer County Canal</i>			50 cfs	Conditional	Yes (03CW324)
	<i>Lake Canal</i>				Conditional	
	<i>Greeley No. 2 Canal</i>				Conditional	
	<i>Timnath Reservoir</i>				Conditional	
	Long Draw and:					
	<i>North Poudre Munroe Canal</i>				Conditional	Yes (83CW126)
	<i>Main Canal of North Poudre</i>			50 cfs	Conditional	Yes (03CW324)
	<i>Larimer and Weld Canal</i>				Conditional	
	<i>Larimer County Canal</i>				Conditional	
	<i>Lake Canal</i>				Conditional	
	<i>Greeley No. 2 Canal</i>				Conditional	
	<i>Timnath Reservoir</i>				Conditional	
	Horsetooth and:					
	<i>North Poudre Munroe Canal</i>				Conditional	
	<i>Main Canal of North Poudre</i>				Conditional	
	<i>Larimer and Weld Canal</i>				Conditional	
	<i>Larimer County Canal</i>				Conditional	
	<i>Lake Canal</i>				Conditional	
	<i>Greeley No. 2 Canal</i>				Conditional	
	<i>Timnath Reservoir</i>				Conditional	
	-4					
	All structures above and Rockwell Reservoir				Conditional	
	-5					
	All structures above and Milton Seaman				Conditional	
	All structures above and Barnes Meadow				Conditional	

Platte River Power Authority water rights/decrees, conditional exchanges are in blue

Decree	Description of water rights	Uses	Date of appropriation	Volume/flow rate	Outcome of original water court case	Absolute?
-6						
	Rawhide Pipeline and Fossil Creek Reservoir				Conditional	Yes (83CW126)
	Rawhide Pipeline and North Poudre No. 5				Conditional	
	Rawhide Pipeline and North Poudre No. 6				Conditional	
	Fossil Creek Reservoir to Rawhide Pipeline				Conditional	Yes (83CW126)
	North Poudre No. 5 to Rawhide Pipeline				Conditional	
	North Poudre No. 6 to Rawhide Pipeline				Conditional	
	Fossil Creek Reservoir to North Poudre No. 5			25 cfs	Conditional	Yes (03CW324)
	Fossil Creek Reservoir to North Poudre No. 6			25 cfs	Conditional	Yes (03CW324)
	North Poudre No. 5 to Fossil Creek Reservoir			25 cfs	Conditional	Yes (03CW324)
	North Poudre No. 6 to Fossil Creek Reservoir			25 cfs	Conditional	Yes (03CW324)
-7						
	Intake of Rawhide Pipeline to:					
	<i>Lake Canal</i>				Conditional	
	<i>Larimer and Weld Canal</i>				Conditional	
	<i>Timnath Reservoir Inlet</i>				Conditional	
	<i>Larimer County Canal</i>				Conditional	
	<i>North Poudre Canal</i>				Conditional	
	North Poudre No. 6 to:					
	<i>Lake Canal</i>				Conditional	
	<i>Larimer and Weld Canal</i>				Conditional	
	<i>Timnath Reservoir Inlet</i>				Conditional	
	<i>Larimer County Canal</i>				Conditional	
	<i>North Poudre Canal</i>				Conditional	

Platte River Power Authority water rights/decrees, conditional exchanges are in blue

Decree	Description of Water rights	Uses	Date of appropriation	Volume/flow rate	Outcome of original water court case	Absolute?
79CW158	Rawhide Reservoir, first enlargement	Same as W-9322-78	Jan. 31, 1979	4200 AF (enlarge from 13,600 AF to 17,800)	Conditional	Yes (89CW144, 1,498 abandoned)
82CW318	Rawhide Pipeline	Cooling water and sluice water, stockwater, irrigation and dust suppression	Dec. 31, 1977	15.19 (Absolute)	Absolute	Yes
82CW319	Rawhide Pipeline enlargement		June 22, 1982	1.6	Absolute (decree unclear, but application claims absolute)	Yes
83CW126	Long Draw Reservoir enlargement	storage for domestic, municipal, irrigation and industrial	Aug. 31, 1965	6,600 AF Absolute	6,600 AF absolute	Yes (89CW144)
	Rawhide Reservoir (under original W-9322-78 Decree)	Same as W-9322-78	Dec. 31, 1977	4,436 Absolute 9,164 Conditional	4,436 absolute 9,164 conditional	Yes (83CW126; 87CW078)
	<b>Exchanges</b>					
	<i>*Number correlates with number from pages 30-31 of decree</i>					
	-1					
	Long Draw to Joe Wright				Absolute	Yes
	Joe Wright to Long Draw				Absolute	Yes
	-2					
	Long Draw to Horsetooth Reservoir				Absolute	Yes
	Joe Wright to Horsetooth Reservoir				Absolute	Yes
	Horsetooth to Long Draw				Absolute	Yes
	Horsetooth to Joe Wright				Absolute	Yes
	-3					
	Long Draw to North Poudre Munroe Canal				Absolute	Yes
	Joe Wright and North Poudre Munroe Canal				Absolute	Yes

Decree	Description of water rights	Uses	Date of appropriation	Volume/flow rate	Outcome of original water court case	Absolute?
	-6					
	Rawhide Pipeline and Fossil Creek Reservoir				Absolute	Yes
	Fossil Creek Reservoir and Rawhide Pipeline				Absolute	Yes
<b>85CW219</b>	<b>Rawhide Reservoir, first enlargement</b>				2,798 AF conditional 1,498 abandoned	Yes (89CW144, 1,498 abandoned)
<b>87CW078</b>	<b>Rawhide Reservoir (under W-9322-78) All remaining conditional exchanges</b>				9,164 AF absolute Conditional - finding of diligence	Yes
<b>89CW144</b>	<b>Rawhide Reservoir, first enlargement</b>				2,708 absolute	Yes
<b>95CW116</b>	<b>All remaining conditional exchanges</b>				Conditional - finding of diligence	
<b>03CW324</b>	<b>Certain exchanges</b>					
	-2					
	Joe Wright and:					
	<i>Main Canal of North Poudre</i>			50 cfs	Absolute	Yes
	<i>Larimer County Canal</i>			50 cfs	Absolute	Yes
	Long Draw and:					
	<i>Main Canal of North Poudre</i>			50 cfs	Absolute	Yes
	-6					
	Fossil Creek Reservoir to North Poudre No. 5			25 cfs	Absolute	Yes
	Fossil Creek Reservoir to North Poudre No. 6			25 cfs	Absolute	Yes
	North Poudre No. 5 to Fossil Creek Reservoir			25 cfs	Absolute	Yes
	North Poudre No. 6 to Fossil Creek Reservoir			25 cfs	Absolute	Yes
	<b>All other conditional exchanges</b>				Conditional-finding of diligence	



# Platte River Power Authority

## 2030 Water consumption projections

The following chart includes three potential options for Platte River’s resource mix based on 2019/2020 modeling by Platte River staff. These options were developed for planning purposes and are meant to be representative of potential generation resources and are not intended to be comprehensive in any way.

	Water consumption rate gal/MWhr	Installed capacity MW	Annual capacity factor	Annual generation MWh	Annual water needs for generation (million gallons)	Annual water needs for generation acre-feet	Annual site needs and obligations acre-feet	Total annual water demand acre-feet
<u>Option 1: LMS 100 GT and LM6000 CCGT</u>								
Existing CT units	26	388	10%	339,888	9	27		
LMS 100, GT	189	96	10%	84,271	16	49		
LM6000 2X1, CCGT	531	96	70%	589,898	313	961		
<b>Total</b>		<b>580</b>			<b>338</b>	<b>1,037</b>	<b>1,800</b>	<b>2,837</b>
<u>Option 2: 7F CCGT</u>								
Existing CT units	26	388	5%	169,944	4	14		
GE 7F CCGT	530	226	60%	1,187,856	630	1,932		
GE 7F CCGT with duct firing	1,251		10%	197,976	248	760		
<b>Total</b>		<b>614</b>			<b>882</b>	<b>2,706</b>	<b>1,800</b>	<b>4,506</b>
<u>Option 3: Nuclear</u>								
Existing CT units	26	388	10%	339,888	9	27		
Nuclear	830	200	60%	1,051,200	872	2,678		
<b>Total</b>		<b>588</b>			<b>881</b>	<b>2,705</b>	<b>1,800</b>	<b>4,505</b>

\* Annual site needs and obligations includes 1,800 acre-feet of water for Reuse Plan obligations, potable/process water at Rawhide and maintenance of Rawhide reservoir.



## Technical Memorandum

**Date:** September 2, 2020  
**To:** Heather Banks, Chris Fields  
**From:** Heather Thompson  
**Re:** WGFP Model Analyses

The following memorandum summarizes additional Windy Gap Firming Project (WGFP) Model analyses that were conducted to evaluate different levels of Windy Gap unit ownership and storage in Chimney Hollow for Platte River Power Authority (Platte River). Five different levels of storage in the proposed Chimney Hollow Reservoir were analyzed for Platte River including 8,000 ac-ft, 10,000 ac-ft, 12,000 ac-ft, 14,000 ac-ft, and 16,000 ac-ft. For each storage amount, ERC analyzed three levels of Windy Gap ownership (i.e. number of Windy Gap units owned by Platte River) including 60 units, 80 units, and 100 units. In addition, an ownership level of 120 units was evaluated for a storage level of 14,000 ac-ft and 16,000 ac-ft since that is Platte River's current Windy Gap unit ownership and subscription to storage in Chimney Hollow. For each combination of storage and ownership, ERC determined Platte River's firm yield, which is the demand that could be met without any shortages throughout the model study period.

### WGFP Model Scenario and Assumptions

A detailed description of the WGFP Model is provided in the Windy Gap Firming Project Modeling Report (Boyle 2003) and the Addendum to the WGFP Modeling Report (Boyle 2006). The WGFP Model was relied on to provide hydrologic data and information on firm yield for alternatives analyzed in the WGFP EIS. The model operates on a monthly time step for a study period that extends from 1950 through 1996.

The WGFP Model scenario that was used for this analysis is Chimney Hollow Reservoir with repositioning under future conditions, which includes reasonably foreseeable future actions. ERC evaluated several storage and ownership levels for Platte River using a similar WGFP Model scenario in 2014. However, since that time there have been several modifications to Windy Gap operating agreements and other participants' Windy Gap ownership and storage levels in Chimney Hollow. The most notable changes that affect the WGFP model are listed below:

- The 1990 Windy Gap Carriage Contract was renegotiated and delivery charges as well as carryover charges for Windy Gap water remaining in Lake Granby each March 31 changed.
- The City of Evans is no longer a participant in the WGFP.
- Several WGFP participants have modified their Windy Gap unit ownership and the storage they have subscribed to in Chimney Hollow.

- Agreements were reached with Grand County and Middle Park Water Conservancy District regarding storage and firming of their Windy Gap water and temperature mitigation.

Key model assumptions that are pertinent to the changes listed above and Platte River's operations are described below.

### **1. Platte River Demand**

Platte River's annual demand was distributed monthly based on Windy Gap delivery data from 2009 through 2011. This data was relied on for modeling completed previously for Platte River in 2014 and the demand distribution was not updated for this effort. It was assumed that 10% of Platte River's annual demand would be delivered each month from March through September and 6% of Platte River's annual demand would be delivered each month during the remaining five months.

### **2. Platte River's Windy Gap Unit Ownership**

Platte River currently owns 120 units Windy Gap units, which entitles Platte River to one-quarter of the Windy Gap water supply. Platte River requested that ERC analyze three different levels of Windy Gap ownership including 100 units, 80 units, and 60 units. For ownership levels less than 120 units, it was assumed that Windy Gap units not used by Platte River were used partially by another entity participating in the firming project and partially by an entity that is not participating in the WGFP. As Platte River's storage was decreased, it was assumed that storage was acquired by another participant so the total size of Chimney Hollow did not change. Approximately 7 of Platte River's Windy Gap units were reallocated to another participant for every 2,000 ac-ft (~300 ac-ft per Windy Gap unit) of firming storage that was reallocated from Platte River to another participant. **Table 1** summarizes the reallocation of Platte River's storage and Wind Gap units to other participants and non-participants for each scenario analyzed.

### **3. Prepositioning**

The WGFP scenario that was evaluated includes prepositioning since the renegotiated Carriage Contract allows for that operating program. With prepositioning, Windy Gap water is not physically delivered through the Adams Tunnel. Instead, C-BT water is delivered into Chimney Hollow Reservoir primarily during the fall and winter to occupy storage space that is not occupied by Windy Gap water. This creates space for Windy Gap water in Granby Reservoir. When Windy Gap water is delivered into Granby Reservoir, the C-BT water in Chimney Hollow Reservoir is exchanged for a like amount of Windy Gap water in Granby Reservoir.

### **4. Diversion Shrink**

Windy Gap Project water is diverted from the Colorado River just downstream of the confluence of the Colorado and Fraser Rivers at Windy Gap Reservoir. In the model, Windy Gap diversions are subject to a 10% "diversion shrink" when water is delivered into Granby Reservoir. The WGFP Model includes the 10%

diversion shrink for all scenarios evaluated. The 10% diversion shrink in the model is similar to the renegotiated Carriage Contract, which includes a 5% diversion shrink on water delivered into Granby Reservoir and another 5% shrink when Windy Gap water is delivered to the East Slope either physically or by exchange via prepositioning. The WGFP model does not have the ability to split losses between water delivered into Granby and water delivered to the East Slope; however, the total loss applied is correct when water is delivered to the East Slope.

## **5. Carryover Shrink**

The previous 1990 Carriage Contract included a 10% carryover shrink assessed on any Windy Gap water remaining in Granby Reservoir on March 31 with the shrink amount credited to the C-BT Project. The renegotiated Carriage Contract reduced the carryover shrink from 10% to 5%. Therefore, the WGFP Model was revised and the carryover shrink was reduced to 5% for all scenarios evaluated.

## **6. Reintroduction Shrink**

In addition to diversion and carryover shrink, the renegotiated Carriage Contract includes reintroduction shrink that is assessed on water that is *physically* delivered from Chimney Hollow when Windy Gap water is reintroduced into the C-BT system after it has been stored in Chimney Hollow. Platte River anticipates taking delivery of their Windy Gap water stored in Chimney Hollow via exchanges whereby C-BT water is released from Horsetooth Reservoir and an equivalent amount of Windy Gap water is booked over from the PRPA's account to the C-BT account in Chimney Hollow Reservoir. The WGFP Model was previously configured so that all deliveries from Chimney Hollow Reservoir to Platte River are physically released from the reservoir. While it is difficult to accurately predict when Windy Gap water would be delivered via exchange versus directly from Chimney Hollow Reservoir, the model was revised so that reintroduction shrink is not charged on deliveries from Chimney Hollow Reservoir since it is anticipated that deliveries to most participants will occur primarily via exchanges.

## **7. Mitigation Measures**

Several mitigation measures have been established to offset or minimize impacts from implementation of the WGFP. The *Fish and Wildlife Mitigation Plan* (FWMP) that was developed by the Subdistrict in cooperation with the Colorado Division of Parks and Wildlife (CDPW) was adopted by the Colorado Wildlife Commission on June 9, 2011 and by the Colorado Water Conservation Board on July 13, 2011. The principal mitigation measure that has the potential to affect Platte River's firm yield is the curtailment of WGFP diversions after July 15 when temperatures in the Colorado River below Windy Gap Reservoir and above the Williams Fork River exceed the chronic or acute temperature standard. To reflect the potential impact of this mitigation measure in the model, each scenario was simulated with Windy Gap pumping curtailed in August. Potential reductions in Windy Gap pumping in July as a result of temperature mitigation would likely be small and infrequent; therefore, no changes were made to reflect temperature mitigation in July in the model.

## 8. Agreements with Middle Park Water Conservancy District and Grand County

The Participants have negotiated an agreement with Middle Park Water Conservancy District (MPWCD) and Grand County that would provide firm annual and variable yield to both MPWCD and Grand County. MPWCD's firm annual yield would consist of a combination of 850 ac-ft/yr and 1,450 ac-ft/yr for a total of 2,300 ac-ft/yr. In addition, the agreement allows MPWCD and Grand County to receive "variable yield", defined as a portion of the amount pumped by the WGFP participants. This agreement was not incorporated in the model due to the complexities of the various conditions of the agreement and limitations with the current operating rules available in the model. The model reflects that MPWCD's firm yield is generated by the first 3,000 ac-ft/yr of Windy Gap water pumped. In other words, that yield is not derived from the participant's Windy Gap supplies. This configuration provides a reasonable approximation of the potential impacts on the participant's firm yield since the first 3,000 ac-ft of Windy Gap water pumped is not available to the participants and is used to generate firm yield for MPWCD. Previous analyses conducted for NCWCD to evaluate the effects of this agreement show that Platte River's firm yield is not affected by reductions in their supply associated with variable yield provided to MPWCD and Grand County. Because Platte River has such a large portion of the Windy Gap supply in relation to their firming storage and demand, Platte River is still able to fill their Chimney Hollow Reservoir account in most average and wet years despite potential reductions in their supply associated with this agreement. While previous modeling showed there was no reduction in Platte River's firm yield associated with this agreement at an ownership level of 160 units, the risk of a reduction in firm yield increases at lower ownership levels.

### Model Results Summary

**Table 2** provides a summary of the results for the model scenarios evaluated. The results presented in **Table 2** are based on a 47-year study period from 1950 through 1996. The critical period for Platte River typically extends from the fall of 1953 when Platte River's account fills through the spring of 1956 when it empties. During this drought, which occurs once in the 47 year study period, model results show there would be no pumping in 1954 and approximately 7,600 ac-ft pumped in 1955.

#### *Model Results for Storage of 16,000 ac-ft*

Because several participants' Windy Gap unit ownership and storage levels have changed since modeling work was previously done for Platte River in 2014, ERC completed a revised model run that includes each participant's current Windy Gap ownership and storage levels in Chimney Hollow. The results of this run are shown in **Table 3**.

Platte River's firm yield at its current ownership and storage level is 6,110 ac-ft/yr. Platte River's firm yield at this ownership and storage level was previously estimated to be 5,645 ac-ft/yr in 2014. The increase in firm yield is primarily because a reintroduction shrink of 5% is not charged on Platte River's deliveries in the current version of the model since Platte River anticipates taking delivery of its Windy Gap water

mainly via exchanges, which do not incur a loss. There is also an impact on Platte River's yield due to changes in other non-participants' and participants' Windy Gap ownership levels, storage in Chimney Hollow, and demands. These changes impact each entity's Windy Gap supplies, storage levels in Granby Reservoir and Chimney Hollow, and bookovers that occur among participants and non-participants when Granby Reservoir fills. In addition, C-BT storage contents are different because modifications were made to carryover shrink and reintroduction shrink. Changes in C-BT contents affect the timing and magnitude of spills at Granby Reservoir, which can impact the timing and magnitude of Windy Gap bookovers among participants and non-participants when spills occur. Finally, previous model results at 120 units were interpolated because model runs in 2014 were completed at ownership levels of 100 units and 160 units and the results for intermediate ownership levels were interpolated. Current results at an ownership level of 120 units are more accurate because they are based on a model run as opposed to interpolation.

At lower Windy Gap ownership levels and 16,000 ac-ft of storage, Platte River's firm yield ranges from 4,410 ac-ft/yr at an ownership level of 60 units up to 5,775 ac-ft /yr at an ownership level of 100 units. The firm yield decreases at a higher rate as ownership levels of 100 units and less. At an ownership level of 100 units, the Windy Gap supply is not sufficient to fill Platte River's account at the start of the critical period and as a result the additional storage operates less efficiently. At 16,000 ac-ft of storage, Platte River is supply limited if it reduces the number of units owned to 100 units or less. When Platte River decreases its ownership to 80 units or less, the critical period changes from the 1950's drought to the period from 1961 through 1968, which is a more prolonged dry period with below average Windy Gap diversions. With fewer Windy Gap units, Platte River would be more vulnerable to reductions in firm yield that could potentially occur due to climate change and operations such as those related to the MPWCD and Grand County agreement that are difficult to predict.

#### *Model Results for Storage Level of 14,000 ac-ft*

Windy Gap ownership levels of 100 and 120 units were analyzed at 14,000 ac-ft of storage. Platte River's firm yield ranges from 5,265 ac-ft /yr at an ownership level of 100 units up to 5,595 ac-ft /yr at an ownership level of 120 units. At an ownership level of 100 units, the Windy Gap supply is not sufficient to fill Platte River's account at the start of the critical period. At 14,000 ac-ft of storage, Platte River is supply limited if it reduces the number of units owned to 100 units or less.

#### *Model Results for Storage Level of 12,000 ac-ft*

At 12,000 ac-ft of storage, Platte River's firm yield ranges from 3,955 ac-ft /yr at an ownership level of 60 units up to 4,750 ac-ft /yr at an ownership level of 100 units. The firm yield decreases substantially as ownership levels are decreased below 100 units. For example, the decrease in yield between 100 units and 80 units is 325 ac-ft/yr whereas the decrease in yield between 80 units and 60 units is 470 ac-ft/yr. At ownership levels of less than 100 units, Platte River is supply limited because its Windy Gap supply is not sufficient to fill its Chimney Hollow account at the start of the critical period and as a result the storage operates less efficiently. When Platte River decreases its ownership to 60 units, the critical period changes from the 1950's drought to the period from 1961 through 1968.

The increase in yield for each additional 20 Windy Gap units is fairly small at ownership levels of about 100 units or higher. That is because Platte River's 12,000 acre-foot storage account is full prior to the critical period at ownership levels greater than 100 units, in which case, Platte River is storage limited and there is little additional Windy Gap supply provided by additional units during the critical period.

#### *Model Results for Storage Level of 10,000 ac-ft*

At 10,000 ac-ft of storage, Platte River's firm yield ranges from 3,545 ac-ft/yr at an ownership level of 60 units up to 4,150 ac-ft /yr at an ownership level of 100 units. The firm yield decreases substantially as ownership levels are decreased below 80 units. For example, the decrease in yield between 100 units and 80 units is 250 ac-ft/yr whereas the decrease in yield between 80 units and 60 units is 355 ac-ft/yr. At ownership levels less than 80 units, Platte River is supply limited because its Windy Gap supply is not sufficient to fill their Chimney Hollow account at the start of the critical period. At 80 units, Platte River's account in Chimney Hollow fills at the start of the critical period in 1953; however, it fills one month earlier than it would if Platte River owned 100 units. There would be little incremental yield at ownership levels greater than 100 units.

#### *Model Results for Storage Level of 8,000 ac-ft*

At 8,000 ac-ft of storage, Platte River's firm yield ranges from 3,050 ac-ft /yr at an ownership level of 60 units up to 3,415 ac-ft /yr at an ownership level of 100 units. The firm yield decreases substantially as ownership levels are decreased below 80 units. For example, the decrease in yield between 100 units and 80 units is only 75 ac-ft/yr whereas the decrease in yield between 80 units and 60 units is 290 ac-ft/yr. That is because Platte River's account fills at the start of the critical period at ownership levels of 80 and 100 units in which case it is storage limited. However, at an ownership level of 60 units, Platte River's Windy Gap supply is not sufficient to fill its Chimney Hollow account at the start of the critical period.

In summary, given the trade-offs between supply and storage, ERC recommends maintaining a Windy Gap ownership level of 120 units at 14,000 ac-ft or 16,000 ac-ft of storage, 100 to 120 units at 12,000 ac-ft of storage, 80 to 100 units at 10,000 ac-ft of storage and 60 to 80 units at 8,000 ac-ft of storage. The risk of incurring shortages during short, severe droughts is higher if Platte River reduces the number of Windy Gap units it owns. This also applies to potential impacts associated with the agreement with MPWCD and Grand County. The risk of a reduction in firm yield associated with that agreement increases at lower ownership levels.

### **Synthetic Drought Analysis**

A separate analysis was conducted outside of the WGFP Model to determine the demand that could be met under a synthetic two-year and three-year drought assuming that no Windy Gap Water is pumped for two and three years in a row, respectively. While the model shows there are five years during the study period when little to no Windy Gap water was pumped, there are no sequences of back to back years with no Windy Gap pumping. A 2-year period of no Windy Gap pumping has a recurrence interval

of about 1 in 57 years whereas a 3-year period of no pumping has a recurrence interval of about 1 in 250 years.

The firm yield was determined using the modeled contents of Platte River's storage account in July 1953 for each storage and Windy Gap ownership level as the contents at the start of the synthetic drought. This differs from the analysis that was completed in 2014, which assumed that Platte River's account was full at the start of the synthetic drought. This change was made current modeling shows that Platte River's account was often not full at the start of the critical period at lower Windy Gap ownership levels. Another difference with the previous analysis is that the current analysis does not include reintroduction shrink on deliveries out of Platte River's account in Chimney Hollow.

The results of this analysis are presented in **Table 2**. Under a 2-year drought, the firm yield would range from 2,875 ac-ft at a storage level of 8,000 ac-ft up to 5,755 ac-ft at a storage level of 16,000 ac-ft. Under a 3-year drought, the firm yield would range from 2,060 ac-ft at a storage level of 8,000 ac-ft up to 4,120 ac-ft at a storage level of 16,000 ac-ft. At each storage level, the firm yield increases at higher ownership levels because the contents in PRPA's account were higher at the start of the synthetic drought.

**Table 1: Distribution of Platte River’s Windy Gap Units and Storage**

Platte River Storage	Platte River WG Units	Platte River Storage Reallocated to Participants	Platte River WG Units Reallocated to Non-Participants	Platte River WG Units Reallocated to Participants
16,000	120	0	0	0
16,000	100	0	20	0
16,000	80	0	40	0
16,000	60	0	60	0
14,000	120	2,000	0	0 <sup>1</sup>
14,000	100	2,000	7	13
12,000	100	4,000	7	13
12,000	80	4,000	27	13
12,000	60	4,000	47	13
10,000	100	6,000	0	20
10,000	80	6,000	20	20
10,000	60	6,000	40	20
8,000	100	8,000	0	20
8,000	80	8,000	13	27
8,000	60	8,000	33	27

Notes:

1: 7 units owned by non-participants were reallocated to a participant to accompany the 2,000 ac-ft of storage that was reallocated from PRPA to another participant.

**Table 2: Summary of Windy Gap Firming Project Model Results**

Platte River Windy Gap Units	Demand (AF)	No Reintroduction Shrink & Temperature Mitigation <sup>1</sup>		No Reintroduction Shrink & 2-yr Drought with No WG Pumping <sup>2</sup>		No Reintroduction Shrink & 3-yr Drought with No WG Pumping <sup>3</sup>	
		Storage	S:FY Ratio	Storage	S:FY Ratio	Storage	S:FY Ratio
120	6,110	16,000	2.62				
100	5,775	16,000	2.77				
80	5,280	16,000	3.03				
60	4,410	16,000	3.63				
120	5,755			16,000	2.78		
100	5,480			16,000	2.92		
80	5,225			16,000	3.06		
60	4,410 <sup>4</sup>			16,000	3.63		
120	4,120					16,000	3.88
100	3,925					16,000	4.08
80	3,740					16,000	4.28
60	3,565					16,000	4.49
120	5,595	14,000	2.50				
100	5,265	14,000	2.66				
120	5,230			14,000	2.68		
100	4,970			14,000	2.82		
120	3,745					14,000	3.74
100	3,560					14,000	3.93
100	4,750	12,000	2.53				
80	4,425	12,000	2.71				
60	3,955	12,000	3.03				
100	4,445			12,000	2.70		
80	4,180			12,000	2.87		
60	3,910			12,000	3.07		
100	3,180					12,000	3.77
80	2,995					12,000	4.01
60	2,800					12,000	4.29
100	4,150	10,000	2.41				
80	3,900	10,000	2.56				
60	3,545	10,000	2.82				
100	3,735			10,000	2.68		
80	3,660			10,000	2.73		
60	3,365			10,000	2.97		
100	2,675					10,000	3.74

Platte River Windy Gap Units	Demand (AF)	No Reintroduction Shrink & Temperature Mitigation <sup>1</sup>		No Reintroduction Shrink & 2-yr Drought with No WG Pumping <sup>2</sup>		No Reintroduction Shrink & 3-yr Drought with No WG Pumping <sup>3</sup>	
		Storage	S:FY Ratio	Storage	S:FY Ratio	Storage	S:FY Ratio
80	2,620					10,000	3.82
60	2,410					10,000	4.15
100	3,415	8,000	2.34				
80	3,340	8,000	2.40				
60	3,050	8,000	2.62				
100	2,985			8,000	2.68		
80	2,985			8,000	2.68		
60	2,875			8,000	2.78		
100	2,140					8,000	3.74
80	2,140					8,000	3.74
60	2,060					8,000	3.88

Notes:

- 1: No Windy Gap pumping was allowed in August to reflect potential mitigation for temperature standard exceedances.
- 2: These results were calculated assuming a 2-year drought with no Windy Gap pumping.
- 3: These results were calculated assuming a 3-year drought with no Windy Gap pumping.
- 4: The critical period shifts to 1961-1968 when Platte River's ownership drops to 60 units with 16,000 ac-ft of storage, therefore, the firm yield is not impacted if there is no pumping in 1954 and 1955.

**Table 3: Model Results for Current Windy Gap Unit Ownership and Storage Levels in Chimney Hollow**

Participant	WG Units	Storage (ac-ft)	Storage/WG Unit (ac-ft/unit)	Firm Yield (ac-ft)	S:FY Ratio
Loveland	40	9,587	240	2,820	3.40
Superior	15	4,726	315	1,205	3.92
Greeley	49	9,189	188	2,910	3.16
Longmont	80	8,000	100	3,165	2.53
Broomfield	56	26,464	473	5,455	4.85
Louisville	9	2,835	315	720	3.94
Platte River	120	16,000	133	6,110	2.62
Erie	20	6,000	300	1,575	3.81
CWCWD	1	346	346	83	4.17
Little Thompson	19	4,850	255	1,380	3.51
Ft. Lupton	13	1,103	85	475	2.32
Lafayette	3	900	300	228	3.95
<b>Total</b>	<b>425</b>	<b>90,000</b>		<b>26,126</b>	<b>3.44</b>

**Appendix C – Water Resources Policy document**

 <b>Platte River</b> Power Authority	<h1>Policy</h1>	Version #: 1.1 Effective date: 02/27/2020 Next review date: 02/27/2023
	TITLE: Water Resources Policy	Page 1 of 3

**Purpose:**

This policy provides direction to the Platte River General Manager/CEO on activities related to securing a reliable source of water for operations and the management of water rights and resources as an asset of the organization.

**Policy:**

Water is critical to the reliable operation of the Rawhide Energy Station (Rawhide) and may be necessary for the reliable operation of future generation resources. Platte River's initial ownership of 160 units of the Windy Gap Project (one third of the total project) was anticipated to be sufficient supply for the initial and future needs of the organization. Based on this assumption, and in an effort to make the most efficient and responsible use of water, Platte River entered into several significant water agreements, including but not limited to the Reuse Agreement, the Memorandum of Understanding, the North Poudre Storage Agreement, the Soldier Canyon Outlet Agreement and the Carter Lake Outlet Agreement. These agreements are discussed in detail in the **Platte River Power Authority Water Resources Reference Document**.

Operational history has revealed the limitations of the Windy Gap Project; it is often constrained by the junior priority of its water rights as well as by the project's dependence on the use of Colorado-Big Thompson infrastructure for storage and delivery of water. While ownership of a significant number of Windy Gap units proved advantageous during periods in which the Windy Gap Project failed to fully deliver water, the Windy Gap Firming Project will offer greater reliability than unit ownership alone. Moreover, growth in the Northern Colorado region has placed increased pressure on water resources and necessitates more active management of the Platte River water resources as an asset of the organization and member communities. By participating in the Windy Gap Firming Project, Platte River will reduce its overall need for Windy Gap Project units and gain flexibility to manage the units as an asset in future water resources operations.

It is the intent of the board that this policy will position Platte River to pursue activities that will: increase the reliability of water deliveries to meet contractual commitments and the operational needs of the organization; and, maximize the operational and economic value of its water resources, which include but are not limited to Windy Gap units, outlet capacity, storage allocations in the Windy Gap Firming Project, and treated effluent received through the operation of water exchanges.

Consequently, the General Manager/CEO is instructed to:

1. Maintain adequate water supplies for all existing and projected future operations. To do so, the General Manager/CEO is authorized to:
  - a. Maintain Platte River's participation level in the Windy Gap Firming Project at a storage level of 16,000 acre feet.



# Policy

TITLE: Water Resources Policy

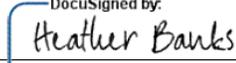
Page 2 of 3

- b. Lease water required for Platte River operations and contractual commitments as needed.
- c. Participate in Platte River's resource planning efforts to incorporate planning for future water needs, with considerations for type and location of future generation resources.
- d. Continue to research and explore alternative water supply opportunities.
- e. Review and modify existing water agreements and pursue new agreements to improve operations, increase reliability, and maximize the value of water resources assets.

2. Manage water as an asset. To do so, the General Manager/CEO is authorized to:

- a. Lease water:
  - i. Lease reusable effluent
    - o Water that cannot be pumped or exchanged from Fossil Creek Reservoir is at risk of uncompensated loss. Pumping activity should be managed to minimize storage of effluent, but Platte River will also be proactive in the markets through which any at-risk water may be leased.
  - ii. Lease of Windy Gap units
    - o Leases of Windy Gap units can be of any duration and/or quantity, so long as Platte River maintains control of a minimum of one hundred (100) units.
  - iii. The General Manager/CEO will inform the board of leasing activity.
- b. Sell Windy Gap Units:
  - i. Platte River may sell Windy Gap units, so long as Platte River maintains control of a minimum of one hundred (100) units.
  - ii. Compensation may be monetary, may involve water storage rights, or may involve other forms of consideration that provide value.
  - iii. The General Manager/CEO will inform the board of any sale of Windy Gap units.
- c. Sell/Lease Carter Lake outlet capacity
  - i. Maintain a minimum of five (5) cfs of Carter Lake outlet capacity.
  - ii. Platte River may lease Carter Lake outlet capacity, so long as five (5) cfs can be made available for operational needs when required.
  - iii. The General Manager/CEO will inform the board of the sale or lease of Carter Lake outlet capacity.

 <b>Platte River</b> Power Authority	<h1>Policy</h1>	Version #: 1.1 Effective date: 02/27/2020 Next review date: 02/27/2023
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<b>Document owner:</b> Fuels and Water Manager <small>DocuSigned by:</small>  2/19/2020		<b>Effective date:</b> 02/27/2020
<small>729E0E33705D448...</small> <b>Authority:</b> Board of Directors 		<b>Review frequency:</b> Every 3 years
<b>Counsel review:</b> General Counsel <small>DocuSigned by:</small>  2/19/2020		<b>Review date:</b> 02/27/2023
<b>Implementing parties and assigned responsibilities:</b>		
The General Manager/CEO will have primary responsibility for implementation.		
<b>Associated Items (if applicable):</b>		
Platte River has prepared, and annually updates, the <b>Platte River Power Authority Water Resources Reference Document</b> . This reference provides a detailed explanation of Platte River's water resources and infrastructure, the operational uses of water, and the underlying agreements that support our water portfolio and define the rights and obligations associated with our water assets. The <b>Water Resources Reference Document</b> forms the underpinnings for this policy.		
<b>Definitions (if applicable):</b>		

Version	Date	Action	Author	Change tracking (new, review, revision)
Original	12/08/2016	Original policy by Board Resolution 24-16	Heather Banks	Original
1.1	02/27/2020	Updated to AP style and revised to account for current asset ownership	Heather Banks	Revision

## **Appendix D – Glossary**

## Glossary of water terms

for Platte River Water Resources Reference Document

### A

**Acre-foot:** The volume of water that would cover one acre of land to a depth of one foot.

**Augmentation:** A requirement to put water into the stream to prevent reductions in streamflow caused by pumping a well (or some other water use) from affecting the amount of water available to water rights on that stream and the remainder of the stream system.

### C

**C-BT:** Colorado Big Thompson Project. The Colorado-Big Thompson Project collects water from the upper Colorado River basin on the West Slope and delivers the water beneath the Continental Divide to Colorado's East Slope. The C-BT Project uses a complex system of reservoirs, pump plants, tunnels, pipelines and power plants and relies on two basic forces of nature: melting snow and gravity. After flowing through the power system, water is stored in three East Slope terminal reservoirs: Horsetooth Reservoir west of Fort Collins; Carter Lake southwest of Berthoud; and Boulder Reservoir northeast of Boulder.

**CFS:** Cubic feet per second. One CFS equals 1.98 acre-feet per day.

**Chimney Hollow Reservoir Project:** The central component of the Windy Gap Firming Project, Chimney Hollow Reservoir is the result of a collaborative effort by 12 project participants to improve the reliability of the Windy Gap Project. The reservoir will be located just west of Carter Lake in Larimer County and its 90,000 acre-feet of dedicated storage capacity will supply a reliable 30,000 acre-feet of water each year to project participants. This project will not take water away from irrigated agriculture or other users, but will utilize the existing water rights currently associated with The Windy Gap Project.

**Colorado Water Division 1:** One of seven water divisions in the state of Colorado. Division 1 includes the South Platte River Basin, the Republican River Basin and the Laramie River Basin. Geographically, Division 1 is located in the northeast quadrant of Colorado.

**Cooling water:** reusable effluent stored in Hamilton Reservoir that is used to cool Rawhide Unit 1.

## E

**EIS:** Environmental Impact Statement – a document prepared to describe the impacts on the environment as a result of a proposed action. It also describes impacts of alternatives as well as plans to mitigate the impacts.

## F

**Firm water:** Firm water can be relied upon and is available even during a drought.

**Fully consumable water:** Water that can be used and reused to extinction. This is imported, non-native water in which the return flows have not been historically relied upon.

## I

**Integrated Operations:** A protocol in which C-BT Project water may be delivered to Windy Gap participants in-lieu of Windy Gap water when it isn't available. Replacement of C-BT water is required from Windy Gap water pumped in subsequent periods.

## M

**Municipal Subdistrict:** It is a separate conservancy district within the Northern Colorado Water Conservancy District. It was formed by several municipalities to build and operate the Windy Gap Project.

## N

**New foreign water:** Water that is introduced into the Cache La Poudre Basin from the Colorado and Michigan River Basins and whose return flows historically have not been used by others.

**Northern Water:** Northern Colorado Water Conservancy District. Along with the USBR, jointly operates and maintains the C-BT Project.

## P

**Process water:** Windy Gap water that is used at Rawhide for the purpose of service water, boiler water, fire water and other plant processes in which reusable effluent would not be appropriate.

## R

**Reclamation:** United States Bureau of Reclamation

**Return flows:** As pertaining to the Reuse Agreement, wastewater collection and return flow includes wastewater collected from domestic, commercial and industrial users, treated at wastewater-treatment facilities, and returned to the hydrologic system or released for reuse as reclaimed wastewater (reusable effluent). This is typically an average of 55% of the original quantity of water first used by the municipality.

**Reusable effluent:** Fully consumable water that has been used first through a municipality and then treated in a water reclamation facility. This water can be used to extinction.

## W

**Windy Gap Firming Project:** A project designed to firm the supply of Windy Gap water by creating a storage reservoir along the Front Range. The Firming Project (of which Chimney Hollow Reservoir is the major component), was reviewed and approved under the National Environmental Policy Act, state and local approvals and requirements, plus substantial negotiations, and will result in robust mitigation, enhancements and protection for fish, wildlife and the environment, to address the project's impacts. Windy Gap water will be pumped into Chimney Hollow Reservoir in wet years and stored for use in dry years when the Windy Gap Project does not pump.

**Windy Gap Project:** The Windy Gap Project consists of a diversion dam on the Colorado River, a 445-acre-foot reservoir, a pumping plant, and a six-mile pipeline to Lake Granby. Windy Gap water is pumped and stored in Lake Granby before it is delivered to water users via the Colorado-Big Thompson Project's East Slope distribution system.

**Windy Gap unit:** A Windy Gap unit is equivalent to 100 acre-feet of water during years of full Windy Gap production.

**WSSC:** Water Supply and Storage Company