

CPNMD - Renewable Water Plan

December 2010

Integrated Water Resources Plan (IWRP)

Water Supply – acquisitions, partnerships & plans

Storage – acquisitions & plans

Treatment – partnerships & plans

Transportation – acquisitions, partnerships & plans

Map

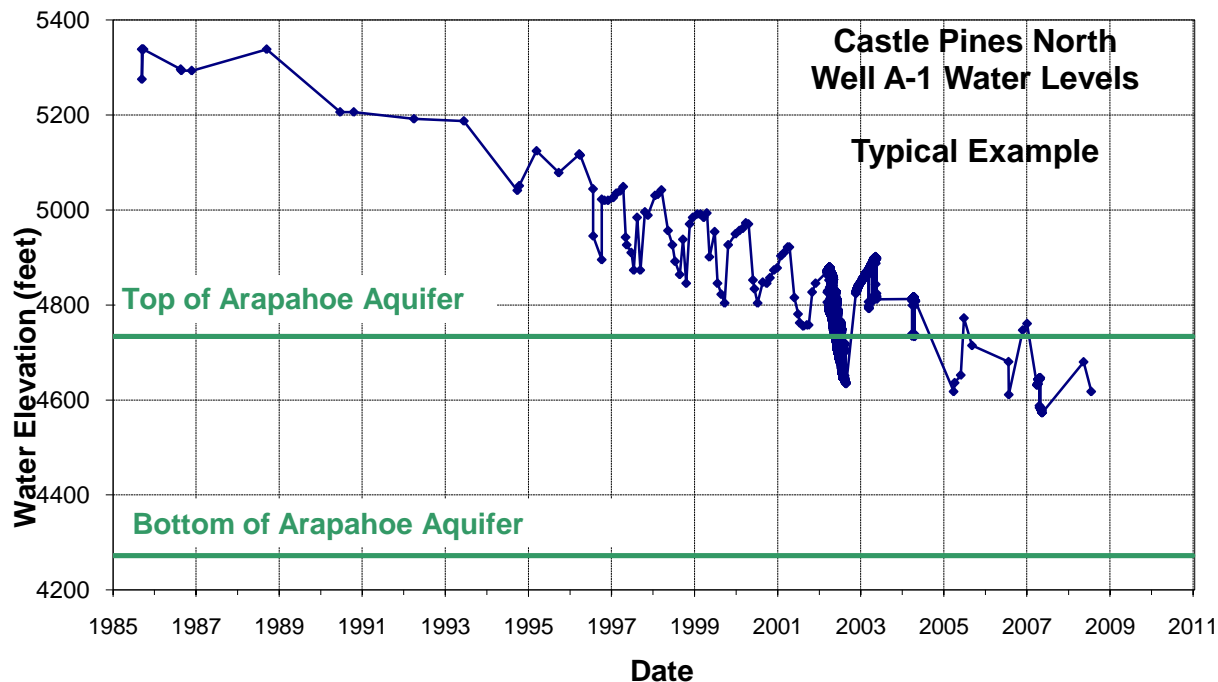
Integrated Water Resources Plan (IWRP)

- In 2003 communities in northern Douglas County became aware the Denver Basin Aquifer may not be a sustainable water supply – Bob Raynolds’ article in the Denver Post
- In 2005, CPNMD contracted Camp, Dresser, McKee (CDM) to review CPNMD’s Denver Basin Aquifer water supply and prepare a long-term renewable water plan specific to CPNMD if required.
- The report was published and adopted by the CPNMD Board in 2006. The plan was named the **Integrated Water Resources Plan**.

“**Renewable**”: A sustainable water source that is replenished periodically thus never running out.

Integrated Water Resources Plan (IWRP)

- The IWRP Report **identified** the following:
 - CPNMD's Denver Basin Aquifer groundwater wells have declining water levels and lower production rates resulting in higher costs.



(continued next slide)

Integrated Water Resources Plan (IWRP)

- The IWRP Report **identified** the following:
 - This trend is projected to continue leaving CPNMD unable to meet maximum day demand beginning in approximately 2022.

CPNMD has periodically reviewed CDM's well projected declines. The most recent review was in April 2010. CDM's shortfall projection beginning in 2022 has not changed.

- To solve this problem CDM advised an alternate (renewable) water supply was required.

Integrated Water Resources Plan (IWRP)

- The IWRP Report **suggested** the following renewable water sources beginning with the ones closest to home:
 - Utilize existing PCWA outflows and Plum Creek water rights
(water supplies exist and are closest to home requiring only distribution and treatment)
 - Upper (above Chatfield Reservoir) South Platte River Basin water rights
(utilize the natural stream channel to Chatfield Reservoir to reduce transportation costs)

(continued next slide)

Integrated Water Resources Plan (IWRP)

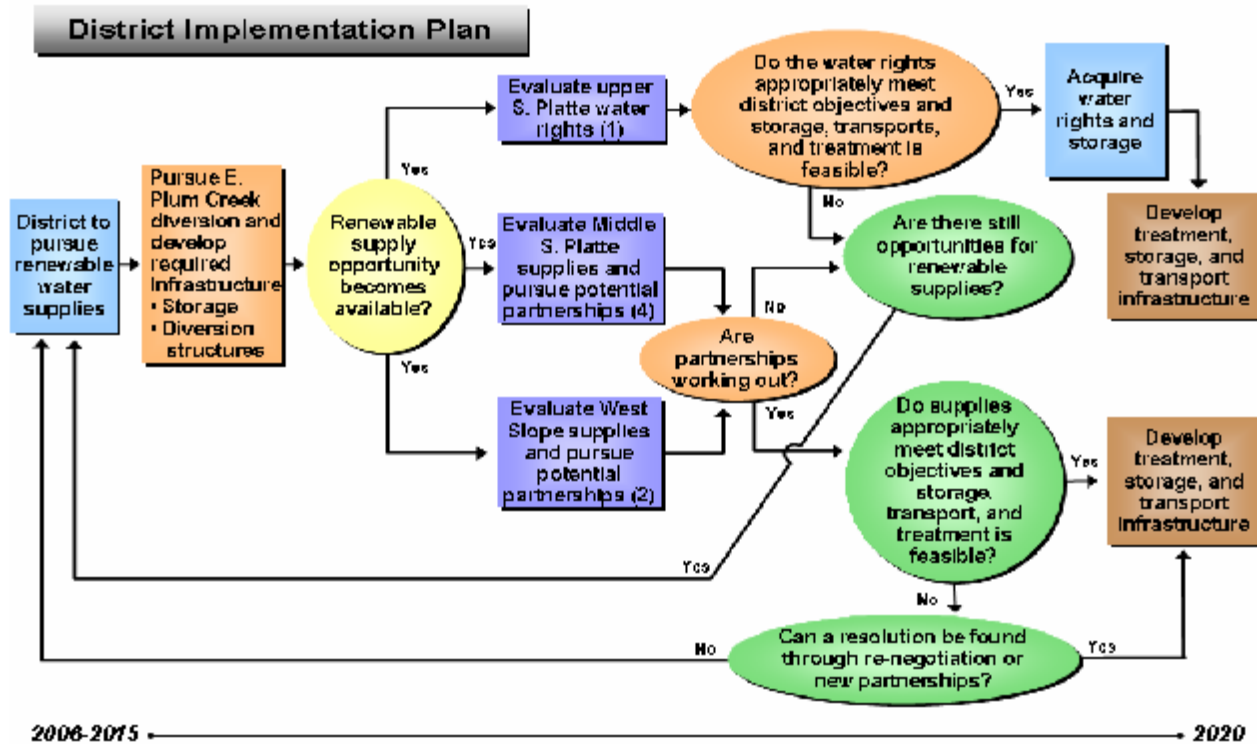
- The IWRP Report **suggested** the following renewable water sources:
 - Middle (between Chatfield Reservoir and Greeley) South Platte River Basin water rights
(transportation and pumping is necessary to move water to the CPN community requiring partnerships to be cost effective)
 - Trans-basin water rights
(most expensive and long-range requiring partnerships)
- The most cost effective solution will likely result in a combination of these water sources

Integrated Water Resources Plan (IWRP)

- The IWRP Report **recommended** an Implementation Plan
(next slide shows entire plan as presented in the IWRP)
 - Begin developing the existing water supplies on Plum Creek.
 - While doing that –
 - Seek upper South Platte River opportunities
 - Seek middle South Platte River opportunities
 - Watch for Trans-Basin opportunities
 - Build partnerships with other water providers for cooperative acquisition of water rights and construction of infrastructure and facilities

(IWRP) Recommended Implementation Plan

Colorado Water Infrastructure Center



Section 8
Conclusions and Implementation Plan

Figure 8-2
Implementation Plan

8-2

Integrated Water Resources Plan (IWRP)

- The IWRP Report **projected** the following:
 - CDM projected CPNMD's water demand at build-out would be 2,240 acre feet (acft) annually
 - CDM projected the cost for a renewable water supply would be between \$60 to \$80 million.

CPNMD has periodically reviewed this projected cost. The latest financial model was in December 2009 and CDM's projection remains accurate and on target.

“Acre Feet (acft)”: The amount of water that will cover one acre (43,560 square feet) one foot in depth equals one acft. One acft equals 325,850 gallons. Typically a household requires between 0.6 and 0.75 acft per year.

Integrated Water Resources Plan (IWRP)

- The IWRP Report – **changes**:
 - CPNMD expanded in 2008 with the addition of the Lagae North inclusion which has a projected water demand of 400 acft/yr adjusting the total water demand to 2,640 acft/yr.

CPNMD estimates the conservation program (incentives - Xeriscaping, low flow household appliances) put in place beginning in 2006 has reduced the water demand by 240 acft/yr. (sustainable assumed)
(Major accomplishment)
 - CPNMD revised the projected total water demand including the Lagae North inclusion to 2,400 acft/yr.

Integrated Water Resources Plan (IWRP)

- The IWRP Report – **changes**:
 - The Water Infrastructure and Supply Efficiency (WISE) project was introduced in February 2010 adding an additional water supply.

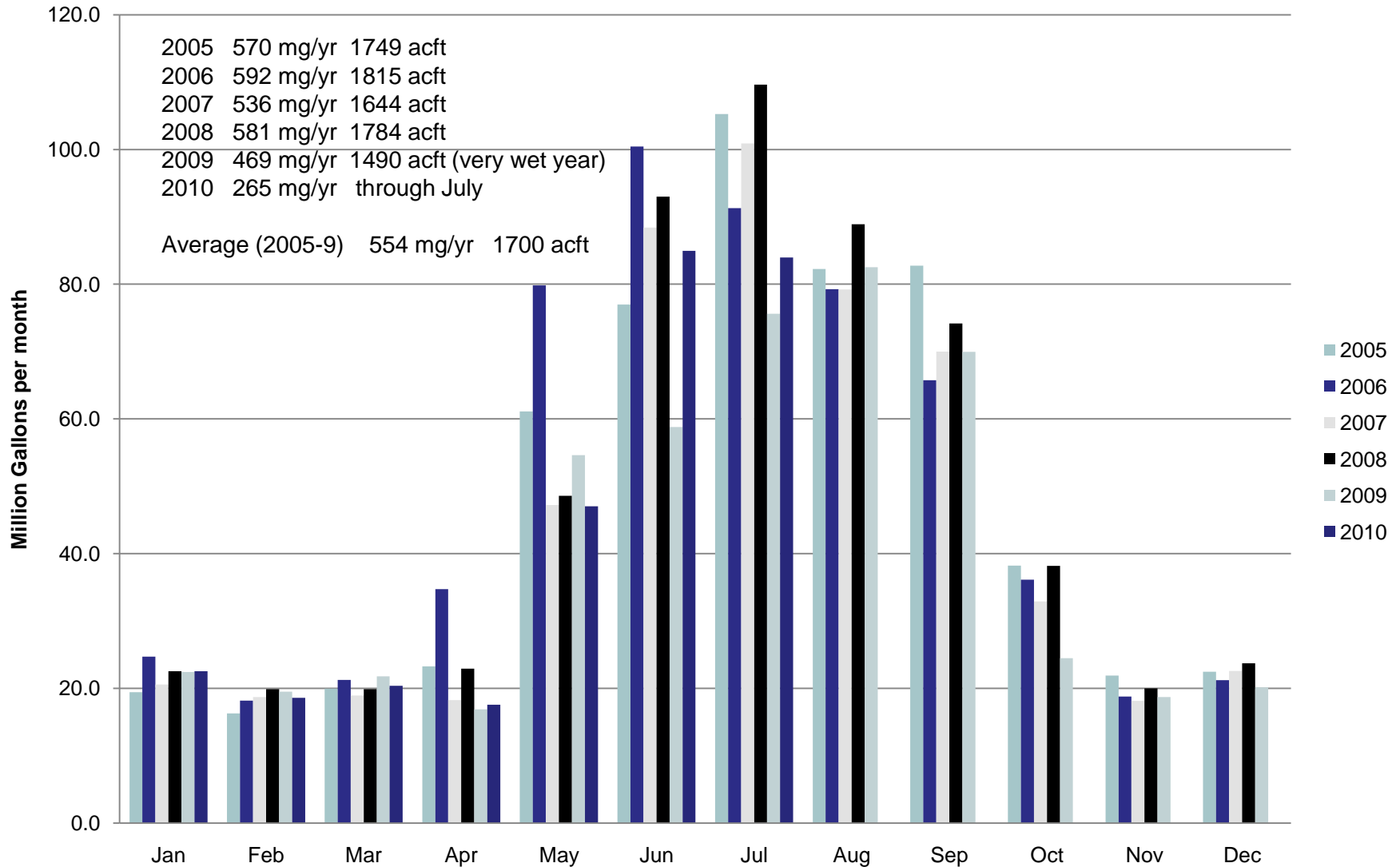
This is a result of a regional partnership between Denver, Aurora and South Metro Water Supply Authority (SMWSA) created in 2009.

CPNMD is a member of SMWSA and will participate in the WISE project's water supply.

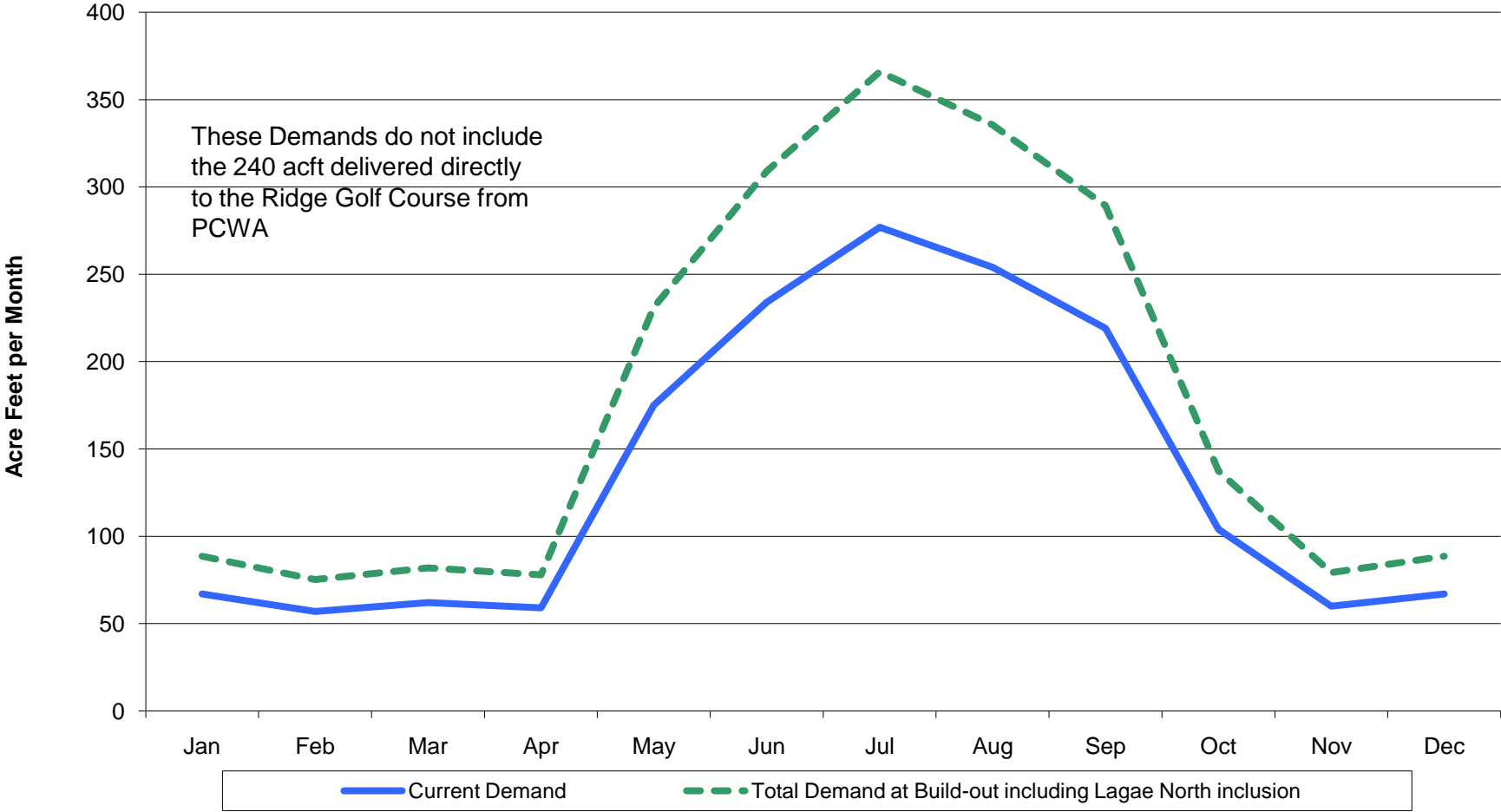
Well Production (2005 – July 2010)

- Current Average well production is 1700 acre feet annually and remains fairly constant – reduced to 1635 acre feet since in 2010 CPNMD began supplying all Ridge Golf Course water from PCWA
- An additional 125 acre feet annually is estimated to support total build-out of original District boundaries and 400 acre feet is estimated to support the Lagae North Inclusion
- The Ridge Golf Course uses approximately 240 acre feet annually of PCWA outflows (175 acre feet annually prior to 2010)
- The existing wells purpose will be converted to cover shortfalls and provide a safety factor

CPNMD Well Production 2005 - July 2010



CPNMD - Current Demand and Estimated Demand at Build-out including Lagae No. Inclusion



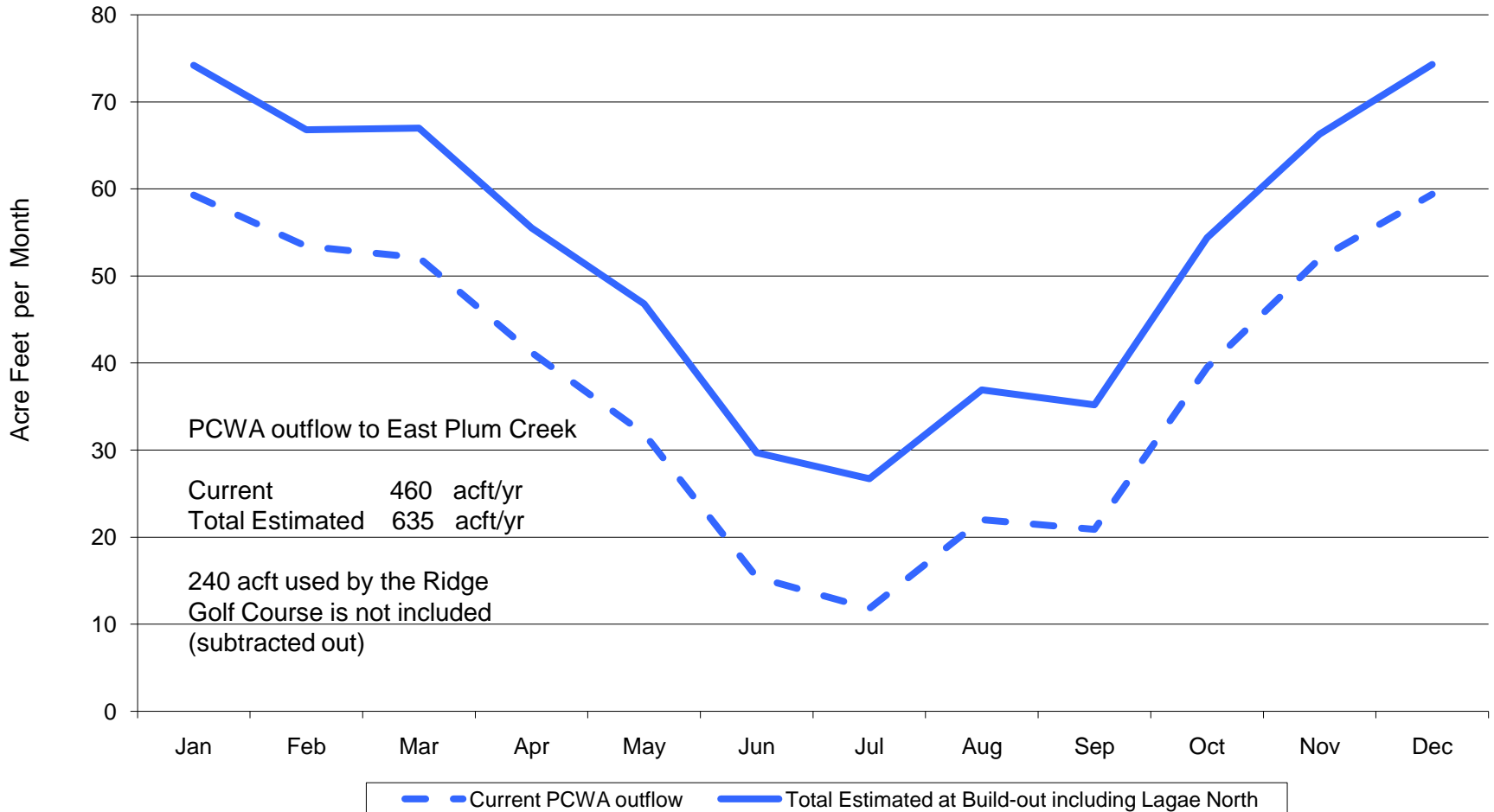
Water Supply – acquisitions & plans

(East Plum Creek)

- 1985 - 2010 Reusable portion of the outflow water from Plum Creek Wastewater Treatment Plant operated by Plum Creek Wastewater Authority (PCWA) - partnership between the Town of Castle Rock (TCR), Castle Pines Metro District (CPMD) and CPNMD.
 - 1997 CPNMD began supplying PCWA outflow water to the Ridge Golf Course – the current amount averages 240 acft annually
 - 2006 Utilize the remainder is part of the IWRP plan

(continued next slide)

PCWA outflow - water supply at East Plum Creek Current & Total Estimated at Build-out including Lagae North inclusion



Water Supply – acquisitions & plans

(East Plum Creek)

- 1985 - 2010 CPNMD began appropriating water rights in East Plum Creek and this effort continues

➤ 1985 An East Plum Creek water right was appropriated and decreed in Water Court referred to as the G1 & G2 wells. Shared ownership with CPMD.
(Case No. 85CW479)

“Appropriation”: action taken to create a water right.

“Decreed”: water right confirmed by Water Court

(continued next slide)

Water Supply – acquisitions & plans

(East Plum Creek)

- 2004 Additional East Plum Creek water rights were appropriated jointly with CPMD referred to as the G-4 through G-8 wells, including two surface diversions, and a new storage reservoir
(Case No. 04CW292 is pending in Water Court)

- 2004 Change G-1 and G-2 wells to alternate points of diversion (G-4 through G-8 wells) including storage locations
(Case No. 04CW293 is pending in Water Court)

- 2004 1,000 acft of storage in Chatfield Reservoir including exchanges up East Plum Creek was appropriated jointly with CPMD
(Case No. 04CW308 is pending in Water Court)

(continued next slide)

Water Supply – acquisitions & plans (East Plum Creek)

- 2009 CPNMD and CPMD jointly applied for an augmentation plan to facilitate operation of the 2004 water rights.
(Case No. 09CW275 is pending in Water Court)

The three 04 cases and the 09 case are being addressed concurrently.

Water Court cases of this complexity usually require several years to get resolved. Our challenge is to negotiate solutions with the Objectors. If not possible these cases will go to trial.

- This complies with the IWRP Implementation Plan involving East Plum Creek water adopted in 2006

Water Supply – acquisitions & plans

(East Plum Creek)

- Case No. 09CW275 (including Case Nos. 04CW292, 293, and 308) - details

- Case No. 09CW275 application was submitted in December 2009. (The other cases were submitted in 2004.) Approximately 10 Objectors responded.

- Engineering Reports describing and explaining this augmentation plan and proposed operations including terms and conditions to prevent injury to existing water rights was provided to the Objectors in May 2010. (The engineering report for the three 04 cases was submitted in 2007.)

- Initial Referee's Conference was held in April 2010 establishing guidelines on how to proceed.

Water Supply – acquisitions & plans

- 2006 - 2010 Following the recommendations of the IWRP, CPNMD immediately began seeking opportunities to acquire additional water supplies and this effort continues.

In 2007, one perfect sized upper South Platte River water right was analyzed but following due diligence did not materialize.

This has been the case with many others to date.

Those resulting in purchases are listed below.

Water Supply – acquisitions & plans

(Upper South Platte River)

- 2009 The first 0.46 cfs (333 acft) of Hock Hocking Mine (upper South Platte River) water rights were purchased pending resolution of three issues for \$7.0 million.

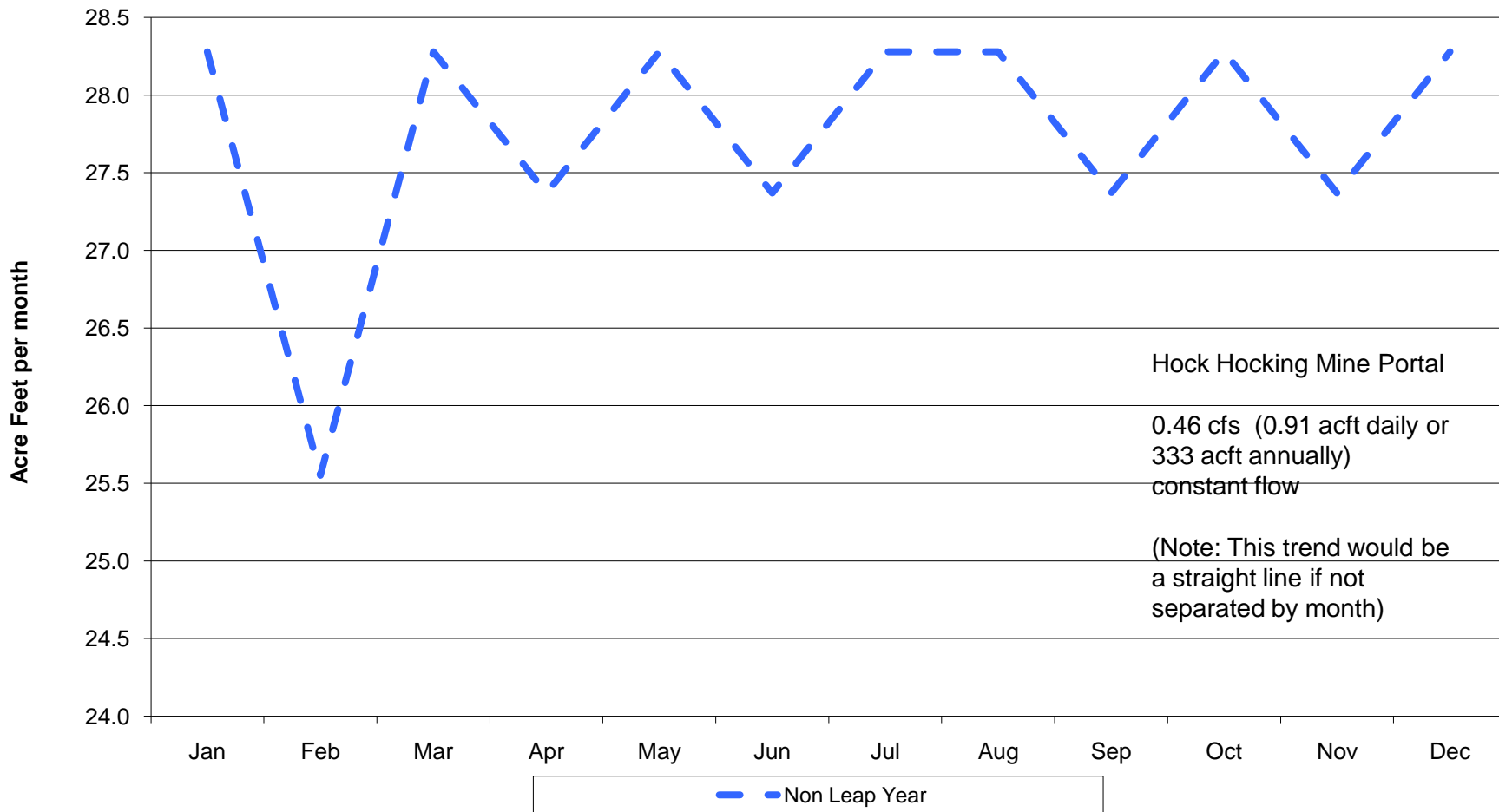
In October 2010, all three issues were resolved in favor of CPNMD making all of the 0.46 cfs water rights available for municipal use and this water can be reused to extinction.

(Major accomplishment)

Currently this water is being leased until the Interconnect Pipeline is constructed.

- This complies with the IWRP Implementation Plan involving upper South Platte water adopted in 2006

Hock Hocking Mine - water supply at portal



Water Supply – acquisitions & plans

(Middle South Platte River)

- 2009 80 shares of Fulton Ditch and 0.5 shares of Platteville Ditch (lower South Platte River) agricultural water rights including the farmland and oil and gas interests
and
25 additional shares of Fulton Ditch agricultural water rights were purchased for \$5.3 million.

An application was filed in Water Court (Case No. 09CW279) to change these water rights to municipal use. The estimated consumptive use is 310 acft/yr.

This application includes an appropriation to exchange this water up to Chatfield Reservoir.

(continued next slide)

Water Supply – acquisitions & plans

(Middle South Platte River)

- Case No. 09CW279 - details
- Application was submitted in December 2009. 26 Objectors responded.
- Initial Referee's Conference was held in June 2010 establishing guidelines on how to proceed.
- Engineering Reports describing and explaining this appropriation and proposed operations including terms and conditions to prevent injury to existing water rights were provided to the Objectors in September 2010.

(continued next slide)

Water Supply – acquisitions & plans

(Middle South Platte River)

Case No. 09CW279 – details

- Converting water rights from agricultural to municipal use requires detailed historical records on how the crops were irrigated (area irrigated, types of crops, when and how much water was diverted, etc.).
- Records are critical in the determination of consumptive use. During the period the application is being reviewed in Water Court these records must be maintained.

Water Court applications of this complexity usually require several years to get resolved. Our challenge is to negotiate solutions with the Objectors. If a resolution cannot be reached it will go to trial.

Water Supply – acquisitions & plans

(Middle South Platte River)

- 2010 2.25 shares of Lupton Bottom Ditch and 7 shares of Meadow Island Ditch (lower South Platte River) agricultural water rights were purchased for \$4.3 million.

Application to change these water rights to municipal use is planned for 2011. The estimated consumptive use is 325 acre feet annually.

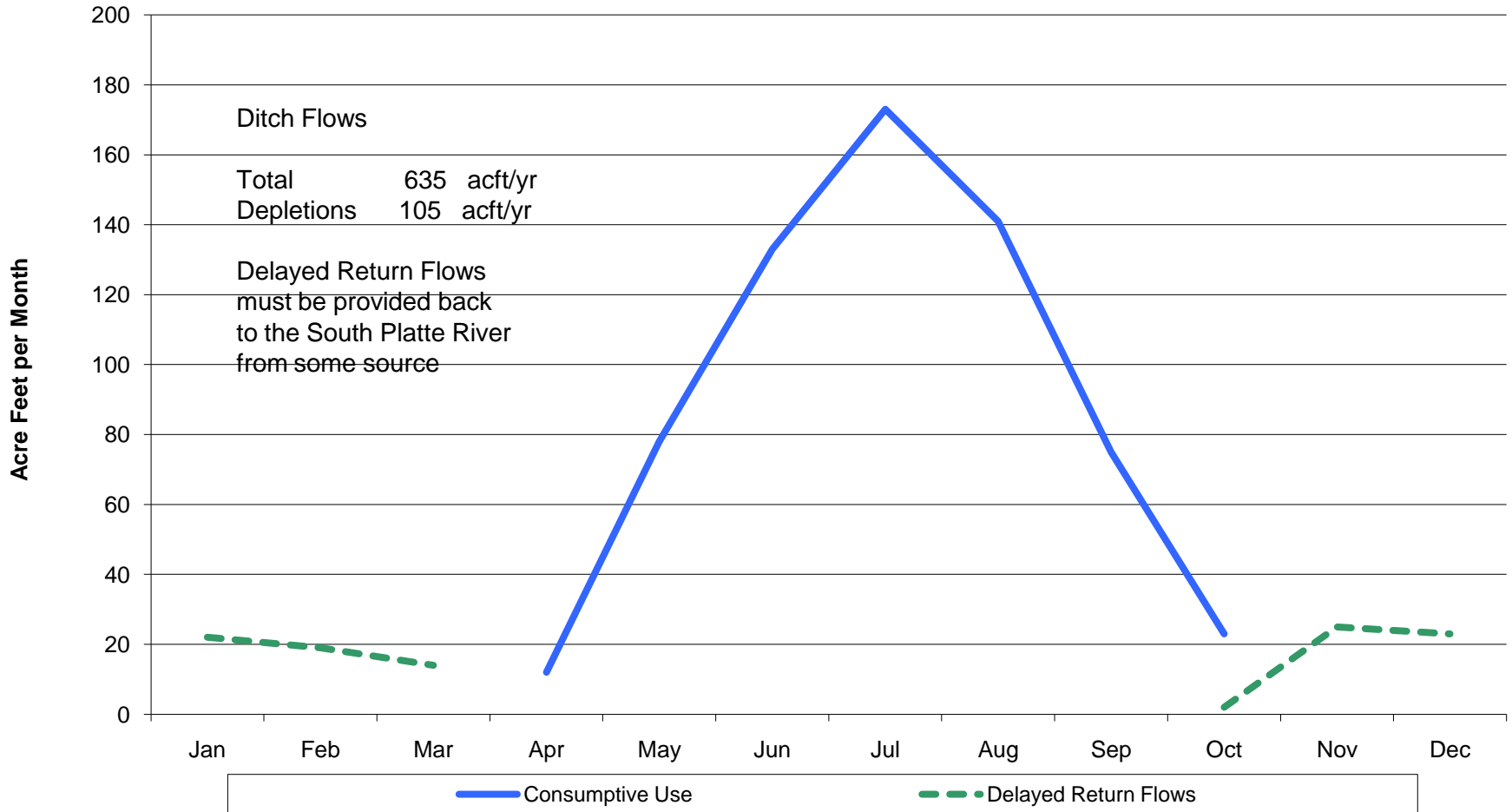
(Note: All of the Ditch water rights mentioned are senior and the consumptive use portion can be used and reused to extinction.)

- This complies with the IWRP Implementation Plan involving middle South Platte water adopted in 2006

Ditch Flows at farm

105 shares Fulton, 0.5 shares Platteville, 2.25 shares Lupton Bottom and 7 shares Meadow Island (irrigation ditches)

Consumptive Use



Water Supply – partnerships & Plans

(WISE project – 1,000 acft requested annually)

- 2009 Denver, Aurora and SMWSA formed a partnership. CPNMD is a member of SMWSA.
- 2010 In February, the Water Infrastructure and Supply Efficiency (WISE) project was introduced. Denver and Aurora will deliver excess potable water to East Cherry Creek Valley's (ECCV) State Land Board (SLB) Pipeline for use by SMWSA members.
- The WISE project water has two key issues - it is interruptible (gaps predicted 2 out of every 10 years), and the current agreement is for 5 years but expected to be extended.
- This complies with the IWRP Implementation Plan involving water acquisitions through partnerships adopted in 2006.

Water Supply – partnerships & plans

(WISE project – 1,000 acft requested annually)

- 2010 Details regarding WISE project were disclosed during this summer as follows:
 - Source # 1 - this water supply will be provided by Aurora and Denver from excess wastewater return flows and will be diverted to Aurora's Prairie Waters well field.
 - Source # 2 - this water supply will be provided by Aurora from acquired middle South Platte River water rights and will be diverted to Aurora's Prairie Waters well field.
 - Aurora's Prairie Waters Pipeline will transport the water collected from the well field to the Peter Binney Water Purification Facility (Prairie Waters Stream).

(continued next page)

Water Supply – partnerships & plans

(WISE project – 1,000 acft requested annually)

- 2010 Details regarding WISE project were disclosed as follows:
 - Source # 3 - this water supply will be provided by Aurora from its upper South Platte River water rights which will be transported via the Rampart Pipeline to the Peter Binney Purification Facility (Rampart Stream).
 - Peter Binney Purification Facility, located at Aurora Reservoir, will treat the Prairie Waters and Rampart streams, blend them together, and distribute the water to Aurora and Denver.

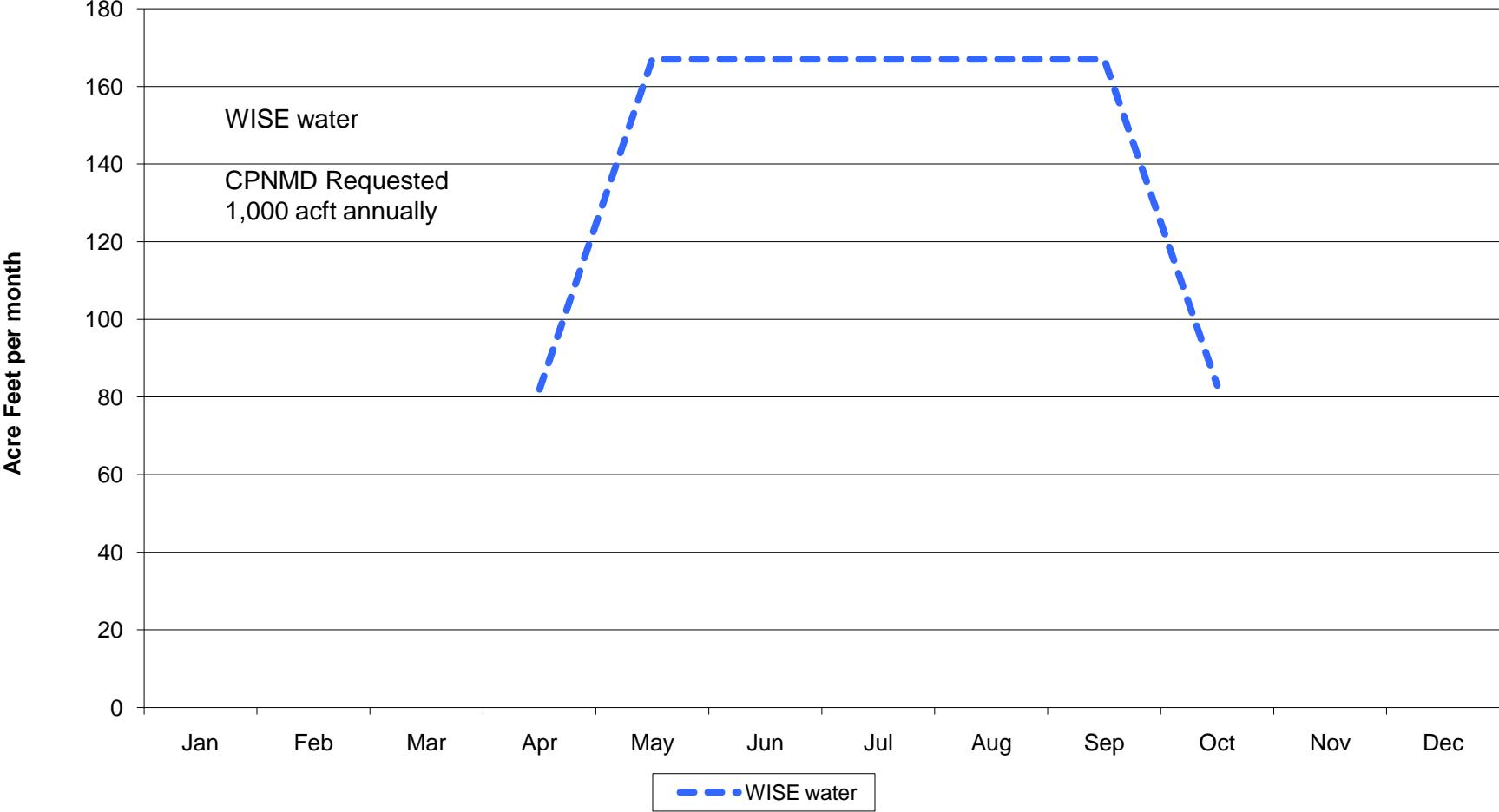
(continued next slide)

Water Supply – partnerships & plans

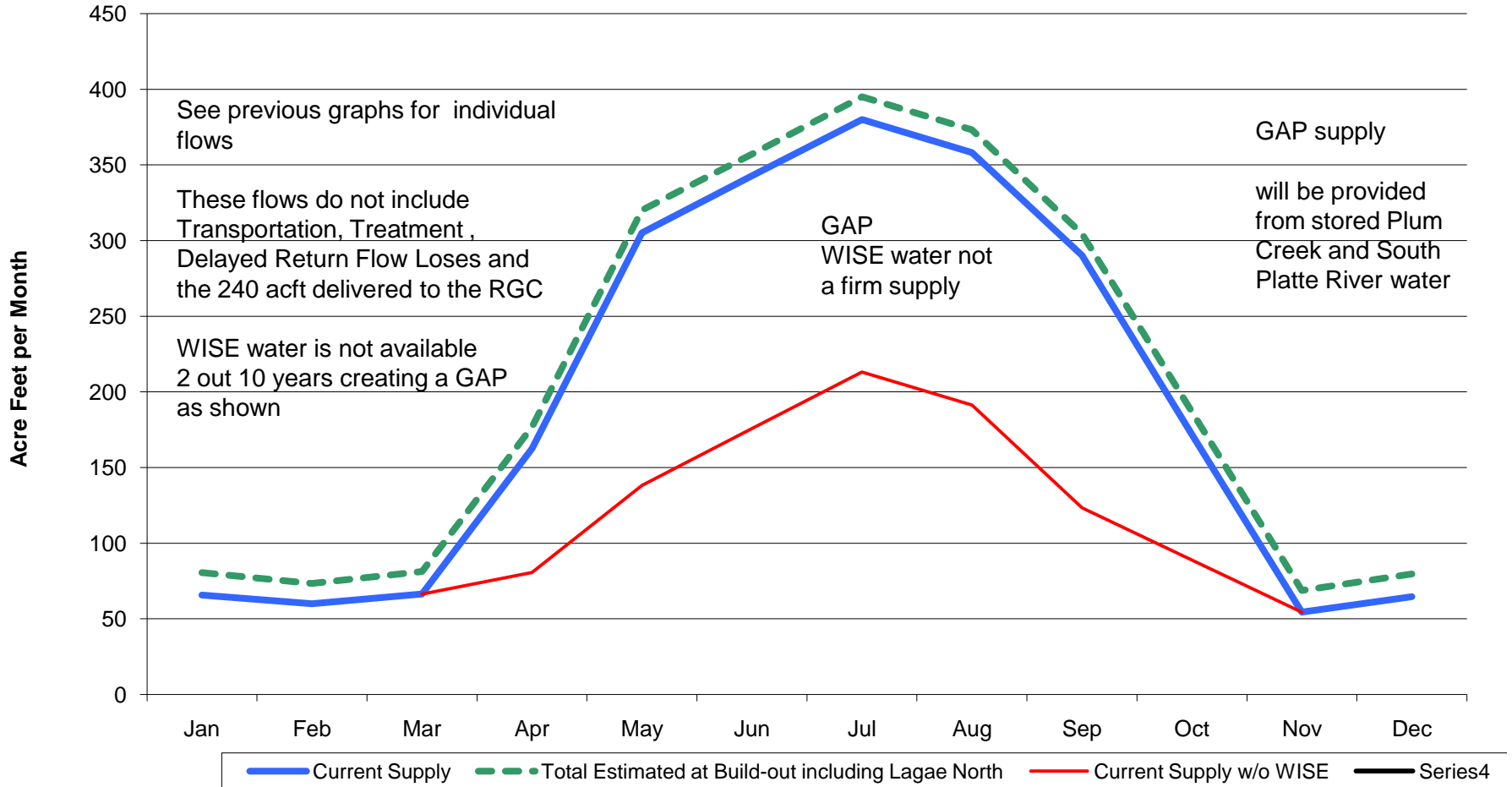
(WISE project – 1,000 acft requested annually)

- 2010 Details regarding WISE project were disclosed as follows:
 - Excess water will be transported to SMWSA users via ECCV's SLB Pipeline. This pipeline connects to ECCV's E-W Pipeline for distribution to SMWSA members near Chambers Road and E-470.
 - The current cost will be paid for as an operational cost (\$/1000 gallons), no capital investment required except for SMWSA member's connections.

WISE - water supply at ECCV SLB Pipeline



Total - PCWA outflows, Hock Hocking, Ditch flows & WISE Current Supply & Total Estimated at Build-out including Lagae North inclusion)



Water Supply – partnerships & plans (Trans-Basin)

- 2006 – 2010 CPNMD continues to monitor various Trans-Basin opportunities.

Most of these opportunities are long-term.

CPNMD will likely have completed their Renewable Water Plan prior to any of this water becoming available.

- This complies with the IWRP Implementation Plan involving Trans-Basin water adopted in 2006

Water Supply – acquisitions, partnerships & plans

(Current Status Summary)

- 2010 Currently CPNMD is continuing to proceed in developing its East Plum Creek water rights and Chatfield Reservoir water and storage rights

Purchased 333 acft of upper South Platte River water rights

Purchased an estimated 635 acft of consumptive use irrigation ditch water rights on the middle South Platte River

Requested 1,000 acft of WISE project water

(continued next slide)

Water Supply – acquisitions, partnerships & plans

(Current Status Summary)

- 2010 The above mentioned water rights should satisfy CPNMD's projected water supply demand assuming all pending Water Court cases are resolved and infrastructure in place.

(Major accomplishment)

CPNMD will not stop seeking opportunities for additional water rights since all of the above mentioned water rights are not firm (WISE water in particular). CPNMD will be selective in acquiring only water rights that will improve its portfolio.

- This complies with the IWRP Implementation Plan involving water supply adopted in 2006

Storage – acquisitions & plans

- Storage is a critical component of the Renewable Water Plan and addressed in the IWRP's Implementation plan

Storage must serve two functions for efficient transportation (including local distribution) and treatment:

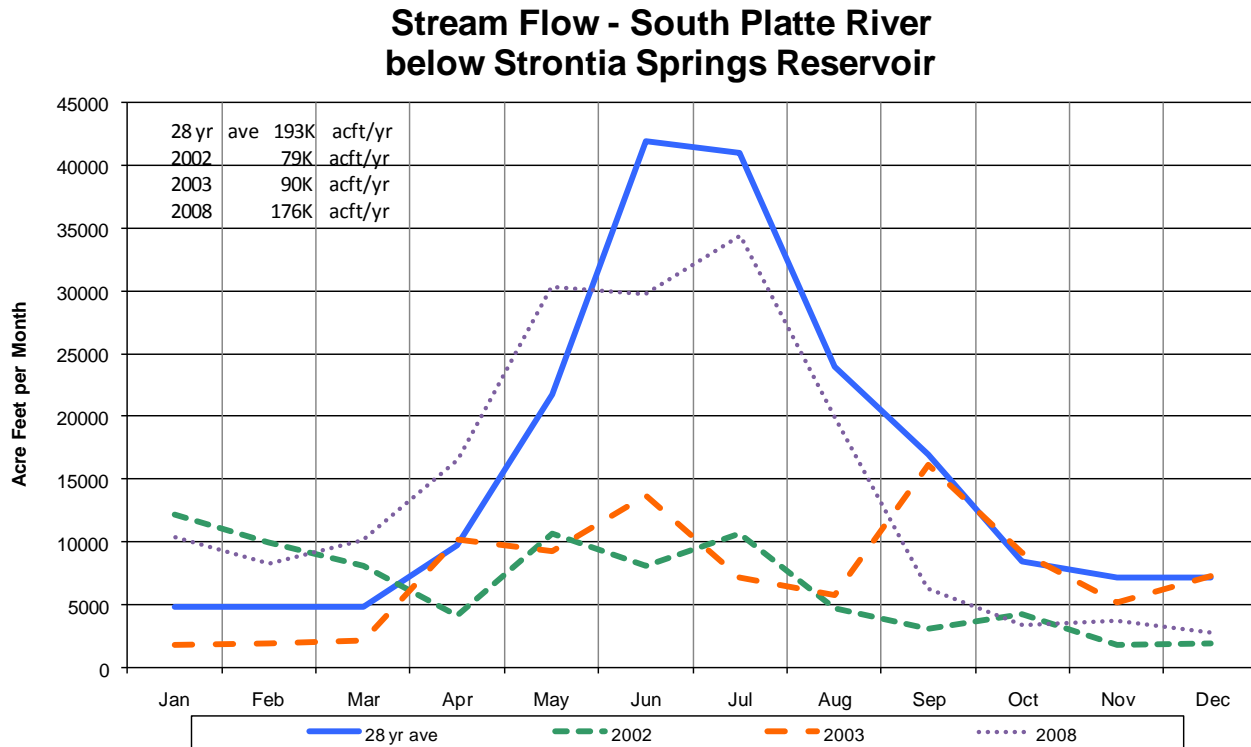
- Have the volume needed to meet water supply demands (24/7) when and where it is needed (usually this requires **local** storage)
- Capture water when and where it is available (usually this requires **remote** storage)

Storage – acquisitions & plans

- The following hydrograph (typical for snowmelt runoff) explains why most renewable water supplies are available less than 50% of the time thus requiring storage.
- Water will be available at Chatfield Reservoir when CPNMD's South Platte River and East Plum Creek water rights are in priority. In 2008 this occurred several times for short periods even when the 2008 flow was slightly below the 28 year average. These large short-term volumes of water need to be captured (stored) to fill gaps in CPNMD's renewable water supply.
- In 2002-3, no water was available due to severe drought.

Storage – acquisitions & plans

- Hydrograph - typical for snowmelt runoff



Storage – acquisitions & plans

(Local Storage)

- CPNMD must have the ability to get water when it is needed (24/7) – requiring local storage
 - Local storage will be available utilizing Rueter-Hess Reservoir (surface water), converting some of CPNMD's existing wells to include Aquifer Storage Recovery (ASR - sub-surface water), and/or by adding additional storage tanks

(continued next slide)

Storage – acquisitions & plans

(Local Storage)

- There are advantages and disadvantages to each:
 - Surface storage (Rueter-Hess) has the advantages of being able to accept large volumes of water discharged into it

Disadvantages are evaporation losses and the released stored water requires conventional treatment

(continued next slide)

Storage – acquisitions & plans

(Local Storage)

- There are advantages and disadvantages to each:
 - Sub-surface storage (ASR) has the advantages being able to utilize CPNMD's existing wells and existing low cost treatment plant

Disadvantages are ASR wells are limited to small volumes of water (only a few existing wells suitable) and the potential of creating a negative chemical reaction in the well

(continued next slide)

Storage – acquisitions & plans

(Local Storage)

- There are advantages and disadvantages to each:
 - Tank storage is expensive in dealing with the volumes of storage required.
(This works well when the primary storage is the Denver Basin aquifers and the tanks are used as a small buffer.)

Storage – acquisitions & plans

(Local Storage)

- Surface Storage in Rueter-Hess Reservoir can capture large volumes of water via the Interconnect Pipeline and the WISE project and provide a 24/7 water supply

- In 2008, the District purchased 1,500 acft of storage in Rueter-Hess Reservoir for \$8.3 million

(Construction projected to be completed in 2012 making this storage space available for use)

- Additional local storage can be provided in Rueter-Hess Reservoir and/or converting CPNMD's existing wells to ASR (if required)

- Note: The Environmental Impact Statement (EIS) needs to be expanded to allow CPNMD to store its current water supplies

Storage – acquisitions & plans

(Remote Storage – upper South Platte)

- Remote Storage in Chatfield Reservoir is required to store large volumes of excess water when available, CPNMD's upper South Platte River water rights, and exchanges from CPNMD's middle South Platte River water rights.
- CPNMD will have 1,000 acft of storage in Chatfield Reservoir assuming the 20,600 acft reallocation project is approved which is likely. The estimated cost is \$6.4 million.

(Projected schedule requires escrow payments in 2012 and 2013 with completion of construction and mitigation in 2015 making this storage space available for use)

(continued next page)

Storage – acquisitions & plans

(Remote Storage – upper South Platte)

- Remote Storage in the new East Plum Creek Reservoir involving CPNMD's East Plum Creek water rights and exchanges from Chatfield Reservoir.
- Additional remote storage can be obtained in Chatfield Reservoir (purchase or lease). (if required)

Storage – acquisitions & plans

(Remote Storage – middle South Platte)

- CPNMD's middle South Platte River water rights will likely require some remote storage near the locations of these water rights so they can be utilized to their fullest
- CPNMD has investigated several gravel pits, but has not purchased any middle South Platte River storage and anticipates one or two locations may be required
- This storage must be included in any future analysis. The approximate cost is \$3,500/acft for this type of storage. Options to lease this storage may be possible.
- This complies with the IWRP Implementation Plan involving storage adopted in 2006

Treatment – partnerships & plans

(Upper South Platte River water)

- The plan is to treat all of CPNMD's upper South Platte River water which includes Plum Creek by utilizing the Centennial Water & Sanitation District's (CWSD) infrastructure which includes CWSD's Blake Water Treatment Plant.
- CPNMD executed an Inter-Governmental Agreement (IGA) with CWSD in January 2010 which allows CPNMD to utilize CWSD's facilities to treat and transport CPNMD's water from the South Platte River near Chatfield Reservoir to CWSD's Tank 4B located near the southeast corner of Highlands Ranch.

(continued next slide)

Treatment – partnerships & plans

(Middle South Platte River water)

- The plan is to treat all of CPNMD's middle South Platte River water by utilizing existing or planned treatment facilities associated with existing infrastructures (Aurora's Prairie Waters System and/or ECCV's N-S and E-W Pipelines).
- Aurora's Prairie Waters System includes the Peter Binney Water Purification Facility completed in October 2010.
- ECCV is planning to construct a Reverse Osmosis (RO) treatment facility near the north of ECCV's N-S Pipeline scheduled for completion by 2015.

Treatment – partnerships & plans

(Local water)

- The plan is to partner with the Town of Castle Rock (TCR), Stonegate and/or Parker Water & Sanitation District (PWSD) and possibly others in a new conventional treatment facility at the base of Rueter-Hess Reservoir's dam
- There are no plans for any other treatment facilities
The plan requires all water transported to CPNMD be treated to drinking water standards
- This complies with the IWRP Implementation Plan involving treatment adopted in 2006.

Transportation – acquisitions & plan (Upper South Platte River water)

- The plan is to transport all of CPNMD's upper South Platte River water via CWSD's existing infrastructure to CWSD's Tank 4B
and
proposed Interconnect Pipeline from Tank 4B to CPNMD's existing distribution system and/or Rueter-Hess Reservoir.
- The Interconnect Pipeline has been designed and construction of the initial phase is to begin in December 2010.

Transportation – acquisitions & plans

(Interconnect Pipeline Project - details)

- The Interconnect Pipeline project will be built in phases – total estimated cost is \$10 million

- The first phase was bid and awarded in November and December 2010 respectively. This phase will include the connection to CWSD's Tank 4B and the Interconnect Pump Station located next to Tank 4B.

- The second phase will be the pipeline from the Pump Station to CPNMD's distribution system's northern end

- The final phase(s) will be determined based on the schedules for the Chambers Pipeline and Rueter- Hess Treatment Plant

Transportation – partnerships & plan

(Middle South Platte River water)

- The plan is to transport CPNMD's middle South Platte River (except exchanged water) via Prairie Waters System to ECCV's SLB and E-W Pipelines

or

United/FRICO/Henrylyn Pipeline and ECCV's N-S and E-W Pipelines

- Both transportation systems will be able to connect to the Interconnect Pipeline at the Interconnect Pump Station located near CWSD's Tank 4B via ECCV's Willows Spur

and/or

to the Chambers Pipeline which is proposed to deliver water to SMWSA's members including CPNMD and Rueter-Hess Reservoir planned for 2015-2017

Transportation – partnerships & plans

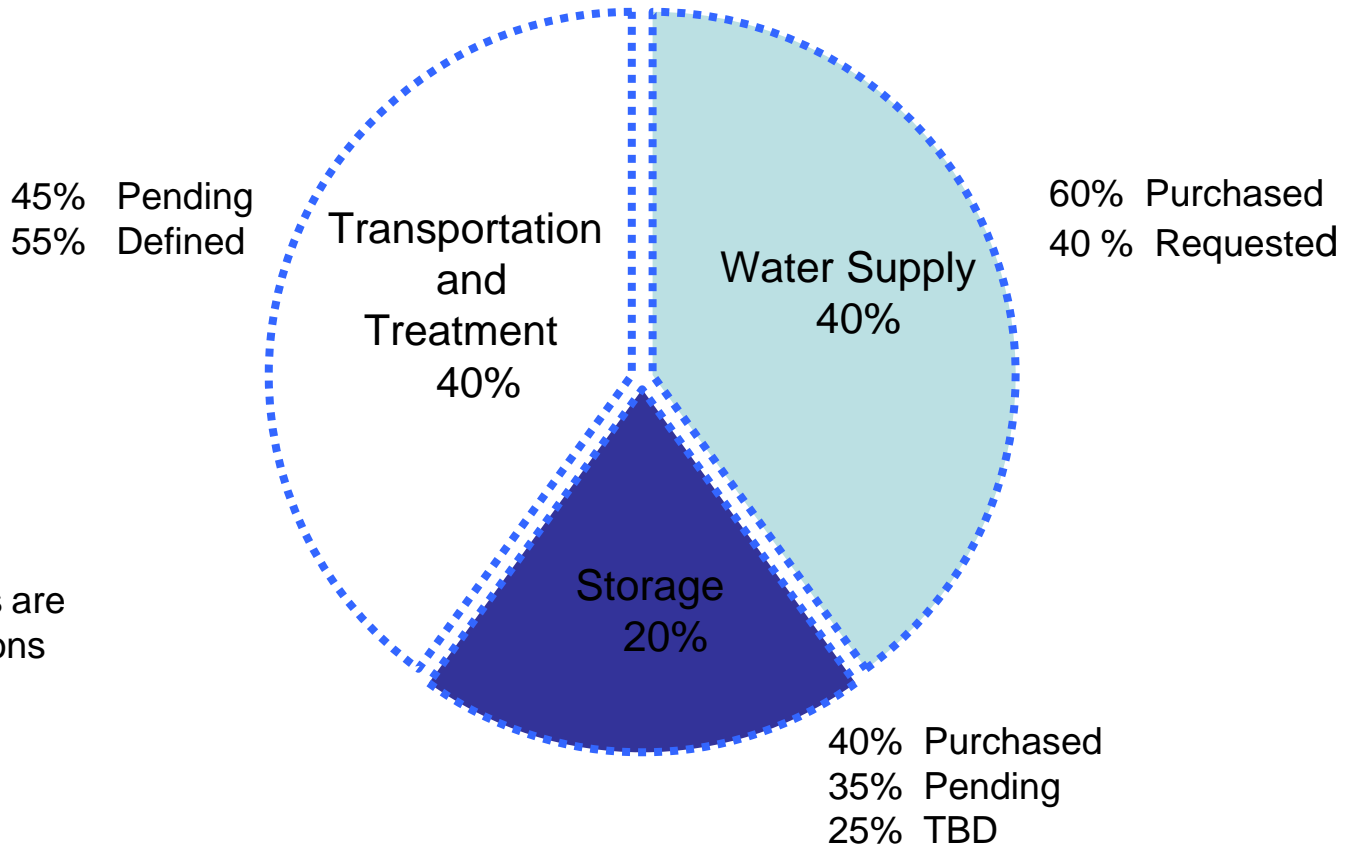
(Local water)

- Water from Rueter-Hess Reservoir will be transported to CPNMD's existing distribution system via Chambers Pipeline project including Rueter-Hess Treatment Plant.
- There are no additional transportation pipelines anticipated at this time.
- This complies with the IWRP Implementation Plan involving transportation adopted in 2006.

Renewable Water Plan

Summary – acquisitions, partnerships and plans

(October 2010)



Note:
Percentages are approximations

Water Supply Storage Transportation & Treatment

Summary – acquisitions, partnerships & plans

(Water Supply, Storage, Treatment & Transportation)

- Water Supply – 100% identified (Continue to evaluate for improvements.)
- Storage – approximately 75% identified (Space in Rueter-Hess Reservoir purchased for local storage. Space in Chatfield Reservoir will be purchased for upper South Platte River remote storage. Gravel pit storage being evaluated for middle South Platte River remote storage.)

(continued next slide)

Summary – acquisitions, partnerships & plans

(Water Supply, Storage, Treatment & Transportation)

- Treatment – 100% identified (Utilize CWSD's Blake Treatment Plant for upper South Platte River water. Utilize Aurora's Peter Binney Purification Facility and/or ECCV's future RO Facility for middle South Platte River water. Utilize Rueter-Hess Treatment Plant for locally stored water. If ASR is installed in any of CPNMD's existing wells, CPNMD's existing treatment plant will be utilized.)

(continued next slide)

Summary – acquisitions, partnerships & plans

(Water Supply, Storage, Treatment & Transportation)

- Transportation – 100% identified (Utilize CWSD's infrastructure and the Interconnect Pipeline for upper South Platte River water. Utilize Aurora's Prairie Water's and/or ECCV's infrastructure including ECCV's Willows Spur and/or the Chambers Pipeline for middle South Platte River water. Utilize a pipeline from Rueter-Hess Reservoir for locally stored water.)

(Major Accomplishment

The plan is in place

Remains between \$60 to \$80 million

Consistent with IWRP's projections and recommendations