

**BEFORE THE OFFICE OF ADMINISTRATIVE HEARINGS
STATE OF KANSAS**

IN THE MATTER OF THE APPLICATION OF
THE CITIES OF HAYS, KANSAS
AND RUSSELL, KANSAS FOR APPROVAL TO
TRANSFER WATER FROM EDWARDS
COUNTY PURSUANT TO THE KANSAS
WATER TRANSFER ACT

OAH Case No. 23AG0003 AG

**PREPARED REBUTTAL TESTIMONY OF EDWARD HARVEY ON BEHALF
OF WATER PROTECTION ASSOCIATION OF CENTRAL KANSAS AND
EDWARDS COUNTY, KANSAS (COLLECTIVELY “INTERVENORS”)**

June 28, 2023

A. INTRODUCTION

Q Please state for the record your name, position, and business address.

A Edward Harvey. I am the founder and a principal in Harvey Economics. My business address is 469 South Cherry Street - Suite 100, Denver, Colorado 80246.

Q. What is your educational and professional background?

A I have a strong educational background and extensive experience in the field of economics, specifically in the context of water resource management. I hold a Master of Science in Business Administration (MSBA) with a specialization in Economics from the University of Denver, as well as a Bachelor of Arts (BA) degree in Economics, also from the University of Denver.

With a total of 50 years of professional experience, I have spent the past 20 years working at Harvey Economics, where I have focused on conducting economic studies related to water, mineral, energy, and environmental resource use. My expertise lies in analyzing the economic impacts of water availability, drought, water quality, infrastructure development, irrigation, water conservation, and non-structural water resource issues.

As a part of my professional involvement, I am affiliated with several reputable organizations. These include the Colorado Commission for Judicial Performance, the American Water Works Association (AWWA), the Colorado Water Congress, and the American Planning Association. These affiliations allow me to stay up-to-date with the latest developments and best practices in the field of water resource management.

Q Please describe your experience and qualifications.

A My experience and qualifications are more comprehensively described in the attached curriculum vitae, which is Exhibit 1 to this testimony. I have dedicated the majority of my career to studying the economic impacts of water, mineral, energy, and environmental resource use, as well as community changes in the western United States. With over 50 years of experience in this field, I have conducted a wide range of studies and analyses, including financial feasibility studies, rate studies, economic impact assessments, future resource demand analyses, and resource valuation studies.

Throughout my career, I have focused on conducting economic studies related to water availability, drought, water quality, infrastructure development, irrigation, water conservation, and non-structural water resource issues. I have worked extensively on projects involving water supply planning, water demand projections, and evaluating the economic and socioeconomic implications of various water-related initiatives.

Some notable projects I have been involved in include the Halligan Water Supply Project EIS in Colorado, where I led the development of long-term water demand projections and evaluated the impacts of expanding Halligan Reservoir on socioeconomic and land use resources. I also played a key role in the Moffat Collection System Project EIS, conducting economic and social impact analyses for the expansion of an existing water supply reservoir for Denver Water.

In addition, I have worked on projects such as the Lake Ralph Hall EIS in Texas, the Windy Gap Firming Project EIS in Colorado, and the Northern Integrated Supply Project (NISP) EIS in Colorado, where I provided expertise in developing water demand projections, assessing project purpose and need, and evaluating the financial feasibility and socioeconomic impacts of proposed water supply projects.

My experience extends to groundwater management, water transfers, and irrigation water allocation. I have conducted analyses of groundwater pumping fees, examined the economic effects of water transfers, and provided expert testimony in arbitration and legal proceedings related to water rights and allocation.

Furthermore, I have worked on studies assessing regional economic impacts, long-term water demand projections, and the effects of water supply projects on various sectors such as agriculture, tourism, construction, public facilities, and fiscal impacts.

Overall, my qualifications and experience enable me to provide comprehensive and insightful analysis of water-related issues, offering valuable expertise in understanding the economic implications, resource demands, and sustainability considerations associated with water resource management.

Q Did you collaborate with anyone at HE in preparing your report?

A Yes. Susan Walker.

Q What is Ms. Walker's background and experience?

A Susan H. Walker is a Director at Harvey Economics and has been a valuable member of the company since 2005. Her expertise lies in planning endeavors related to water, energy, tourism, and other natural resource sectors. With a focus on economic and demographic research, analysis, and modeling, Ms. Walker has completed various projects involving rate studies, demand projections, socioeconomic impact analysis, cost-benefit analysis, project financing, and resource and facility valuation.

Throughout her career, Ms. Walker has worked with municipalities, utilities, special districts, private industry, as well as county, state, and federal agencies. Her project experience showcases her ability to tackle complex assignments and provide comprehensive insights into economic and water-related issues.

One notable project is the BennT Creek Regional Water Authority Growth Projections in Colorado, where Ms. Walker developed housing unit growth projections for the Authority's water service areas. This involved incorporating information from real estate developers, state and county planning documents, zoning regulations, historical growth trends, and economic prospects to estimate future water demands.

In the Morgan County Quality Water District Growth Study, Ms. Walker conducted a comprehensive study on population and economic growth in Morgan County, Colorado, to project future water demands for the district. Her work involved analyzing economic and demographic factors influencing regional growth and developing projections for residential, commercial, industrial, and agricultural customers over a 50-year period.

Currently, Ms. Walker is working on the Eagle County Water Demand Projections project in Colorado. Collaborating with the Eagle River Water & Sanitation District and Upper Eagle Regional Water Authority, she is responsible for preparing long-term water demand projections based on historical and projected population growth, economic conditions, conservation efforts, and water losses.

In addition to these projects, Ms. Walker has contributed her expertise to the Halligan Water Supply Project EIS, White River Reservoir Project, Parker Water Project, Chino Valley Water Demands and Water Pipeline, Platte River Basin Water Plan Update, Northern Integrated Supply Project EIS, Upper Gunnison Demand Management Impact Study, and more. Her work spans across different states and involves assessing future water demands, economic impacts, project financing, and benefit-cost analysis.

Overall, Susan H. Walker's extensive experience, expertise in economic and demographic research, and her contributions to a wide range of water-related projects make her a valuable asset to Harvey Economics and the field of natural resource economics.

Q On whose behalf are you testifying today?

A I am appearing on behalf of Water PACK and Edwards County, Kansas. Water PACK is an association of agricultural producers and businesses organized to promote, foster, and encourage the beneficial, economical, and sustainable use of quality water. Many of its members are located in proximity to the R9 Ranch in Edwards County, Kansas which is the water source that is the subject of the applicant cities transfer application. Edwards County is the geographic locale in which the R9 Ranch is located.

Q What have you reviewed to prepare this testimony and your report?

A Harvey Economics (HE) prepared a rebuttal report (attached as Exhibit 1) in response to certain Direct Testimony and Expert Reports submitted on behalf of the Cities of Hays and Russell (Cities) regarding the Cities' desire for approval of a water transfer from the R9 Ranch in Edwards County, Kansas. HE considered and evaluated these reports only to the extent they addressed or related to population projections, water use patterns, the Cities' net future water needs, and the benefits and costs of the proposed R9 Ranch project to the State of Kansas pertaining to our original report in this matter. This report follows up our report entitled, Review of the Reasonable-Need Limitations Determining Future Water Need for the Cities of Hays and Russell, Kansas, submitted in late May 2023.

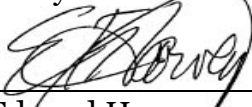
Q. What conclusions did you reach?

- A. Based on our review of those materials, we reached the following conclusions and opinions:
1. None of the Expert Reports have provided any data or other information to refute our views about future growth prospects for Hays or Russell, as described in HE's Expert Report, Review of the Reasonable-Need Limitations Determining Future Water Need for the Cities of Hays and Russell, Kansas. The population growth rates of 0.34 percent per year for Hays and 0.06 percent per year for Russell

remain applicable. We project that Hays will experience modest population growth and Russell's population will be stable for the foreseeable future.

2. HE has not seen any credible evidence that would change our projections of future water demand for the Cities. No further information or reports have been forthcoming related to the Cities' water use patterns; our opinions about future gpcd assumptions remain the same.
3. HE recognizes the potential for future drought which might be more severe than previous droughts. The frequency and probability of extreme droughts in the Smokey Hill Watershed are speculative at this time. Municipal water providers often create drought contingency plans for addressing risks of drought and mitigating their effects during temporary extreme dry periods, and the Cities have these plans.
4. Estimates of firm yield water supplies during drought periods provided in the McCormick Expert Report, as compared to projected water demands, indicate that Hays and Russell currently have sufficient water supplies to meet demands during a moderate drought, similar to that experienced in 2011-2012.
5. Under exceptional drought conditions, Hays would experience shortages, most likely less than 400 acre-feet, and under optimistic growth assumptions, a shortage of less than 700 acre-feet. Russell is not expected to experience shortages under the most likely or optimistic growth projections.
6. The Cities do not need the 4,800 acre-feet per year of new water supply included in the water transfer application for the foreseeable future.
7. Overall, it is HE's opinion that the economic benefits from constructing the R9 Ranch project will be short lived and limited since much of the specialized material and equipment purchased for construction will come from outside Kansas and since workers might be drawn from out of state because of the chronic labor shortage in western Kansas.
8. Dr. Hamilton's estimate of \$43 million in economic benefits from avoiding water shortages in Hays and Russell over the next 50 years is uncertain and unreliable. His estimate of \$117 and \$251 million in avoided losses from very extreme droughts is flawed and speculative.
9. The R9 Ranch project cost projection of \$135 million in 2025 is optimistic given the project timeline and the level of design at this point. Delays in the construction schedule would result in cost increases.
10. HE believes that the economic costs of the project will amount to a minimum of \$192 million and more likely, \$241 million once the project is repaid. This does not include annual operations and maintenance (O&M) costs.
11. In addition to construction costs, for a 65-mile pipeline, other infrastructure and water treatment may be considerable. Together, payments on debt service for construction and the annual operations and maintenance costs will likely be seen in increased water rates for the Cities' water customers.

12. The net costs of the R9 Ranch project will likely exceed its benefits to the Cities and the State of Kansas.



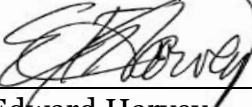
Edward Harvey

DECLARATION

I, Edward Harvey, hereby declare:

1. I am over eighteen (18) years of age and competent to testify upon personal knowledge as to the matters and facts stated herein.
2. I jointly prepared the rebuttal report that is referenced above in close collaboration with Susan Walker of Harvey Economics.
3. Under penalty of perjury, I declare that the statements and conclusions in the rebuttal report are accurate and true to the best of my information, knowledge, and belief.

Dated June 28, 2023



Edward Harvey

EXHIBIT 1
Harvey Economics Rebuttal Report

Rebuttal Response to Selected Expert Reports Filed on Behalf of the Cities of Hays and Russell

In Support of Kansas Water Transfer Act Evaluation



June 28, 2023

Rebuttal Response to Selected Expert Reports Filed on Behalf of the Cities of Hays and Russell

In Support of Kansas Water Transfer Act Evaluation

Prepared for

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Summary of Conclusions and Opinions

This rebuttal report was prepared by Harvey Economics (HE) in response to certain Direct Testimony and Expert Reports submitted on behalf of the Cities of Hays and Russell (Cities) regarding the Cities' desire for approval of a water transfer from the R9 Ranch in Edwards County, Kansas. HE considered and evaluated these reports only to the extent they addressed or related to population projections, water use patterns, the Cities' net future water needs, and the benefits and costs of the proposed R9 Ranch project to the State of Kansas pertaining to our original report in this matter. This report follows our report entitled Review of the Reasonable-Need Limitations Determining Future Water Need for the Cities of Hays and Russell, Kansas submitted May 25, 2023.

Based on our review of those materials, HE reached the following conclusions and opinions:

1. None of the Expert Reports have provided any data or other information to refute our views about future growth prospects for Hays or Russell, as described in HE's Expert Report, Review of the Reasonable-Need Limitations Determining Future Water Need for the Cities of Hays and Russell, Kansas. The population growth rates of 0.34 percent per year for Hays and 0.06 percent per year for Russell remain applicable. We project that Hays will experience modest population growth and Russell's population will be stable for the foreseeable future.
2. HE has not seen any credible evidence that would change our projections of future water demand for the Cities. No further information or reports have been forthcoming related to the Cities' water use patterns; our opinions about future gpcd assumptions remain the same.
3. HE recognizes the potential for future droughts which might be more severe than previous droughts. The frequency and probability of extreme droughts in the Smokey Hill Watershed are speculative at this time. Municipal water providers often create drought contingency plans for addressing risks of drought and mitigating their effects during temporary extreme dry periods, and the Cities have these plans.
4. Estimates of firm yield water supplies during drought periods provided in the McCormick Expert Report, as compared to projected water demands, indicate that Hays and Russell currently have sufficient water supplies to meet demands during a moderate drought, similar to that experienced in 2011-2012.
5. The Cities do not need the 4,800 acre-feet per year of new water supply included in the water transfer application for the foreseeable future. Under moderate drought conditions, the Cities would not need any additional water beyond their presently available resources.
6. Under exceptional drought conditions, Hays would experience shortages, most likely less than 400 acre-feet, and under optimistic growth assumptions, a shortage of less than 700 acre-feet. Russell is not expected to experience shortages under the most likely or optimistic growth projections.
7. Overall, it is HE's opinion that the economic benefits from constructing the R9 Ranch project will be short lived and limited since much of the specialized material and equipment purchased

for construction will come from outside Kansas and since workers might be drawn from out of state because of the chronic labor shortage in western Kansas.

8. Dr. Hamilton's estimate of \$43 million in economic benefits from avoiding water shortages in Hays and Russell over the next 50 years is uncertain and unreliable. His estimate of \$117 and \$251 million in avoided losses from very extreme droughts is flawed and speculative.
9. The R9 Ranch project cost projection of \$135 million in 2025 is optimistic given the project timeline and the level of design at this point. Delays in the construction schedule would result in cost increases.
10. HE believes that the economic costs of the project to the residents of the Cities as Kansas residents will amount to a minimum of \$192 million and more likely, \$241 million once the project is repaid. This does not include annual operations and maintenance (O&M) costs.
11. In addition to construction costs for a 65-mile pipeline, other infrastructure and water treatment expenses may be considerable. Together, payments on debt service for construction and the annual operations and maintenance costs will likely cause increased water rates for the Cities' water customers.
12. The net costs of the R9 Ranch project will likely exceed its benefits to the Cities and the State of Kansas.

SECTION 1

Introduction

This is a rebuttal report prepared by Harvey Economics (HE) on behalf of WaterPACK, as part of the Kansas Water Transfer Act (KWTa) proceedings initiated by the Cities of Hays and Russell, Kansas (Cities). The Cities are seeking approval to transfer water from the R9 Ranch in Edwards County. HE was retained on April 25, 2023, by the law firm Lee Schwalb LLC, representing WaterPACK in the KWTa proceedings.

Expert Reports and Direct Testimony Reviewed

In May 2023, the Cities of Hays and Russell submitted a number of Expert Reports in this matter. Those reports and the associated Direct Testimony documents were prepared by the Cities' consultants and address a variety of topics relevant to the application. HE reviewed the following Direct Testimony and Expert Reports in preparing this rebuttal report:

- Direct Testimony and Expert Report of Amy Hasse, AICP, Principal at RG Planning & Design, on behalf of the Cities of Hays and Russell, Kansas. Her untitled report relates to population projections for the City of Hays.
- Direct Testimony and Expert Report of Jeffrey Basara, Ph.D., on behalf of the Cities of Hays and Russell, Kansas. His report is entitled Drought Impacts and Risk to Water Resources in the Smoky Hill Watershed.
- Direct Testimony and Expert Report of Anthony L. Layzell, Ph.D., on behalf of the Cities of Hays and Russell, Kansas. His report is entitled A Thousand Years of Drought and Climatic Variability in Kansas: Implication for Water Resources Management.
- Direct Testimony and Expert Report of Paul McCormick, P.E., Senior Associate Geological Engineer, Burns & McDonnell Engineering Company, Inc., on behalf of the Cities of Hays and Russell, Kansas. His technical memorandum is entitled Wellfield Yield for the Cities of Hays and Russell, Kansas.¹
- Direct Testimony and Expert Report of Stephen F. Hamilton, Ph.D., on behalf of the Cities of Hays and Russell, Kansas. His report is entitled Expert Report of Stephen F. Hamilton, Ph.D. This report relates to the economic impacts to the State of Kansas from the proposed water transfer.
- Direct Testimony and report of Kevin Waddell, P.E., Preconstruction & Estimating Manager for Water Infrastructure, Burns & McDonnell Engineering Company, Inc., provided on behalf

¹ Mr. McCormick prepared and submitted a second report related to R9 Ranch groundwater modelling in this case. HE did not review that report since it was outside our work scope.

of the Cities of Hays and Russell, Kansas. His untitled report provides an Opinion of Probable Construction Costs for the R9 Ranch Water Transfer Project.

We also reviewed the June 8, 2023, deposition transcripts of Mr. Toby Dougherty, City Manager, City of Hays, and Mr. John Braun, R9 Project Manager, City of Hays.

HE considered and evaluated these reports only to the extent they addressed or related to population projections, water use patterns, the Cities' net future water needs, and the benefits and costs of the proposed R9 Ranch project to the State of Kansas.

Report Contents

This main body of this report contains the following sections:

- *Section 1. Introduction* – Report purpose, basis and content.
- *Section 2. Population Projections for the Cities* – HE evaluates the report submitted by Ms. Hasse and concludes that our initial impression of limited growth prospects for the Cities was correct.
- *Section 3. Future Water Need for the Cities* – We consider the Basara, Layzell and McCormick reports with respect to existing and future water supplies available to the Cities. HE concludes that net future water needs are modest.
- *Section 4. Economic Benefits and Costs to the State of the R9 Ranch Project* – HE evaluates the Waddell and Hamilton reports related to project costs and projected future benefits to the State. HE concludes significant uncertainties surrounding estimates of construction costs, total project costs and potential impacts to ratepayers. We also note flaws in the Hamilton report regarding quantification of benefits and conclude that his estimates of economic benefits are overstated.

SECTION 2

Population Projections for the Cities

This section addresses population projections for the City of Hays, as discussed in the Direct Testimony and Expert Report of Amy Hasse, AICP, Principal at RG Planning & Design.

Hasse Report – Population Projection Analysis Expert Report

In her Direct Testimony, Ms. Hasse concluded that “an estimated growth rate of 1% annually over the next 10 to 20 years is likely for the City of Hays.” She states that her conclusion is based on historic population change trends and other economic and regional trends. Her Expert Report provides historical population data for Hays and a brief discussion of current economic trends including employment and household income data. Her conclusions with regards to population projections state that “the City [of Hays] should be able to grow at a 1% percent rate annually; however, this will depend on a reliable and adequate source of water.” She also provides projections of Hays’ population through 2035 based on a 0.4 percent annual growth rate. Ms. Hasse’s Expert Report did not address the City of Russell.

Harvey Economics Critique of and Response to the Hasse Report

- The historical population data provided in Ms. Hasse’s report indicated that the total population of Hays increased by 0.25 percent per year between 2000 and 2010 and by 0.29 percent per year between 2010 and 2020. Growth over that 20-year period amounted to an average of about 55 people per year. This rate of growth is less than Hays experienced during certain decades in the 1950 to 2000 period. This data is consistent with the information provided in Harvey Economics’ Expert Report.
- Ms. Hasse also makes a calculation of Hays’ historical population growth excluding the majority of Fort Hays State University students assumed not to be permanent residents of the area. She assumes that these students will leave the area and so might not be relevant to an assessment of future water needs. Ms. Hasse calculates Hays’ historical population growth without the bulk of the college students, resulting in a 0.4 percent annual growth rate between 2010 and 2020. HE questions the relevance of this calculation. Assuming the student population of the University will remain relatively constant over time, and assuming that Hays will continue to serve the University with water in the future, there is no reason to remove a portion of current students from the population calculations.
- Ms. Hasse states that “A community’s population growth must also take into consideration current conditions along with historic trends.” We agree that growth projections can deviate from historical trends; however, for that to occur, some economic or demographic conditions or influences must change, driving increased growth. Ms. Hasse’s report does not provide support for a change from the status quo.
- As part of her discussion of economic and regional trends, Ms. Hasse notes “a significant labor shortage” in the region. Earlier this year, as part of his supporting testimony for HB 2290,

Hays' mayor stated that Hays and other communities in northwest Kansas are facing "significant demographic and economic challenges, including a shrinking rural population, an aging workforce, and a decline in the number of college-bound students in rural Kansas."² As discussed in HE's Expert Report, workforce availability is often an important factor in a company's decision to locate in an area. The lack of an adequate labor pool does not support a vision of strong future growth. Labor shortages have been a persistent problem in this region of Kansas and there is no evidence that that phenomenon will change in the future.

- The lack of workers in the area may be the result of multiple factors, one of which is the availability and affordability of housing options; these are documented issues for Hays. The 2021 Hays Housing Needs Study concluded that the Hays housing market is characterized by a need for new housing units, little current building activity and high housing costs relative to comparable communities in western Kansas.³ The Study states that "the availability of affordable, high-quality housing is one of the few obstacles to economic growth and development in Hays." According to the local housing and economic development coalition, Grow Hays, the City has "an extreme undersupply of housing."⁴ In rural areas where lending, labor and materials are already harder to come by, the housing crunch puts cities like Hays in a bind.⁵
- Ms. Hasse states that the increasing median household income in Ellis County in recent years "would indicate that the job market remained competitive with wages increasing to address inflation and attract workers to unfilled jobs." However, HE found that median household income in Kansas grew at a faster rate than that of Ellis County, suggesting that Ellis County has no particular competitive edge to attracting workers, as compared to other areas of the State.⁶ Additionally, over the last 10 years, increases in median household income in Ellis County did not translate into either increased population or a greater number of employed people, both of which remained almost constant during that period.
- We concur that Hays is a regional economic hub, surrounded by many very rural counties and smaller towns. Ms. Hasse describes Hays' "pull factor" of 1.74 as indicating that local businesses are pulling in trade from beyond Hays' city borders. However, although Hays' healthy retail and service economy has been in place for many decades, this has not translated into significant population growth for either Hays or Ellis County in the last 40 years.
- In addition to the workforce shortage and lack of adequate housing, another potential deterrent to development in Hays is the prohibitive cost of land in the area.⁷ One City Commissioner stated that businesses have wanted to relocate to Hays, "but walked away because they couldn't acquire land at a reasonable price." He stated that high land prices "are hindering the recruitment of retail, manufacturing, and businesses." The high cost of land is likely related to

² Mr. Mason Ruder, Mayor, City of Hays, *Supporting Testimony for HB 2290 for the House Appropriations Committee*, February 20, 2023, and *Supporting Testimony for HB 2290 for the Senate Ways and Means Committee*, March 9, 2023.

³ The Docking Institute of Public Affairs at Fort Hays State University, *Hays Housing Needs Study 2021*.

⁴ High Plains Public Radio, *Housing Crisis Threatens to Stifle Rural Kansas Town Hoping to Grow*, 2021.

⁵ High Plains Public Radio, *Housing Crisis Threatens to Stifle Rural Kansas Town Hoping to Grow*, 2021.

⁶ U.S. Census Bureau, American Community Survey.

⁷ Hays Daily News, *City beats land prices with purchase at Commerce and 27th*, March 15, 2019.

the “limited amount of developable land in and adjacent to the City of Hays that is conducive for retail, commercial, and business park use.”⁸

According to the Grow Hays’ 2020-2021 Operational Plan, “Business recruitment remains the single most challenging objective for Grow Hays. With workforce shortages, high land and housing costs, regional depopulation and the recent pandemic, recruitment of large employers or retail establishments is indeed a challenge.”⁹

Harvey Economics Conclusions and Opinions Regarding Hays and Russell’s Population Projections

In our report, Review of the Reasonable-Need Limitations Determining Future Water Needs for the Cities of Hays and Russell, Kansas, we concluded that “the Cities’ assumption of a two percent annual population growth rate through 2040 is unrealistic and unsupportable.” We suggested that the projected growth rates of 0.34 percent per year for Ellis County and 0.06 percent per year for Russell County were indicative of likely future growth for the Cities through 2045. Neither Ms. Hasse nor any other expert have provided data or other information to refute HE’s views about future growth prospects for Hays or Russell.

Ms. Hasse’s future population growth rate of one percent per year for the City of Hays is half the growth rate suggested by the Applicants previously. However, even if Ms. Hasse’s one percent growth rate was to be assumed, calculations of Hays’ and Russell’s future water demands, as presented in the Master Order, would still need to be revised downward for the purposes of evaluating the City’s water need.

It is HE’s opinion that the population growth rates expressed in our original report in this proceeding remain applicable. We project that Hays will experience modest growth and Russell will be stable for the foreseeable future.

⁸ Mr. Toby Dougherty, Hays City Manager, *Commission Work Session Agenda Memo, Subject: Option to Purchase*, April 5, 2018.

⁹ Grow Hays, *2020-2021 Operational Plan*, May 2020, provided to the Hays City Commission as part their June 18, 2020, Work Session.

SECTION 3

Future Water Need for the Cities

This section of the Rebuttal Report addresses the future water need for the Cities of Hays and Russell, considering the Expert Reports submitted on behalf of the Cities. The Direct Testimony and Expert Report of Jeffrey Basara, Ph.D., the Direct Testimony and Expert Report of Anthony Layzell, Ph.D., and the Direct Testimony and Expert Report of Mr. Paul McCormick are evaluated and incorporated as appropriate. Once HE draws information and conclusions from these various expert reports, we return to the central question of how much water the Cities need in the future.

Basara and Layzell Reports – Drought-Related Expert Reports

Dr. Basara and Dr. Layzell’s Expert Reports focus on the potential effects of drought on water resources in the region, including the Smoky Hill Watershed (SHW).

Dr. Basara – Water resources in the Smoky Hill Watershed. Dr. Basara observes that “the climatological record demonstrates consistent, regular, and recent high-impact and multi-year drought events for the area including droughts in the 1930s, 1950s and 2011-2012.” Dr. Basara indicates that “the state of the climate science demonstrates that the risk of multi-year (i.e., two-year, five-year, decadal or multi-decadal) droughts will increase significantly for the area over the next 25 to 100 years. More specifically, the evolution of the hydroclimate into the future poses a significant risk to water resources across the SHW domain, and for the citizens of Hays and Russell, KS.”

Dr. Basara’s Expert Report offers projections related to future precipitation rates, number of dry days, and changes in the growing season, stream flows, and flooding and erosion events.

Dr. Layzell – Historic climactic trends. Dr. Layzell’s Direct Testimony and Expert Report focus on the frequency, duration, and intensity of drought occurrences over the last 1,000 years. He concludes that “western Kansas has experienced more severe droughts than eastern Kansas and northern Kansas has typically experienced more severe drought than southern Kansas over the past 1,000 years. Several past drought episodes in Kansas in the distant past have exceeded those of the 1930s and the 1950s in severity, extent, and duration, including several droughts spanning 50+ years and one drought lasting 110 years.”

McCormick Report – Hays and Russell Wellfield Yield Expert Report

Mr. McCormick reports on a detailed hydrologic analysis of the water supplies available to the City of Hays. He discusses the City’s existing water supplies and the susceptibility of those supplies to drought conditions over 2-, 5-, 10- and 20-year durations. At the conclusion of his report, Mr. McCormick estimates the sustainable yields of Hays’ water sources under four drought conditions, as shown in Table 3-1.

**Table 3-1.
Hays' Sustainable Water Yield Under Various Drought Conditions**

	Sustainable Water Yield			
	Moderate (2-Year)	Exceptional (5-Year)	Decadal (10-Year)	Multi-Decadal (20+ Years)
City of Hays	2,549.6 AFY	1,760 AFY	840 AFY	480 AFY

He expresses a high degree of confidence in the 2-year estimate but less so for the other drought periods since they were estimated through extrapolation.

Mr. McCormick states that the City of Russell has 1,824 acre-feet of permitted water rights from two different sources, but notes that those sources are limited in dry years.

Harvey Economics Evaluation and Response to the Drought and Water Yield Reports

HE reviewed these reports and evaluated only those elements that were applicable to a reliable estimation of water supplies for the Cities. We did not evaluate the scientific or engineering basis for these expert reports. Our observations drawn from these reports are provided below:

- Dr. Basara discusses a declining trend in precipitation, less moisture in the soil and reduced stream flows, but he does not tie these phenomena to water supplies available to the Cities.
- Dr. Basara speaks to the risks of drought, but the probabilities are not translated to changes in expected water supplies.
- Dr. Basara's work addresses a time frame extending through the year 2100, well beyond the planning horizon for this project.
- It is similarly difficult to apply Dr. Layzell's issue of very large droughts occurring in the past millennia to concrete water supply planning. It is speculative to believe that engineers or planners can factor in the severity, duration or frequency of drought with a paleontological time frame into foreseeable water supplies for the Cities.
- Mr. McCormick was apparently tasked with taking these potential droughts into account as he developed sustainable yield estimates. He acknowledges that his sustainable yield estimates are "high level." The two-year drought effects were derived from historical yield data. The five-year drought is at least recognized as the drought of record in the mid-1950's, but the quantified effects are speculative. The sustainable yield estimates Mr. McCormick quantifies for the decadal and multi-decadal droughts must be considered highly speculative.
- Municipal water providers often create drought contingency plans for addressing risks of drought and mitigating their effects during temporary extreme dry periods. Each of the Cities' Water Conservation Plans includes a Drought Response Plan section, which describes specific

triggers, goals and actions undertaken as part of the following drought stages: Stage 1, Water Watch; Stage 2 Water Warning, and Stage 3, Water Emergency. Each stage is more stringent in water use than the previous stage.

Evaluation and projections of drought-related effects to the watershed do not directly equate to changes in firm annual yield for Hays and Russell. For example, projections of changes in precipitation are not tied to impacts to specific water sources. The need for the R9 Ranch project must be based on the Cities' calculated water need. That need relies on estimates of firm annual yield for the Cities, which must be based on defined impacts to individual water sources. Therefore, for the purposes of our water needs analyses in this report, HE assumes that Hays has a sustainable yield of 2,550 acre-feet per year available in a two-year drought and 1,760 acre-feet per year available in a five-year drought. Sustainable yield during a decadal drought or multi-decadal drought are considered speculative. We assume a sustainable yield of 1,842 acre-feet per year for Russell under a moderate drought scenario.

Harvey Economics Conclusions and Opinions Regarding Hays and Russell's Future Water Need

The Cities' net water need in any given year incorporates two components: (1) water demand and (2) water supply. Each City's net water need is calculated as the difference between demand and supply.

In our report, Review of the Reasonable-Need Limitations Determining Future Water Needs for the Cities of Hays and Russell, Kansas, Harvey Economics provides a scenario of future water demands based upon revised growth projections for the Cities and City-specific per capita water use. HE has not seen any credible evidence that would change our projections of future water demand for the Cities, but even with the one percent average annual growth rate suggested by Ms. Hasse, the water demand projections for the Cities would be somewhat greater, as shown in Table 3-2.

Table 3-2.
Alternative 2040 Water Demand Projections for the Cities

	Harvey Economics	One Percent Growth Rate
City of Hays	2,136 AF	2,403 AF
City of Russell	1,092 AF	1,173 AF

By subtracting Mr. McCormick's sustainable water supply estimates provided above from these water demand projections, we can ascertain the net future water needs for the Cities:

**Table 3-3.
Net 2040 Water Needs for the Cities**

	Harvey Economics		One Percent Growth Rate	
	Moderate Drought	Exceptional Drought	Moderate Drought	Exceptional Drought
City of Hays	414 AF Excess	376 AF Shortage	147 AF Excess	643 AF Shortage
City of Russell	732 AF Excess	unknown	651 AF Excess	unknown

The above sets of projections indicate that Hays and Russell currently have sufficient water supplies to meet demands during a moderate drought, similar to that experienced in 2011-2012. Under exceptional drought conditions, Hays would experience shortages, most likely less than 400 acre-feet, and under optimistic growth assumptions, a shortage of less than 700 acre-feet. Russell is not expected to experience shortages under the most likely or optimistic growth projections, but Russell's sustainable supplies during an exceptional drought are unknown to Harvey Economics at this time.

The Cities recently offered to limit their water transfers to a 10-year rolling average of 4,800 AFY. Assuming the 2013-2017 weighted average gpcd of 120 for Region 5 (which includes Hays), this amount of water would serve approximately 35,700 people. This compares with the current combined populations of Hays and Russell of about 25,200 people, which already have a full supply of water. Clearly, the Cities do not need 4,800 AFY of new water supply for the foreseeable future.

Harvey Economics understands that the Cities' water supplies are susceptible to drought and that the sustainable yield of those supplies will be limited during moderately dry and exceptionally dry years. However, as seen in the historical record, drought periods and related impacts to supplies are temporary. Drought Response Plans, which both Cities have adopted, work to address temporary water shortages during dry periods.

SECTION 4

Economic Benefits and Costs to the State of the R9 Ranch Project

This section of the Rebuttal Report evaluates the Direct Testimony and Expert Report of Stephen F. Hamilton, Ph.D., and the Direct Testimony and report of Mr. Kevin Waddell in relation to the potential economic benefits and costs of the R9 Ranch project to the State of Kansas. Following this evaluation, HE offers its own estimates of the Project's benefits and costs.

Hamilton Report – Economic Impact to the State of Kansas Water Transfer Expert Report

In his Direct Testimony, Dr. Hamilton stated that his role was to “evaluate and offer my professional opinion about the economic impact to the State of Kansas of the proposed water transfer.” He concluded that “approving the water transfer will positively impact the State of Kansas economy both by increasing the economic value of the water through reallocation to urban use and by the associated investments in water infrastructure for conveyance of the water to Hays and Russell.” Each of those components is addressed below.

Investments in water infrastructure. Dr. Hamilton projected the economic stimulus that the R9 Ranch project would create by applying the estimated current construction costs for Phase I (\$106.6 million) and Phase II (\$7.7 million) of the project to an economic model that would incorporate the multiplier effects of that expenditure.¹⁰ Through use of the IMPLAN model, Dr. Hamilton estimates that the value of the conveyance infrastructure would produce a statewide economic benefit of \$167 million, a statewide employment impact of 752 full-time equivalent jobs and a statewide tax revenue impact of \$4.4 million. Dr. Hamilton states that all these economic benefits would accrue to the State of Kansas.

Harvey Economics evaluation and response to Dr. Hamilton's estimates of R9 Ranch construction benefits. HE believes that Dr. Hamilton's estimates of the project's construction benefits to the State are substantially overstated and mischaracterized as explained below:

- A long-distance water conveyance project such as R9 Ranch consists of water wells, storage, pumps and a 65-mile pipeline, among other components. The materials, mostly piping, and heavy equipment costs comprise a large portion of total construction costs. These materials and equipment are generally not produced in the State of Kansas and so must be purchased from out of State producers. The economic benefits to Kansas of the R9 Ranch construction would be substantially reduced from these out of State purchases.

¹⁰ As described in Hamilton's report, Phase I consists of installing public water-supply wells, a gathering system, and a pump station on the R9 Ranch and a pipeline connecting the Ranch to Hays' existing water facility near Schoenchen, Kansas. In Phase II, additional pipelines will be installed to deliver from the Schoenchen facility to Russell and Hays.

- Besides the materials and equipment, the R9 Ranch construction will require labor to lay the pipe and to install the other elements of the project. Given the labor shortage in the local area, it is unlikely that many workers will come from Hays and Russell or possibly across Kansas. In fact, the project will likely be open for bidding by construction contractors across the Western U.S. Given the larger workforces available in states like Texas, it is quite possible that the contractor awarded the R9 Ranch project will bring in their own workers, especially those skilled in pipeline construction, from out of State. Under this eventuality, the bulk of the economic benefit from the project construction labor force will accrue to places outside of Kansas.
- Regardless of where these economic benefits occur, they are very short lived. Once it begins, construction could be completed in three years or less, after which the economic benefits will cease.

In sum, HE believes the economic benefits of R9 Ranch construction will be modest and brief within the State of Kansas.

Value of avoided municipal water shortages. Dr. Hamilton creates a complex methodology for estimating the economic benefits that the R9 Ranch project would bring to Hays and Russell through the elimination of future water shortages. He equates the avoided losses from the future shortages with the economic benefit to the residents of the Cities and thereby, to the State of Kansas. After applying his own estimation technique, Dr. Hamilton projects that the total avoided cost (economic benefit) of the additional water supply in Hays and Russell provided by the R9 Ranch over the 50-year period 2030-2072 will be \$43 million. Under worst case hydrologic scenarios, he suggests that the avoided costs (economic benefit) could be up to \$117 million, or even as much as \$251 million.

The methodology devised by Dr. Hamilton to estimate the avoided cost of \$43 million entails numerous steps and assumptions. He begins with the historical hydrologic records for the Hays region from 1893 to 2020 and then selects 79 periods of 50 years each by shuffling the years in the historical period. Next, he uses the Palmer Hydrologic Drought Index to isolate moderate and exceptional drought conditions. Dr. Hamilton then equates these drought conditions to Mr. McCormick's estimates of firm yield under different drought scenarios to estimate a shortage volume. He then allocates these shortages among residential and commercial customers. Next, he assumes a willingness-to-pay for this water and applies that to the Hays water rate structure to estimate the \$43 million, after deducting water production costs.

To estimate the \$117 million, Dr. Hamilton cuts the historical record back from 1893-2020 to 1893-1942 to demonstrate that long term hydrology could be even worse. Dr. Hamilton's estimates are based on multiple model inputs and assumptions.

Harvey Economics evaluation and response to Dr. Hamilton's estimates of avoided cost of water shortages. HE believes that Dr. Hamilton's estimates of the \$43 million in avoided costs is uncertain, based on faulty assumptions, and unreliable for the following reasons:

- Dr. Hamilton's future water demands for Hays and Russell are based on annual growth projections of one percent and 0.25 percent, respectively. HE believes that those growth rates

are unrealistic, so the shortages which Dr. Hamilton assumes are overestimated. Hence, the avoided cost is overestimated.

- Additional unsupportable assumptions are also required for Dr. Hamilton’s calculations, including the distribution of the estimated acre-feet of water shortage across customer classes (residential, commercial, industrial). For example, Dr. Hamilton assumes that shortages amounting to less than 20 percent of residential usage will be completely borne by residential customers. That assumption is likely not accurate, considering some of the regulatory actions included in each City’s Drought Response Plan.
- Dr. Hamilton draws estimates of residential, commercial and industrial customers willingness-to-pay to avoid water shortages mainly from research studies focusing on larger cities outside of Kansas, including the San Francisco Bay Area in California and the Chicago metropolitan area in Illinois, among others. Those studies, and the resulting valuations, are not likely representative of value judgements by Hays and Russell residents and businesses. Willingness to pay to avoid a particular situation, or to gain a certain outcome, will vary by geographic location and will be influenced by the specific circumstances faced by individual water users in that area. That is, spending choices for San Francisco residents are likely different than residents of Hays and Russell. Dr. Hamilton provides no evidence that urban consumers in other states would have the same value for water as the residents or businesses of Hays or Russell.
- The Cities’ reduced water production costs during drought periods, resulting from producing less water, are accounted for, but the customer’s smaller water bills do not appear to be accounted for in this instance.
- A reduction in water deliveries might be more of a quality of life rather than a dollar issue, i.e., brown lawns.
- Dr. Hamilton’s approach to this valuation is largely theoretical and carries a host of assumptions and data sources not tied to the Cities of Hays and Russell. Dr. Hamilton has not demonstrated any specific economic losses historically for the Cities during droughts, for instance in the 2011-2012 time period.

Dr. Hamilton’s estimates of avoided cost under very adverse conditions, \$117 million, \$251 million, etc., are flawed and should be dismissed entirely. First, the \$117M scenario ignored a large part of historical record (1893-1942 only, as opposed to 1893-2020 which he used for the primary analysis). Secondly, out of all the many 50-year draws, he picked the single most adverse one, created out of a theoretical construct. This and the more dire hydrologic assumptions are speculative.

Waddell Report – Opinion of Probable Construction Costs (OPCC) for the R9 Ranch Project

In his Direct Testimony, Mr. Waddell stated the following:

“Construction costs have increased steadily from 2015 to 2019, and dramatically since 2019. The pandemic had, and continues to have, a significant impact on labor availability, material costs and

delivery schedules. The current opinion of probable construction cost estimate is \$106.6 million, a 46.29% increase over Burns & McDonnell's 2015 estimate. Based on my professional knowledge and experience, I estimate with an 80% confidence level that by 2025, the project will cost rate payers in Hays \$134.9 million, a 26.53% increase from the current estimate and an 85.1% increase from 2015."

Harvey Economics evaluation and response to Mr. Waddell's estimates of construction costs. HE has the following comments upon review of Mr. Waddell's OPCC estimates:

As indicated by Mr. Waddell, the OPCC estimate is a Class 5 estimate, which according to the Association for Advancement of Cost Engineering (AACE), reflects an expected accuracy range of between -50% at the low end and +100% at the high end.¹¹ That means that the construction costs of the R9 Ranch project might ultimately be as low as \$67.5 million or as high as \$269.8 million in 2025. This large range is due to the fact that a Class 5 estimate can generally be described as developed for the purposes of concept screening, based on a 0% to 2% maturity level of the Project.

Mr. Waddell assumes that project construction will take place in 2025 and has inflated costs to that date using a forecasted inflation rate for construction costs of 8.16 percent per year. However, delays in construction may be likely to occur for multiple reasons, including the need to secure rights-of-way for 65 miles of pipeline, as well as the need to arrange project financing. If the project were delayed by three years, the 2025 OPCC would increase to approximately \$170.7 million, after application of the inflation rate Mr. Waddell provided for construction costs. If delayed for five years, the 2025 OPCC would increase to approximately \$199.7 million.

Importantly, Mr. Waddell's cost estimate does not include operating costs for the R9 Ranch project. The Cities will incur operating costs for pumping, equipment repair and replacement, water quality testing, upkeep, etc. HE is not aware that this amount has been accounted for or even estimated.

The wide accuracy range of a Class 5 cost estimate, in combination with an uncertain construction start date and the potential for even larger annual cost increases, leads HE to believe that the construction costs of the R9 Ranch project are highly uncertain and are likely to be greater than currently assumed by the Cities of Hays and Russell.

Harvey Economics Conclusions and Opinions Regarding Economic Benefits and Costs to the State

In our report, Review of the Reasonable-Need Limitations Determining Future Water Needs for the Cities of Hays and Russell, Kansas, Harvey Economics concluded that "the R9 Ranch project will very likely result in a net cost to the water ratepayers of Hays and Russell" and that "the R9 Ranch project as presently described in the KWTA Application produces a net cost to the Cities and the State of Kansas." Upon review of the Expert Reports and Direct Testimony, as described above, we maintain that position with regard to the R9 Ranch project.

¹¹ AACE International Recommended Practice No. 97R-18, *Cost Estimate Classification System – as Applied in Engineering, Procurement, and Construction for the Pipeline Transportation Infrastructure Industries*, August 2020.

Any economic benefits from the project must be compared with the costs to determine if there are net benefits to the Applicants and the State of Kansas. The primary cost of this project, besides those incurred in Edwards County, can be measured as the cumulative debt service required to repay a bond issue for the eventual full cost of the project. Whether the money is raised from sales tax or water rates or even State of Kansas coffers, the economic value of the funds dedicated to the R9 Ranch project can be measured by this bond repayment, since those funds could have gone to other any number of other projects and uses by the Cities or within the State of Kansas.

Based on the information submitted by Mr. Waddell, the capital cost of the project in 2025 will be approximately \$135 million. HE believes that this figure is optimistic, as described above. We believe the costs will more likely be \$170 million or could eventually be \$200 million or even more.

In the late 1990s Hays approved a 0.5 cent sales tax “devoted exclusively to water exploration and development activities.”¹² The City currently has about \$40 million in reserves from that source and estimates that the tax generates about \$3 million per year. It appears to be the City’s intention that the project will be paid for, at least in large part, using those funds.¹³ However, Hays will eventually have to issue bonds to pay for the project. Regardless, the money to fund this Project will come from the citizens of the Cities or Kansas residents.

To project the economic cost of the R9 Ranch project, HE has assumed the repayment of a hypothetical 20-year bond issue with project costs of \$135 million, \$170 million and \$200 million. The annual payments and the cumulative debt service cost under each project cost scenario are depicted in Table 4-1.

¹² City of Hays, 2023 Budget.

¹³ Deposition of Toby R. Dougherty, In the Matter of the Application of the Cities of Hays, Kansas and Russell, Kanans For Approval to Transfer Water from Edwards County Pursuant to the Kansas Water Transfer Act, June 8, 2023.

Table 4-1.
Alternative Bond Repayment Schedules for the R9 Ranch Project

Estimated Construction Cost	Debt Service		
	\$135,000,000	\$170,000,000	\$200,000,000
2025	\$9,584,897	---	---
2026	\$9,584,897	---	---
2027	\$9,584,897	---	---
2028	\$9,584,897	\$12,069,870	---
2029	\$9,584,897	\$12,069,870	---
2030	\$9,584,897	\$12,069,870	\$14,199,847
2031	\$9,584,897	\$12,069,870	\$14,199,847
2032	\$9,584,897	\$12,069,870	\$14,199,847
2033	\$9,584,897	\$12,069,870	\$14,199,847
2034	\$9,584,897	\$12,069,870	\$14,199,847
2035	\$9,584,897	\$12,069,870	\$14,199,847
2036	\$9,584,897	\$12,069,870	\$14,199,847
2037	\$9,584,897	\$12,069,870	\$14,199,847
2038	\$9,584,897	\$12,069,870	\$14,199,847
2039	\$9,584,897	\$12,069,870	\$14,199,847
2040	\$9,584,897	\$12,069,870	\$14,199,847
2041	\$9,584,897	\$12,069,870	\$14,199,847
2042	\$9,584,897	\$12,069,870	\$14,199,847
2043	\$9,584,897	\$12,069,870	\$14,199,847
2044	\$9,584,897	\$12,069,870	\$14,199,847
2045	---	\$12,069,870	\$14,199,847
2046	---	\$12,069,870	\$14,199,847
2047	---	\$12,069,870	\$14,199,847
2048	---	---	\$14,199,847
2049	---	---	\$14,199,847
Total	\$191,697,939	\$241,397,404	\$283,996,946

Notes: (1) Interest rate of 3.6% based on June 21, 2023, Bond Buyer 20-Bond GO Index.

(2) Assumes Moody's AA bond rating and 20-year maturity

Under the optimistic \$135 million bond issue, the cumulative cost with principal and interest would be \$191.7 million; this increases to \$241.4 million if the project is delayed three years. The annual cost to fully repay the lowest cost estimate of the project will be about \$9.6 million. That is more than \$900 per year for every household in Hays and Russell. Even if those monies come from City of Hays reserves, those funds still came from households in Hays. By comparison, and according to Dr. Hamilton, the avoided losses due to water shortages by completing the R9 Ranch project are less than \$860,000 a year, or about \$82 per year per household. The R9 Ranch project costs will exceed any construction benefits or avoided costs of future water shortages, based on our evaluation of those benefits.