

Arapahoe County Water Supply Study

Planning Commission Study Session November 14, 2023



Agenda

Water Context

Study Overview

Water Demand Projections

Water Efficiency Effects

Landscaping Changes

Water Reuse

Groundwater Modeling Results

Engagement Overview

Next Steps



Water Context: Colorado's Divide



- 80% population on Front Range
- 80% water on West Slope

Prepared by the Colorado Division of Water Resources Hydrographic Branch (2011 Revision). All values in acre feet (AF)



Growing Water Demands



	2020	2050	
Colorado	5.8 M	7.5 M	
Arapahoe County	655,000	900,000 - 960,000	



Arapahoe County Water Supplies

Surface Waters Prone to Drought Approx. 50% from West Slope

Groundwater

Designated Basins: Over-appropriated

Denver Basin: Drought-proof but Diminishing



Designated Basins

Areas Depend on **Groundwater - Virtually No** Surface Water Alluvial and Denver Basin groundwater Withdrawals governed by **Colorado Groundwater Commission and local** groundwater districts





Denver Basin Wells





Denver Basin





DenverBasin





Denver Basin





DenverBasin - Well Declines



Developing Denver Basin Water Rights has a Diminishing Water Return Over Time



Well Classifications

ALLUVIAL/TRIBUTARY

NONTRIBUTARY

NOT NONTRIBUTARY

- Connected to Surface WatersPumping can Deplete Surface Flows
- Minimal Connection to Surface Waters
- Pumping has Small Effect on Surface Flows
- More Connected to Surface Waters
- Pumping has More Effect on Surface Flows
- Requires "Augmentation" to Offset Impacts



Study Overview

Plan for current and future water needs.

- Assess water supplies and demands up to the year 2050.
- Identify potential shortages.
- Identify how water can be used more efficiently in the years ahead.
- Engage residents to better understand needs and concerns.
- Complete a study seeking to balance demands with supplies.





Tasks & Deliverables

- Land Use and Socioeconomic Scenario Development
- Groundwater Analysis
- <u>Review of Water Conscious Landscaping Standards</u>
- Assessment of Water Conservation Plans on Future Water Demand
- Demand and Supply Analysis
- Water Reuse Analysis
- Recommendations for Regulatory Modifications
- Plan Update and Implementation
- Water Supply Study

Water Supply

1. Regions

Renewable vs. Non-Renewable Supply
 Groundwater Study - Region 2







Water Supplies Region 1

- Suppliers Denver Water, ECCV, ACWWA, Englewood, Inverness, Aurora Water and Rangeview Metropolitan District (including Sky Ranch and Lowry Ranch)
- Reviewed Water Master Plans, Conservation Plans, Fact Books, Self Assessments and other documents
- Most water supply provided by imported renewable sources
- Denver Basin groundwater is a minor supply primarily for drought contingency
- Its use will continue to decline as suppliers develop renewable supplies



Water Supplies Region 2

- Primary Suppliers Towns of Strasburg, Bennett, Byers and Deer Trail
- > 95% of Region 2 is within a designated basin (Lost Creek or Kiowa Bijou)
- Supply is Denver Basin groundwater (minor alluvial groundwater for irrigation)
- Reviewed self assessments and data from the Division of Water Resources to evaluate supplies
- Study focusing on Denver Basin to estimate future supplies for Region 2 growth



Groundwater Study Summary

- Compiled groundwater data from the Colorado Division of Water Resources (DWR)
- Imported data into an interactive GIS map along with County supplied data
- Evaluated the legal supply of Denver Basin groundwater and the amount that has already been allocated
- Input groundwater data to a Petra geological model to estimate the physical supply from the Denver Basin aquifers
- Compared Petra model results to DWR allocations



Petra vs. DWR Allocations

- Petra analysis refined the amount of recoverable Denver Basin groundwater based on geophysical logs.
- Compared Division of Water Resources (DWR) Allocations (state determination of Denver Basin groundwater in storage) vs. Petra for the 2021 Watkins/Bennett study.
- Within this study area, approx. 60% of Denver Basin groundwater can be physically withdrawn.





Denver Basin



STRUCTURAL MAPPING METHODOLOGY





Groundwater Study Results

- Approx. 66,000 acre-ft/year is available from the Denver Basin aquifers in Region 2 (Petra geological analysis).
- Approx. 24% is notnontributary (NNT) groundwater that would require an augmentation or replacement plan to develop.



Gross Water Availibility NNT - Actual Gross Water Availibility NT

Water Demand Projections

- Data
- Estimating Use
- Evaluating Supply



Data

•Growth: County staff provided estimates of total households and commercial growth for each water provider and municipality.

•Water use category percentage estimates:

Single-Family Dwellings (45 %) Multi-Family Dwellings (25%) Commercial/Industrial Use (21%) Outside (Municipal) Irrigation (8-9%)

Data obtained from

- 2021 Aurora Self Assessment
- 2015 Aurora Water Conservation Plan
- 2021 Denver Water fact book
- Water use data from 2021 ACWWA, Byers and Rangeview Self
 Assessments







Estimating Use

Indoor use - Residential and commercial percentage: Averaged baseline for Jan-April & Nov-Dec (essentially no irrigation).

•Indoor water demand efficiencies have improved over the last 20 years

•Lesser opportunities for conservation (LEED building and water efficient fixtures)

Irrigation use - Difference between baseline indoor use and total water use. •30 to 50% of water demand per household or commercial building, less for multi-family •Opportunities for conservation

Demand data used:

- 120-140 gals per day p<mark>er person</mark> •
- 2.57 people per household
- Residential use in Denver: 105,000 gals per year per residence Irrigation use: 30 to 50% of demand per household or commercial building, less for multi-family



Water Analysis Key Takeaways

- Legally available Denver Basin groundwater > that which can be physically removed with conventional drilling and well completion.
- 2. Irrigation demands are 30-50% of supplied water.
- 3. Water supplies in Region 1 are diverse and primarily renewable with limited reliance on Denver Basin groundwater.
- 4. Water supplies in Region 2 are primarily Denver Basin groundwater.



Use of the GIS Mapping

https://experience.arcgis.com/experience/8f913e983c544423b2db5ed04dda54cf



Water Efficiency Effects

- Improved efficiency over last 25 years already in effect
- Increased efficiency thru 2050
- Reference efficiency goals in water provider planning documents
- Flattening demand projections







Landscaping Changes

- Provisions / requirements in municipal code
 - ✓ Land development code
 - ✓ Unified development ordinance
 - ✓ Unified land use code
 - ✓ Development standards
 - For both residential and commercial

No more than 33% of any one species

Streetscape plans may achieve street tree diversity on a broader area or block-scale basis while planting the same species on individual street segments or blocks for the urban design effect.

So are they recommendations or requirements?

Xeric Guidelines. All landscape plans shall conserve water with landscape materials and design techniques using the following xeric principles.

- Incorporate a "zoned planting scheme" to reduce water demand by grouping plants with similar water requirements together in the same hydrozone.
- 2. Limit high-irrigation turf and plantings to appropriate high-use areas with high visibility
- or and functional needs and use water-conserving grasses such as fescue sods. No limitations on Use drought tolerant plants, suitable to the region, with low watering and pruning requirements. Grass, for example.
- Incorporate soil amendments and use of organic mulches that reduce water loss and limit erosion. All plant areas should receive soil amendments of at least 3 cubic yards per 1,000 square feet.
- Install efficient automatic irrigation systems that incorporate water conservation measures, including spray heads for ground cover and drip irrigation for shrubs and trees, and high-efficiency or precision nozzles. Provide regular and attentive maintenance to ensure irrigation systems are functioning properly.

[.] Alternative sources of irrigation for all landscape areas are encouraged.





Landscaping Changes

- ✓ Amount and types of turf permitted on-site
- Required use of species on approved plant lists
- ✓ Grouping plants by hydrozone
- ✓ Irrigation system design requirements
 - ✓ Qualified Water-Efficient Landscaper Review
- ✓ Limitations on slope irrigation
- ✓ Water-Sense or Smart Irrigation controllers
- ✓ HOAs not exempt







Water Reuse

Good start for water supply - reliability

Reuse Options

- o Exchanges
- o Irrigation use purple pipes
- o Indirect potable reuse environmental buffer
- o Direct potable reuse on the horizon



Examples: Rangeview, Aurora's Prairie Waters Project,

SMWSA Water Infrastructure & Supply Efficiency (WISE)



Engagement Overview

- Advisory Committee Meetings
- Project website, 1-pager and info sign up (57)
- I-70 REAP Meeting 4/13/2023
- Arapahoe County Fair Booth
- Upcoming Activities

Advisory Committee Meeting - December METROQUEST! (Community Interactive Online Engagement) - January-February Two Public Meetings - January-February

Home

Your County

County Departments

Public Works And Development

Divisions

Planning And Land Development

Long Range Planning

Water Supply Study

Water Supply Study

What will the County's water supply look like in the year 2050? A yearlong Water Supply Study is underway and will help the County plan for current and future water needs and inform land use decisions to effectively manage growth for future generations.

The Study will assess water supplies and the demands of future populations through the year 2050. It will also recommend ways the County can use water more efficiently in the years ahead. Conditions, such as climate and population growth will be considered against water demands and supplies.

In the coming months, the County will provide opportunities for residents and key stakeholders to provide input on water issues. Watch for public meetings and online surveys and share your thoughts.



arapahoeco.gov/waterstudy



MetroQuest Strategies Example





In the news

"We Need to Plan for that" News story with a good study overview.



A model community for water recycling right here in Arapahoe County!



https://www.denver7.com/news/local-news/we-need-to-plan-forthat-amid-rapid-growth-arapahoe-county-launches-months-longstudy-of-water-resources

https://www.cbsnews.com/colorado/news/arapahoe-countyneighborhood-recycling-sewage-future-water-preservation/

Next Steps

- Identify Water Strategies for Public Input

 MetroQuest, Public Meetings
- Develop Policy Recommendations, Bring Forward for Consideration – Spring 2024
- Draft/Finalize Report May/June 2024



Questions? Comments?

Loretta Daniel, Arapahoe County

Larry Mugler, Arapahoe County

Will Koger, Project Manager, Forsgren Associates

Bill Fronczak, Asst. Project Manager, LRE Water

arapahoeco.gov/waterstudy