



June 12, 2025

Town of Palmer Lake Planning Commission
42 Valley Crescent
Palmer Lake, CO 80133

RE: Buc-ee's Travel Center Water Supply Considerations

Dear Commissioners:

We are writing on behalf of Ian Griffis regarding Town of Palmer Lake ("Town") water supply considerations for the proposed Buc-ee's Travel Center annexation. We have consulted with northern El Paso County water users for over two decades regarding groundwater geology, Denver Basin aquifer well development, municipal water supply planning, and water rights matters. Our resumes are attached as **Appendix A**.

1. Summary

- i) The Town is in a precarious position due to an underdeveloped water supply system. Presently, the Town cannot meet peak day water demand if there is a well failure. The Town should address its current water supply deficiencies before taking on new commitments.
- ii) Approximately 50% of Town water supply comes from the non-renewable Denver Basin aquifers.
- iii) Buc-ee's Travel Center will increase Town water demand by 25-27% and that demand will necessarily be served by Denver Basin groundwater.
- iv) Denver Basin well construction is capital-intensive, with each well costing approximately \$2.8M, or \$4.7M with treatment.

- v) Only the Denver and Arapahoe aquifers can be practically developed for Town municipal water use; Denver aquifer well yields are unpredictable.
- vi) Denver and Arapahoe aquifer water levels are declining beneath the Town. Based on data from the Town's A-2 well, water level decline in the Arapahoe aquifer has averaged 17 feet per year and yield has decreased by 40% since when the well was first drilled in 2001.
- vii) Denver Basin groundwater is a nonrenewable resource. The rate of Denver Basin water level and well yield decline will accelerate with greater Town well pumping and a higher density of Town wells.
- viii) The April 2025 GMS Report estimates a \$10.4M capital cost to serve Buc-ee's Travel Center. The actual long-term capital cost will be greater because the April 2025 GMS Report does not account for the cost to construct additional wells as well yields decline.
- ix) The Town's water service commitments are permanent, yet the proposed Buc-ee's Travel Center Denver Basin supply is nonrenewable and finite. The April 2025 GMS Report does not address the cost for renewable water service.
- x) Most water providers require development to pay its own way both for immediate capital improvements (e.g. wells, treatment, and distribution) and also costs for renewable water rights acquisition and infrastructure.
- xi) Instead of making a new water service commitment to Buc-ee's Travel Center, the Town should:
 - a. Remedy its immediate water supply issues.
 - b. Compare projected Town water demand vs future well yield to ensure that the Town can provide water service to its residents in the future in the event that the top producing well is offline.
 - c. Identify and budget for future well construction projects to make up for declining well yields and routine well replacement.
 - d. Identify and budget for a permanent, renewable water supply to replace or substantially supplement Denver Basin groundwater in the future.
- xii) There are grant and low-interest loan funding opportunities available through the Colorado Water Conservation Board to support the Town's planning and water infrastructure. Town can secure its water future without relying on Buc-ee's Travel Center tax revenue.

- xiii) Annexation of the Buc-ee's Travel Center is likely to result in increased scrutiny over the Town's water rights operations, including preservation of the water level in historic Palmer Lake.

2. Introduction

In addition to professional experience and references cited in this letter, we have relied upon information from the:

- i) April 2021 Water Resource Evaluation report prepared by GMS, Inc. (the "April 2021 GMS Report");
- ii) November 2022 Preliminary Engineering Report for Water System Improvements prepared by GMS, Inc. (the "November 2022 GMS Report");
- iii) April 2025 Preliminary Engineering Report, Town of Palmer Lake Water System Improvements for Proposed Buc-ee's Travel Center report prepared by GMS, Inc. ("April 2025 GMS Report"); and
- iv) May 5, 2025 Town Board of Trustees Workshop.

The April 2025 GMS Report identifies that the Buc-ee's Travel Center will increase Town water demand by 25-27% over current conditions.¹ In recent years, the Town water supply has been derived from approximately 40-55% non-renewable Denver Basin aquifer pumping from the Denver and Arapahoe aquifers.² The Town plans to supply the Buc-ee's Travel Center and annexations enabled by the new 12-inch water line with additional Denver Basin wells because the Town's surface water supplies are already maximized to physical and water rights capacity.

3. Denver Basin aquifers

The layered sandstone, siltstone, clay, and shale Denver Basin aquifers were deposited approximately 70 to 34 million years ago, first as marine beach deposits (Fox Hills aquifer) and later as rivers that eroded sediment from mountains to the west (Arapahoe, Denver, and Dawson aquifers).³ From top to bottom, the Denver Basin includes the Dawson, Denver, Arapahoe, and Fox Hills aquifers. The aquifers are not homogeneous units but rather zones of sandstone/siltstone/clay/shale layers separated by thicker zones of impermeable clay and shale. The aquifers are variable both vertically and laterally.

¹ April 2025 GMS Report, Table 15 at 40.

² April 2025 GMS Report, Table 8 at 28.

³ Thorson, Jon, P. Geology of Upper Cretaceous, Paleocene and Eocene Strata in the Southwestern Denver Basin, Colorado, Colorado Geological Survey, 2011.

Denver Basin groundwater rights are allocated based on land area and a 100-year aquifer life.⁴ Discharge from the Denver Basin aquifers is much greater than recharge; groundwater is mined.⁵ As a practical matter, the economic life of the Denver Basin aquifers for municipal use is much less than 100-years in northern El Paso County.⁶

The Town is located on the western edge of the Denver Basin, where the Denver Basin aquifers are truncated by the Rampart Range Fault system along the mountain front at the base of Sundance and Chautauqua Mountains.⁷ Well yields near the edge of the aquifer can experience “boundary effects” that reduce long-term well yield. Douglas County implemented special “Margin B” zoning regulations to prevent excessive depletion of the vulnerable western edge of the Denver Basin.

3.1. Denver Basin aquifers beneath the Town

Beneath the Town, each of the Denver Basin aquifers have different characteristics:

- i) The Dawson aquifer generally supports well yields less than 50 gallons per minute (gpm) at a total depth of approximately 1,100-1,400 feet. The Dawson aquifer is “not-nontributary.” Municipal pumping from the Dawson aquifer must be approved by a decreed plan for augmentation. We are not aware of a plan for augmentation that would allow Dawson aquifer pumping by the Town.
- ii) The Denver aquifer has a total depth of approximately 1,400-1,700 feet. Denver aquifer well yields are laterally variable in northern El Paso County. For example, the Town’s D-3 well is unused due to low yield. *See* April 2021 GMS Report at 12. After the Arapahoe aquifer, the Denver aquifer is the second most widely developed aquifer for municipal use in northern El Paso County.
- iii) The Arapahoe aquifer has a total depth of approximately 2,100 to 2,400 feet and currently supports well yields on the order of 150 to 300 gpm in northern El Paso County. For example, Town Well A-2 has a reported current “actual” yield of 240 gpm. *See* April 2025 GMS Report, Table 7 at 25. The Arapahoe aquifer is the most widely developed aquifer in northern El Paso County for municipal use due to relatively high well yield. Water levels in the Arapahoe aquifer are declining, as addressed in subsection 3.2, below.
- iv) The Laramie-Fox Hills aquifer has a total depth of approximately 2,500 to 2,800 feet. The Laramie-Fox Hills aquifer is not widely developed in northern El Paso County due to: (i) substantial depth and corresponding well construction cost; (ii) yield likely lower

⁴ § 37-90-137(4), C.R.S.

⁵ Paschke, Suzanne S., et. al., Groundwater Availability of the Denver Basin Aquifer System, Colorado, Professional Paper 1770, United States Geological Survey, 2011.

⁶ El Paso County Water Master Plan, Forsgren Associates, Inc., February 2009.

⁷ Keller, John W., et. al., Geologic Map of the Palmer Lake Quadrangle, El Paso County, Colorado, Colorado, Open-File Report 06-6, Geological Survey, 2007.

than in the Arapahoe aquifer; and (iii) serious water quality issues including total dissolved solids (salts) and radionuclides that exceed drinking water standards. For these reasons, we are not aware of any northern El Paso County municipalities that have or plan to develop Laramie-Fox Hills aquifer wells for potable consumption.

3.2. Denver Basin aquifer water levels

Well yield is particularly sensitive to “available drawdown” which is the difference between the static, non-pumping water level and the deepest practical pumping water level in a well. A shallower “static” water level affords more available drawdown and greater well yield. As the aquifer and well static water level declines due to groundwater mining, well yield also decreases. Wells cannot be deepened because they already fully penetrate the targeted Denver Basin aquifer.

There are two serious well water supply concerns for the Denver Basin aquifers in northern El Paso County related to aquifer water level: (i) long-term well water level declines and (ii) well-to-well interference.

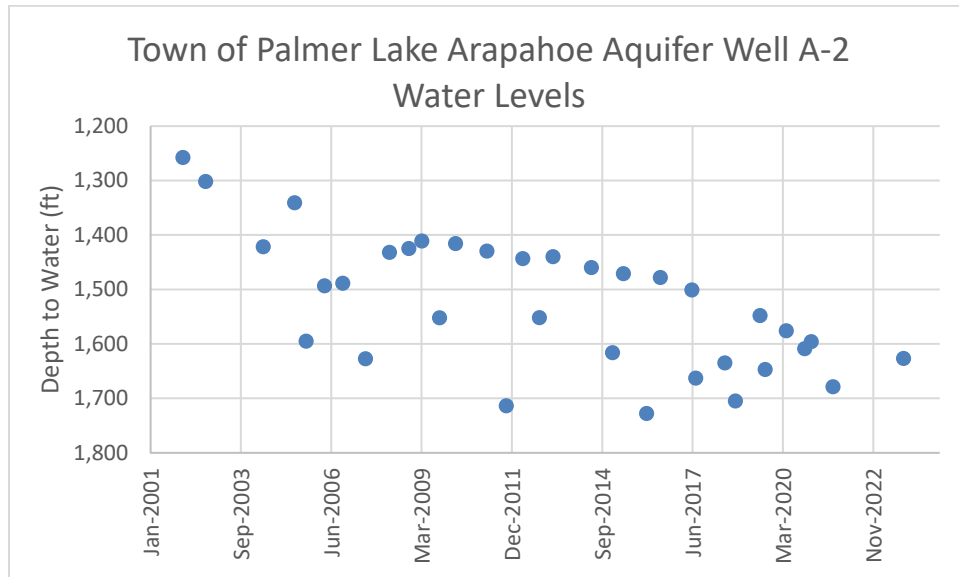
3.2.1 *Aquifer water level declines*

Denver Basin aquifer water level declines occur because aquifer discharge through pumping greatly exceeds aquifer recharge. Such water level declines are well documented, well understood, and occurring throughout the Denver Basin. The Town’s Denver Basin aquifer wells have experienced substantial water level and yield declines:

- i) When Town Denver aquifer well D-2 was equipped in 1989, it was tested at 210 gpm. The replacement well D-2R well has a reported yield of 130 gpm, a decrease of 38%. This change in yield is likely due to a decrease in the well static water level of 207 feet from a depth of 342 feet in 1989 to 549 feet in 2023 at an average decline rate of 6 feet per year.⁸
- ii) When Town Arapahoe aquifer well A-2 was drilled in 2001, it was tested at 400 gpm. Today, the A-2 well has a reported yield of 240 gpm, a decrease of 40%. This change in yield is likely due to a decrease in the well static water level of 369 feet from a depth of 1,258 feet in 2001 to 1,627 feet in 2023 at an average decline rate of 17 feet per year.⁹ Well A-2 water levels are illustrated in the graph below.

⁸ Well yield and water levels from Colorado Division of Water Resources permit file no. 31264-F and 31264-FR and Colorado Decision Support System water level information, DB-119 PALMER LAKE D-2R and DB-119 (1987-2022). Current reported yield from the April 2025 GMS Report, Table 7 at 25.

⁹ Well yield and water levels reported in Colorado Division of Water Resources permit file no. 56816-F and Colorado Decision Support System water level information, DB-119 PALMER LAKE A-2. Current reported yield from the April 2025 GMS Report, Table 7 at 25.



Denver and Arapahoe aquifer water level declines are not unique to the Town. Other northern El Paso County municipalities report similar and more severe water level declines. Our experience with Denver Basin aquifer development has shown that increased rates of aquifer withdrawal increase the rate of water level decline. A portion of water level declines result from neighboring pumping, but the most immediate effects result from in-Town or in-District pumping.

3.2.2 Well-to-well water level impacts

Groundwater in the Denver and Arapahoe aquifers is stored under artesian pressure, which is an important consideration for well spacing because groundwater level impacts extend for great distances in artesian or confined aquifers. The “cone of depression,” which is the zone of water level impact surrounding a pumping well, can extend more than a mile from each confined Denver Basin aquifer well. During peak irrigation season pumping, we have documented and plan for 75 to 150 feet of water level impact due to well-to-well interference.

To manage, but not eliminate, well-to-well interference, Denver Basin wells constructed in the same aquifer should be spaced at least a half mile apart. Unfortunately, such well spacing results in substantial capital distribution and treatment costs.

4. Town water demands and water supply

The Town derives its water supply from surface water rights diverted from Monument Creek and Denver Basin well pumping. The Town’s surface water rights are fully developed and future water demands will necessarily be met by new Denver Basin wells.

The Town appears to have a robust water rights portfolio relative to future water demand: The Town’s current annual water demand is 168 acre-feet per year (AF/yr) and buildout (2050) water

demands including Buc-ee's Travel Center and associated potential annexations is 299 AF/yr. *See* April 2025 GMS Report, Table 14 at 39. The Town estimates that it has substantial "paper" Denver Basin water rights in the traditionally developed Denver and Arapahoe aquifers, totaling 1,535.8 AF/yr. *See* November 2022 GMS Report, Table 8 at 34.

However, "paper" water rights must be developed with expensive Denver Basin aquifer wells to serve customer demand. Construction of wells and water treatment is driven by peak day demand, estimated by the Town at 284% of average annual demand. Unfortunately, well drilling is capital-intensive. For example, the Town estimates that proposed Buc-ee's Well A-3 is a \$4.7M project. *See* April 2025 GMS Report, Table 19 at 61-62.

4.1. Current Town water demands and water supply

Despite what appears to be a rich "paper" water rights portfolio, the Town is in a precarious water supply situation. Current average day demand is peak day is estimated at 0.42 million gallons per day (MGD). *See* April 2025 GMS Report, Table 16 at 39. Yet, firm water supply is 0.25 MGD (a 40% deficit), assuming well A-2 goes offline. *See* April 2025 GMS Report, Table 7 at 25. This critical vulnerability has been known to the Town since 2022:

The water system...needs include the addition of a new Arapahoe Aquifer well. The Town's well supply capacity is vulnerable with only two wells. With the existing larger capacity well out of service, well production capacity is limited to 288,000 gpd, less than the existing...demand. (November 2022 GMS Report, § IX at 67).

We understand that the Town plans to remedy their existing water supply gap by constructing Arapahoe aquifer well A-1 in the near future, estimated to initially yield 0.35 MGD (240 gpm) to provide 0.59 MGD firm capacity. However, until that well is drilled, constructed, and online, the Town may need to impose outdoor use water restrictions if well or well pump failure occurs. Furthermore, well yield is not known until a well is drilled, constructed, and tested.

4.2. Near-term Town water demands and water supply

With addition of Buc-ee's Travel Center demand, peak day Town water demand will be approximately 0.54 MGD, which is slightly less than Town firm capacity if future Arapahoe aquifer well A-1 yields 0.35 MGD as expected by the Town. We understand the Town will also drill Buc-ee's Arapahoe aquifer well A-3, bringing estimated firm Town capacity to 0.94 MGD.

Based on the April 2021, November 2022, and April 2025 GMS Reports, it does not appear that the Town has planned for additional future Denver or Arapahoe aquifer wells that will be needed as well yields decline. This is an important planning consideration because a new Town Arapahoe

aquifer well supply is estimated to cost \$4.7M with treatment, or approximately \$2.8M exclusive of treatment.¹⁰

4.2.1 Shortcomings in Town Denver Basin water supply planning

The April 2025 GMS Report estimates a \$10.4M cost for waterline extension, well construction, and water treatment for Buc-ee's Travel Center. The actual capital cost will be greater because the Town's water supply projections are based upon current Denver Basin well yields and does not account for the cost for future well construction to maintain production from a declining resource. The Town has not considered the following factors that will affect Town water supply during the next 10 years and add to the estimated \$10.4M Buc-ee's Travel Center water infrastructure cost:

- i) Decrease in Denver Basin aquifer well yields over time due to declining aquifer water levels. A rule-of-thumb is that well capacity decreases by approximately 5% per year due to water level declines, although the actual rate of decline depends on local factors.
- ii) Decrease in Denver Basin aquifer well yields due to well-to-well interference, which depends on well spacing.
- iii) Uncertain yield for new Denver Basin aquifer wells.
- iv) Replacement of well A-1 that was drilled in 2021 and is near its 25 to 30 year expected usable life. (For example, Town well D-2 failed after 34 years).
- v) Treatment of radium that is naturally occurring and reportedly increasing in concentration in water pumped from the Denver and Arapahoe aquifers. *See* April 2025 GMS Report, § IX at 63.

By not considering these factors, the Town has failed to consider the actual costs to continue reliance on the Denver Basin aquifers and the increased rate of aquifer depletion and treatment costs due to the Buc-ee's Travel Center and associated future annexations.

4.2.2 Future renewable water supply

In the mid-2000's neighboring water providers including Triview Metropolitan District ("Triview"), Donala Water and Sanitation District ("Donala"), Woodmoor Water and Sanitation District ("Woodmoor"), and the Town of Monument ("Monument") began to grapple with the finite nature of Denver Basin groundwater resource and the economic reality of drilling more wells to maintain production from declining aquifers.

Over the past two decades, neighboring water providers have been implementing renewable water supply plans: (i) Triview acquired renewable water rights on Fountain Creek and the Arkansas

¹⁰ Well cost based upon April 2025 GMS Report, Table 19 at 61-62. Well cost exclusive of treatment is a pro-rated amount.

River that are treated and delivered through Colorado Springs Utilities (“CS-U”) infrastructure; (ii) Donala acquired water rights on the Arkansas River that are also conveyed through CS-U infrastructure; and (iii) Donala, Woodmoor, and Monument have partnered in the Loop Water Authority to deliver renewable Fountain Creek water rights.

The Town’s need for a new renewable water supply is not a question of “if,” but a question of “when.” Water service to the Buc-ee’s Travel Center will accelerate the timing of when the Town’s reliance on Denver Basin groundwater becomes uneconomical. A critical shortcoming of the April 2025 GMS Report is that it does not address the actual cost for a permanent water commitment to Buc-ee’s, which will ultimately require a renewable water supply.

5. Water rights administration

The Town operates a complex water rights portfolio including: (i) surface water rights decreed in Case Nos. CA-751, CA-13801, and 13CW3061; (ii) Denver Basin groundwater rights decreed Case Nos. 86CW108, 87CW68; (iii) plans for augmentation decreed in Case Nos. 87CW69, 10CW87, and 14CW3068; and (iv) rights of exchange decreed in Case Nos. 87CW69.

Initial review of the water accounting requirements in the above-mentioned water rights decrees compared to water accounting submitted by the Town to the Colorado Division of Water Resources indicates compliance deficiencies.

In our experience, unintentional decretal non-compliance often goes unnoticed until a water user embarks on a substantial new project. We encourage the Town to take compliance with its water rights decrees seriously before considering a large increment of new growth with the Buc-ee’s Travel Center. Non-compliance issues have the potential to reignite historical Town water challenges including preservation of water levels in Palmer Lake.

If you have any questions about this letter, please contact us.

Very truly yours,

BBA Water Consultants, Inc.



Daniel O. Niemela, C.P.G.
Principal – Hydrogeologist



Rachael Frei, P.E.
Project Manager – Water Resources Engineer

DN/RF/jeb
Enclosures
2515.00



APPENDIX A

DANIEL O. NIEMELA, C.P.G.

Principal - Hydrogeologist

EDUCATION

B.A. in Geology, 2000, The Colorado College, Colorado Springs, Colorado.
Emphasis in Geology. Received Distinction for senior thesis project entitled “An Evaluation of Ground Water Development Potential for an Alluvial Aquifer in Crested Butte, CO.”

Graduate course work at Colorado School of Mines

PROFESSIONAL

American Water Resources Association
American Institute of Professional Geologists
Colorado Water Well Contractors Association – Technical Director, 2006 - 2021
Colorado Water Well Contractors Association Member of the Year – 2013
HB13-1248 and SB15-198 Leasing Following Technical Committee, 2012 - 2015
Colorado Ground Water Association – Director-at-Large, 2005 - 2006
National Ground Water Association
Chaffee County Economic Development Corporation, Policy Committee, 2023 - 2025

REGISTRATION

American Institute of Professional Geologists Certified Professional Geologist. CPG-12016

EXPERIENCE RECORD

2002-Present BBA Water Consultants, Inc., Englewood, Colorado
Principal/Hydrogeologist. Assist clients with development and maintenance of physical and legal ground and surface water supplies. Water supply planning; preparation of technical reports in support and opposition of Water Court applications; historical consumptive use quantification; water rights administration; augmentation plans; water rights valuation; water rights change of use; develop and implement water accounting procedures; water rights and reservoir modeling; design groundwater tests and analyses; supervise and perform pump tests and analyze test data; prepare analytical groundwater models; prepare well and recharge facility designs and specifications; conduct field investigations; evaluate geophysical log data, geologic maps and aerial photos; perform numerical groundwater modeling and calibration using MODFLOW; prepare groundwater quantifications; evaluate well-to-well impacts; and quantify surface water and groundwater interaction.

PUBLICATIONS

“Irrigation Season Water Level Changes in Municipal Arapahoe Aquifer Wells, Douglas County, Colorado,” Geological Society of America Abstract with Programs, Vol. 39, No. 6, p. 43. 2007.

DANIEL O. NIEMELA – Continued

“Monitoring and Management of Nonrenewable Ground Water Resources – Case Study: Denver Basin Aquifers,” AWRA Adaptive Management of Water Resources AWRA Summer Specialty Conference Proceedings. 2006.

“A Review of Water Level Changes in the Denver Basin Bedrock Aquifers,” Geological Society of America Abstract with Programs, Vol. 36, No. 5, p. 311. 2004.

PRESENTATIONS

Colorado Bar Association “Maximizing the Effectiveness of Your Expert Witness in Water Court,” October 2024.

EDC Insights Panel “Whiskey’s for Drinking. Water’s for Fighting,” November 2023.

“Drought, Wildfire and Ground Water.” CWWCA Annual Conference, Webinar, January 2021.

“History of Colorado Water Rights.” The Colorado College, Webinar, November 2020.

“Types of Well Permits from Easy Exempt to Complex Fee Wells.” CWWCA Annual Conference, Denver, CO, January 2019.

“History of Colorado Water Rights.” CWWCA Mid-Year Conference, Breckenridge, CO, July 2017.

“History of Colorado Water Rights.” Colorado College Guest Speaker, February 2017.

“Western Water Rights and Groundwater Administration.” NGWA Webinar, August 2014.

“Introduction to Hydrogeology.” CWWCA Annual Conference, Denver, CO, January 2014.

“Well Augmentation Plans.” CWWCA Mid-Year Conference, Breckenridge, CO, July 2013.

“Introduction to Fractured Rock Hydrology, Various Case Studies.” CWWCA Annual Conference, Denver, CO, January 2013.

“Introduction to Hydrology.” CWWCA Short Course, Denver, CO, January 2013.

“Introduction to Sedimentary Rock Hydrology, The Denver Basin.” CWWCA Mid-Year Conference, Breckenridge, CO, July 2012.

“Introduction to Fractured Rock Hydrology, Summit County.” CWWCA Mid-Year Conference, Breckenridge, CO, July 2012.

“Adaptive Management in the Denver Basin Aquifers, Colorado.” Declining Ground Water Levels: Measuring, Monitoring, and Mitigation – A National Ground Water Association Virtual Conference, October 2011.

“Turning to Groundwater: An engineering perspective.” The University of Denver Water Law Review 2011 Symposium, Denver, CO, April, 2011.

DANIEL O. NIEMELA – Continued

“Economics of Denver Basin and Renewable Water Supply Planning and Surprising Ground Water Level Trends,” Colorado Section of the American Water Resources Association, Monthly Lunch Program, July 2010.

“Pumping Tests and Hydrogeologic Data,” CWWCA Annual Conference, Denver, CO, January 2009.

“Denver Basin Water Supply Planning: A Cost Comparison to Renewable Water,” Colorado Groundwater Association Denver Basin Lecture Series, Parker, CO, May 2009.

“Denver Basin Aquifers,” Metropolitan State College of Denver, Guest Lecturer, Denver, CO, 2003 through 2008.

“Irrigation Season Water Level Changes in Municipal Arapahoe Aquifer Wells, Douglas County, CO,” Geological Society of America 2007 Annual Meeting, Denver, CO, October 2007.

“Monitoring and Management of Nonrenewable Ground Water Resources – Case Study: Denver Basin Aquifer,” AWRA Adaptive Management of Water Resources AWRA Specialty Conference, Missoula, MT, June 2006.

“A Review of Water Level Changes in the Denver Basin Bedrock Aquifers,” Geological Society of America 2004 Annual Meeting, Denver, CO, November 2004.

DANIEL O. NIEMELA, C.P.G.
EXPERT EXPERIENCE

Year	Type of Report or Testimony	Case No.	Description
2025	Deposition	22CW3074, Division 5	5/13/25 Deposition, Snake River Water District
2024	Deposition	22CW3074, Division 5	9/11/24 Deposition, Snake River Water District
2024	Expert Report	21CW3058, Division 2	Woodmoor Water and Sanitation District No. 1 Opposition to Triview Metropolitan District Exchanges
2024	Expert Report	20CW3012 and 20CW3013, Division 2	Tri-State Generation and Transmission Association Pueblo East Pit III Appropriative Storage Right and Plan for Augmentation
2022	Expert Report	19CW3036, Division 2	Tri-State Generation and Transmission Association and Amity Mutual Irrigation Company Opposition to Lower Arkansas Water Management Association Change of Use
2021	Testimony	17CW3069, Division 2	Tri-State Generation and Transmission Association and Amity Mutual Irrigation Company Opposition to Lower Arkansas Water Management Association Plan for Augmentation
2021	Expert Report	17CW3069, Division 2	Tri-State Generation and Transmission Association and Amity Mutual Irrigation Company Opposition to Lower Arkansas Water Management Association Plan for Augmentation
2020	Expert Report	17CW3202, Division 1	Centennial Water and Sanitation District Opposition to Central Colorado Water Conservancy District Change of Use and Appropriation of Storage Water Rights
2020	Expert Report	16CW3010, Division 2	[Additional] Supplemental Disclosure, Woodmoor Water and Sanitation District No. 1 Opposition to Triview Metropolitan District Application to Amend Plans for Augmentation
2020	Expert Report	16CW3010, Division 2	Supplemental Disclosure, Woodmoor Water and Sanitation District No. 1 Opposition to Triview Metropolitan District Application to Amend Plans for Augmentation
2020	Expert Report	17CW3122, Division 1	Centennial Water and Sanitation District Opposition to Perry Park Water and Sanitation District Application for Change of Use and Plan for Augmentation
2020	Expert Report	16CW3010, Division 2	Woodmoor Water and Sanitation District No. 1 Opposition to Triview Metropolitan District Application to Amend Plans for Augmentation
2019	Expert Report	17CW3072, Division 2	Woodmoor Water and Sanitation District No. 1 Rebuttal in Widefield Water and Sanitation District Change of Water Rights
2019	Expert Report	18CW3016, Division 2	Woodmoor Water and Sanitation District No. 1 Opposition to Triview Metropolitan District and Fountain Mutual Irrigation Company Change of Water Rights and Plan for Augmentation
2019	Expert Report	16CW3056, Division 2	Woodmoor Water and Sanitation District No. 1 Opposition to Colorado Springs Utilities Plan for Augmentation, Addition of Replacement Water Sources and Appropriative Rights of Exchange
2019	Deposition	16CW3202, Division 1	5/29/19 Deposition, Centennial Water and Sanitation District Opposition to Central Colorado Water Conservancy District, the Ground Water Management Subdistrict of the Central Colorado Water Conservancy District and the Well Augmentation Subdistrict of the Central Colorado Water Conservancy District Application for Conditional Ground Water Rights, Conditional Surface Water Rights, Conditional Recharge Rights and Plan for Augmentation
2019	Expert Report	16CW3202, Division 1	Supplemental Disclosure, Centennial Water and Sanitation District Opposition to Central Colorado Water Conservancy District, the Ground Water Management Subdistrict of the Central Colorado Water Conservancy District and the Well Augmentation Subdistrict of the Central Colorado Water Conservancy District Application for Conditional Ground Water Rights, Conditional Surface Water Rights, Conditional Recharge Rights and Plan for Augmentation
2019	Expert Report	17CW3069, Division 2	Tri-State Generation and Transmission Association Opposition to Lower Arkansas Water Management Association Application for a Plan for Augmentation
2019	Expert Report	16CW3202, Division 1	Centennial Water and Sanitation District Opposition to Central Colorado Water Conservancy District, the Ground Water Management Subdistrict of the Central Colorado Water Conservancy District and the Well Augmentation Subdistrict of the Central Colorado Water Conservancy District Application for Conditional Ground Water Rights, Conditional Surface Water Rights, Conditional Recharge Rights and Plan for Augmentation
2019	Expert Report	15CW3016, Division 2	Woodmoor Water and Sanitation District No. 1 Opposition to United States of America Application for Appropriative Storage Rights and Plan for Augmentation for the United States Air Force Academy
2018	Expert Report	16CW3119, Division 1	Centennial Water and Sanitation District Opposition to Central Colorado Water Conservancy District Change of Use and Appropriation of Storage Water Rights
2018	Expert Report	10CW4, Division 2	Tri-State Generation and Transmission Association Opposition to Lower Arkansas Valley Water Conservancy District and lower Arkansas Valley Super Ditch Company Appropriative Rights of Substitution and Exchange
2018	Expert Report	08CW104, Division 1	Centennial Water and Sanitation District Opposition to Fort Morgan Farms Plan for Augmentation
2018	Expert Report	13CW3153, Division 1	Centennial Water and Sanitation District Opposition to Kenneth Mayer Junior Water Rights, Change of Use, Plan for Augmentation and Exchange Water Rights
2017	Expert Report	14CW3123, Division 1	Centennial Water and Sanitation District Opposition to Groundwater Management Subdistrict and Well Augmentation Subdistrict of the Central Water Conservancy District Change of Use, Recharge and Exchange
2017	Testimony	N/A	10/5/17 Testimony to Water Resources Review Committee regarding HB17-1289
2017	Testimony	N/A	8/2/17 Testimony to Water Resources Review Committee regarding HB17-1289
2017	Deposition	14CW3177, Division 1	5/24/17 Deposition, Centennial Water and Sanitation District Opposition to City of Aurora Change of Use

Year	Type of Report or Testimony	Case No.	Description
2017	Expert Report	14CW3177, Division 1	Supplemental Disclosure, Centennial Water and Sanitation District Opposition to City of Aurora Change of Use
2017	Expert Report	12CW94, Division 2	Supplemental Disclosure, Tri-State Generation and Transmission Association, Inc Opposition to Catlin Augmentation Association Change of Use
2017	Expert Report	12CW94, Division 2	Tri-State Generation and Transmission Association, Inc Opposition to Catlin Augmentation Association Change of Use
2017	Expert Report	09CW91, Division 1	Centennial Water and Sanitation District Opposition to Public Service Company of Colorado Change of Use and Addition of Water Rights to Plan for Augmentation
2017	Expert Report	14CW3177, Division 1	Centennial Water and Sanitation District Opposition to City of Aurora Change of Use
2016	Expert Report	12CW94, Division 2	Tri-State Generation and Transmission Association, Inc Opposition to Catlin Augmentation Association Change of Use
2016	Expert Report	15CW3010, Division 1	Centennial Water and Sanitation District Opposition to Town of Wiggins and Box Elder Creek Properties Application for Conditional Water Right, Appropriative Right of Exchange and Plan for Augmentation
2016	Expert Report	16CW3038, Division 2	Amity Mutual Irrigation Company v. Fort Lyon Canal Company
2015	Expert Report	11CW13, Division 2	Tri-State Generation and Transmission Association, Inc Opposition to City of La Junta Water Rights Change of Use and Exchange
2015	Expert Report	12CW31, Division 2	Tri-State Generation and Transmission Association, Inc Opposition to Colorado Springs Utilities Application for Conditional Rights of Storage and Exchange
2015	Expert Report	12CW31, Division 2	Woodmoor Water and Sanitation District No. 1 Opposition to Colorado Springs Utilities Application for Conditional Rights of Storage and Exchange
2015	Expert Report	88CW23(B), Division 2	Woodmoor Water and Sanitation District No. 1 Opposition to Triview Metropolitan District Plan for Augmentation and Lawn Irrigation Return Flow Quantification
2014	Expert Report	2010-CV-4123 District Court, Denver, CO	Highland Ditch Co. Irrigation Water Supply in Longmont, CO, Prepared for Shigo, LLC
2013	Rebuttal Expert Report	12CW1, Division 2	Woodmoor Water and Sanitation District Change in Water Rights
2013	Supplemental Expert Report	11CW95, Division 2	Tri-State Generation and Transmission Association, Inc Opposition to Lance O. Verhoeff & Verhoeff Farms, Inc. Storage Rights
2013	Expert Report	11CW95, Division 2	Tri-State Generation and Transmission Association, Inc Opposition to Lance O. Verhoeff & Verhoeff Farms, Inc. Storage Rights
2013	Expert Report	12CW1, Division 2	Woodmoor Water and Sanitation District Change in Water Rights
2012	Expert Report	10CW29, Division 2	Woodmoor Water and Sanitation District Substitution and Exchange Water Rights
2012	Expert Report	10CW28, Division 2	Woodmoor Water and Sanitation District Plan for Augmentation and for Quantification of Reusable Outdoor Use Return Flows
2011	Rebuttal Expert Report	07CW104, Division 2 and 08CW263, Division 1	Woodmoor Water and Sanitation District Denver Basin Water Rights Adjudication
2011	Expert Report	07CW104, Division 2 and 08CW263, Division 1	Woodmoor Water and Sanitation District Denver Basin Water Rights Adjudication

RACHAEL D. FREI, P.E.

Project Manager - Senior Water Resources Engineer

EDUCATION

B.S. in Environmental Engineering, Colorado State University, Fort Collins, Colorado
Graduated December 2014

M.S. in Civil & Environmental Engineering, Colorado School of Mines, Golden, Colorado
Graduated December 2021

Relevant coursework include: analytical hydrology, integrated surface water hydrology, watershed modeling, mathematical modeling of groundwater systems, soil and water engineering, water law, engineering applications of GIS, numerical modeling and risk analysis, and project management.

Academic projects include: evaluation of sustainable ground water supply using ESRI ArcMap tools and development of an interactive multi-criteria decision analysis tool in Microsoft Excel to provide recommended options based on input water quality and site characteristics.

PROFESSIONAL AFFILIATIONS

American Society of Civil Engineers, Denver Section, Member since 2015

American Water Resources Association, Colorado Section, Member since 2015

ASCE Environmental & Water Resources Institute, Colorado Section, Member since 2015, Board Member 2024-Present

Colorado Ground Water Associations, Member since 2015

National Ground Water Association, Member since 2015

REGISTRATION

Registered Professional Engineer in the State of Colorado (P.E. 0057005).

EXPERIENCE RECORD

2015 - Present

BBA Water Consultants, Inc., Englewood, Colorado.

Project Manager – Senior Water Resources Engineer. Responsible for managing and leading various water resources and water rights projects, including: surface and ground water modeling, water rights operational modeling, historical use evaluations and changes of water rights, analysis and oversight of substitute water supply plans, augmentation plan operations and accounting, reservoir modeling and accounting, design and construction management of water supply wells and monitoring wells, operation of ground water pumping tests and data analysis, general water use accounting, water rights evaluations, and field data collection and interpretation. Serves as mentor to junior staff. Assists in preparation of technical reports in support of and opposition to Water Court applications.