PACIFIC INSTITUTE

An Assessment of Water Supply Alternatives in New Mexico

Summary Report

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Glossary

Acre-foot – The conventional unit for measuring large volumes of water in the western US, equivalent to 325,851 gallons.

Brackish Groundwater – Groundwater, typically stored in deep, confined aquifers, having total dissolved solids concentrations of 1,000–10,000 milligrams per liter (mg/L).

Graywater – Wastewater produced from bathroom sinks, showers, bathtubs, clothes washers, and laundry sinks, derived from residential and commercial buildings.

Levelized Cost of Water – The unit cost of supplied or conserved water, calculated as the net present value of life cycle costs and monetary benefits of a water supply alternative, divided by the lifetime volume of water supplied or conserved by that alternative.

Non-Potable Reuse – The reuse of municipal and industrial wastewater or graywater that has been sufficiently treated for non-drinking water quality uses, such as irrigation, toilet flushing, and cooling tower makeup.

Potable Water – Water that has been treated to drinking water quality that is suitable for human consumption, hygiene, and food preparation.

Produced Water – The fluid that is an incidental byproduct from drilling for or the production of oil and gas.

Recycled Water/Reclaimed Water System – A dedicated distribution system for non-potable reuse that delivers treated municipal and industrial wastewater and/or stormwater runoff to meet non-potable water demands (also known as a "purple-pipe" system).

Stormwater Runoff – Runoff generated from precipitation that falls on rooftops, roads, and other impervious surfaces.

Technical Potential – The maximum annual amount of water that can be provided or conserved by a water supply alternative.

Total Dissolved Solids – The concentration of all dissolved solid matter, such as minerals, metals, salts, and contaminants, in a water source, expressed in milligrams per liter (mg/L).

Treated Wastewater – Municipal and industrial wastewater that has been treated to suitable standards to be released to the environment, as defined by the EPA.

Water Conservation – Technologies and practices that reduce the demand for water, either by adjusting behavior to reduce overall water use (e.g., taking shorter showers) or by reducing the amount of water needed for the same use (e.g., installing a high-efficiency showerhead).

Water Supply Alternative – A strategy for water supply that is supplied from sources other than direct diversion/withdrawal from surface water and groundwater bodies.

Abbreviations

AF	Acre-Foot
AFY	Acre-Foot Per Year
CII	Commercial, Industrial, and Institutional
ISC	Interstate Stream Commission
M&I	Municipal and Industrial
NMED	New Mexico Environment Department
NMBGMR	New Mexico Bureau of Geology and Mineral Resource
OSE	New Mexico Office of the State Engineer
PVACD	Pecos Valley Artesian Conservancy District

New Mexico's Water Supply at Risk

New Mexico is the driest it's been in a thousand years. The March 2026 heatwave demolished records throughout the Southwest (Fleck 2026), decimating one of the lowest snowpacks in a generation. Recent reports project that increasingly hotter and drier conditions will decrease surface water availability by as much as 30% by 2070 and diminish groundwater recharge, at a time when growing crops, landscapes, and economies demand more water throughout the state (Dunbar et al. 2022; Follingstad et al. 2026). These impacts threaten the long-term water resilience of New Mexico and risk leaving the state unable to accommodate population growth and economic development into the future or even meet current demands.

New Mexico must overcome major hydrologic and institutional challenges, including decreasing water availability and laws and regulations that no longer reflect current or future conditions. People in many parts of the state are rising to the challenge, conserving water indoors and out, reducing groundwater overdraft, and decreasing pressure on drying streams. Still, declining water supply availability continues to exceed the state's efforts to bring demand into balance with supply. Despite the state's planning and investments, each water planning region faces increasing supply/demand imbalances and risk.

New Mexico must overcome major hydrologic and institutional challenges, including decreasing water availability and laws and regulations that no longer reflect current or future conditions.

To address these challenges, the New Mexico Water Policy and Infrastructure Task Force (Water Task Force) (2022) recommended pursuing alternative water supplies, including brackish groundwater desalination and water reuse, as well as promoting water conservation across all sectors. In 2023, in accordance with one of the recommendations of the Water Task Force, the New Mexico Legislature updated the state's regional water planning laws and passed the Water Security Planning Act (SB337), authorizing the Interstate Stream Commission (ISC) to reinvigorate a regional water supply planning framework. The ISC completed rulemaking for this framework in late 2025, with the final rule adopted in March 2026, and is now developing guidelines for public comment and potential Commission approval by fall 2026. (N.M. Admin. Code § 19.25.16 2026).

The 50-Year Water Action Plan, released in 2024, offered high-level estimates of the potential impact of greater implementation of water supply alternatives such as conservation, reuse of treated municipal wastewater and produced water from oil and gas extraction, and desalination of brackish groundwater (New Mexico Office of the Governor 2024). One of the first steps the administration took to implement the 50-Year Water Action Plan was to propose the Strategic Water Supply — an initiative to help New Mexico develop alternative water sources for economic opportunities.

The Legislature passed the Strategic Water Supply Act (HB137) in 2025 to begin appropriating funds via grants and contracts for projects involving brackish water that enhance the state's freshwater resources (Strategic Water Supply Act 2025). These efforts reflect a proactive approach to securing New Mexico's water future. Implementing any of these water supply alternatives will require careful consideration and planning informed by comprehensive assessments of their efficacy and the potential benefits and costs for communities and economies across the state.

This report summarizes an analysis of the technical potential and cost of various water supply alternatives to address the known decrease in water supply that New Mexico is experiencing. The analysis includes agricultural conservation, municipal and industrial (M&I) water conservation, reuse of treated M&I wastewater, capture and use of urban stormwater runoff, reuse of produced water from oil and gas extraction, and brackish groundwater desalination. For each, it provides an estimate of the maximum amount of water that could be obtained or conserved in an average year, referred to as the technical potential, and a range of costs based on the best available information for New Mexico. These represent high-level estimates intended to inform future decisions and investments about which alternatives to pursue; specific projects will require additional analyses based on local conditions. A companion technical report describes the data sources, assumptions, and analysis procedure that inform these estimates.

Key Findings

Our key findings are summarized in Figures 2 and 3 on page 13, showing opportunities for water supply alternatives in acre-feet per year (AFY), estimated costs per acre-foot, and important considerations for each alternative. Please see the following sections and the accompanying technical report for detailed descriptions of each alternative, potential costs, and considerations.

An acre-foot is the conventional unit of measurement of large volumes of water in the West, equal to 325,851 gallons of water — the amount required to cover an acre of land with a foot of water. In New Mexico, one acre-foot of water is equal to the annual demand of 3.5 households.

There are significant opportunities to expand on the progress made in conservation for the agricultural and municipal and industrial (M&I) sectors, often at the lowest cost compared to the other alternatives investigated in this study. Reducing water use through conservation can help accommodate new growth with the same, or in some cases even less, water and minimize the impact of reductions in water supply. Reducing consumptive water use has little to no impact on downstream communities and ecosystems, while non-consumptive savings can potentially reduce surface water return flows and/or impact return flow credits for some water users. However, reducing non-consumptive water use is often the most cost-effective strategy to adapt to diminishing water availability and can even generate monetary savings over time that outweigh its initial costs.

Consumptive use of water effectively removes water from the hydrological system, such that it cannot be used by others (Bokum et al. 2015). Examples of consumptive water use are evaporation from reservoirs, ponds, irrigation systems, or cooling systems; evapotranspiration from vegetation, including landscapes and crops; and percolation into deep aquifers that cannot be recovered. Non-consumptive use refers to all water use that is returned to the hydrological system for use by others. Figure 1 shows the relative impacts of consumptive and non-consumptive uses on surface water supply.

Reusing treated municipal wastewater capturing stormwater allow communities to meet additional uses with their current water supply. Where possible, these strategies can also support more intentional recharge of depleted groundwater aquifers. Implementation will require careful consideration of the impacts to downstream flows, return flow credits, and interstate compact compliance at the basin level and must be evaluated on a case-by-case basis.

Although produced water and brackish groundwater are present in New Mexico, they carry substantial uncertainty related to available volumes, development costs, and public and environmental health impacts. Due to this

FIGURE 1: Example of water use along a river showing consumptive and non-consumptive use

Note: Units are provided for demonstration purposes and represent hypothetical values

uncertainty, the role of these alternatives in New Mexico's water supply portfolio is unclear, and their development can run the risk of overinvestment and/or stranded infrastructure assets. At the same time, both of these water sources are non-renewable. Brackish groundwater is potentially better suited as an emergency option for limited water supply augmentation, while produced water can have highly variable annual volumes that depend on oil and gas industry activity in New Mexico and global market trends. New Mexico can support ongoing efforts by state agencies and researchers to further investigate the current and future suitability of these water sources while making full use of existing conservation and reuse opportunities available today.

Some of the water supply alternatives investigated in this study have the potential to reduce downstream flows in some communities. While a complete assessment of downstream flow impacts by basin for each water supply alternative is outside the scope of this study, we provide a qualitative discussion of potential impacts by water supply alternative in this report, as well as a basin-level summary of the technical potential for each alternative in the project technical report. The findings presented in this study provide an initial assessment to compare these alternatives and help identify opportunities for implementation and additional investigation to inform decision making. Future investigations should refine these estimates at smaller scales to account for basin-level conditions and better characterize the impacts on downstream flows and interstate compact compliance.

Key Considerations for Implementation of Water Supply Alternatives

Agricultural Conservation
- Extends use of existing supplies
- Requires comprehensive withdrawal metering and ongoing monitoring
- Water rights implications
- Administrative and monitoring challenges
- Potential third-party impacts
- Implications for production of food & fiber

Municipal and Industrial Conservation
- Extends use of existing supplies
- Non-consumptive use savings may reduce downstream flows and return flow credits
- Consumptive use savings typically have a higher cost, less than new supply

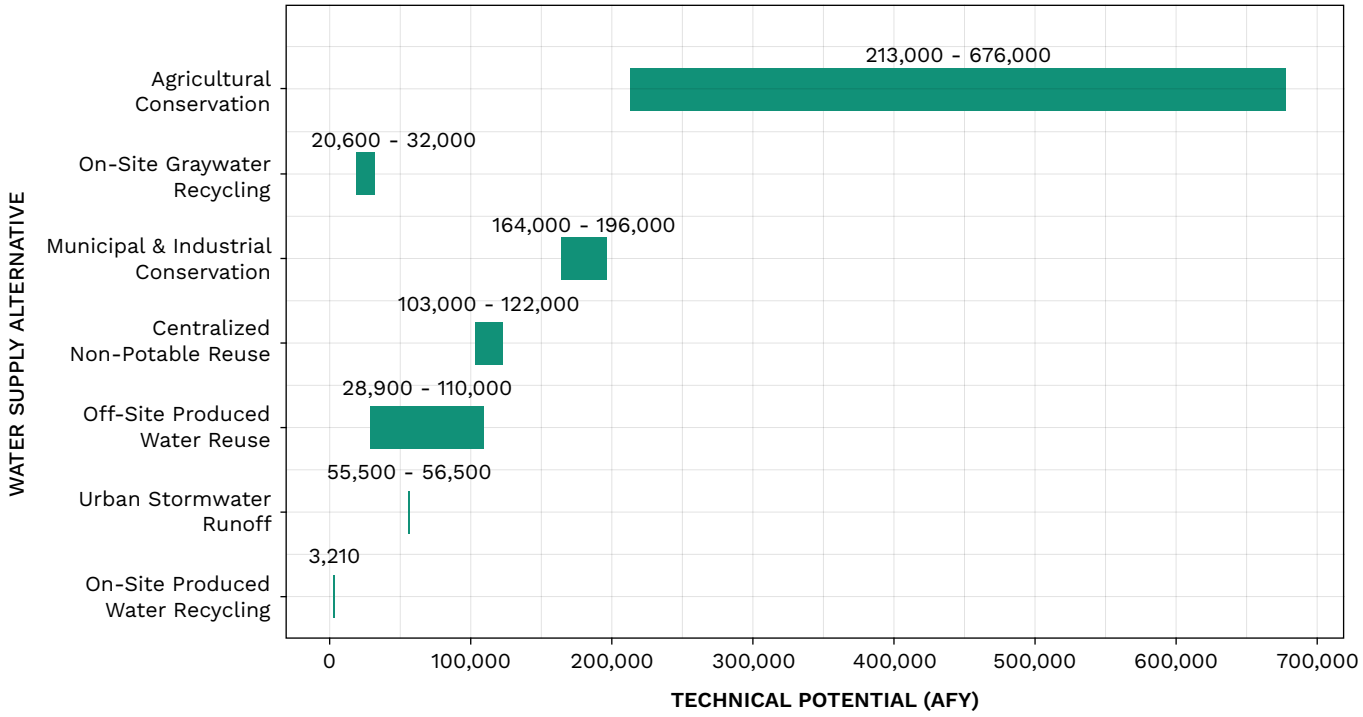
Wastewater Reuse (Non-Potable Reuse)
- May reduce downstream return flows and return flow credits
- Cost of centralized reuse infrastructure varies with scale of implementation
- Could require additional implementation methods (indirect/direct potable reuse, managed aquifer recharge, aquifer storage and recovery) to realize full technical potential.

Stormwater Capture
- May reduce downstream return flows and return flow credits
- Diminishes downstream indirect reuse potential
- Could require legal changes to realize full technical potential

Produced Water Reuse
- Public and environmental safety concerns
- Supplies are rarely in areas with significant local water demands, wide cost range driven by high transport costs to align supply with demand
- Not a renewable resource, annual availability depends on oil and gas industry activity and global market trends

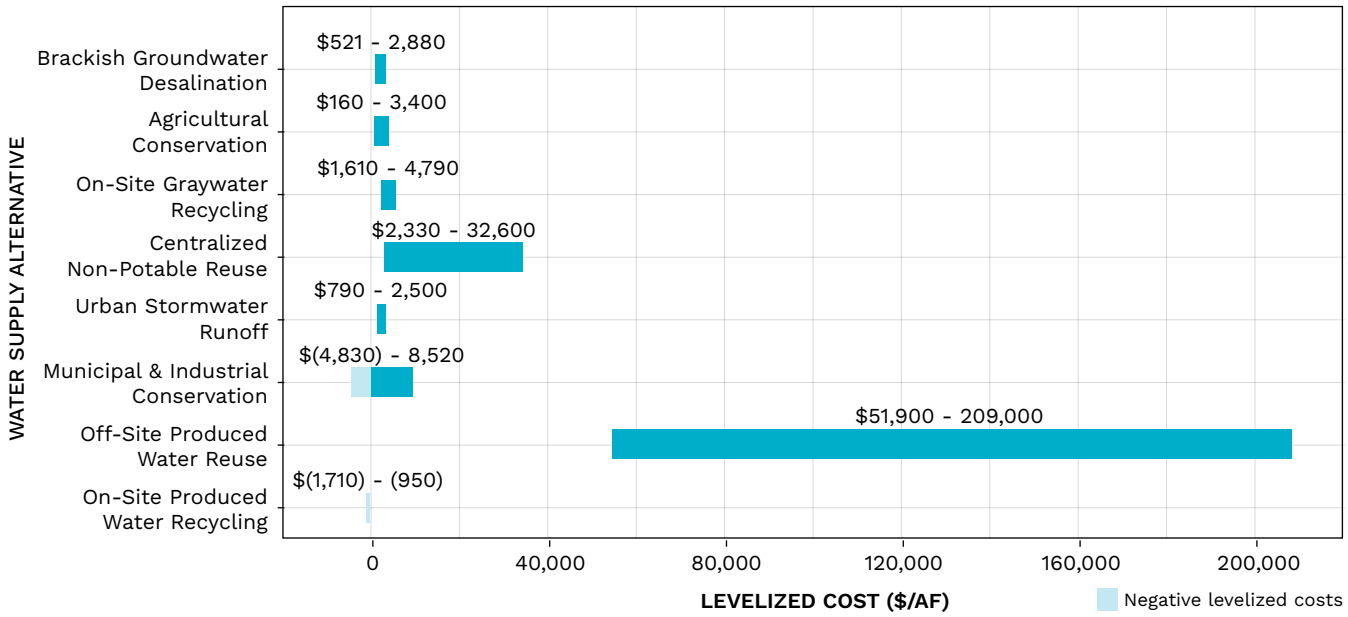
Brackish Groundwater Desalination
- Not a renewable resource but could offer an emergency supply option
- Groundwater overdraft can cause land subsidence and degrade adjacent freshwater aquifers and ecosystems

FIGURE 2: Technical Potential of Water Supply Alternatives, By Water Source and Implementation Strategy



Note: Volumetric potential for brackish groundwater desalination could not be estimated with available data.

FIGURE 3: Levelized Cost of Water Supply Alternatives, By Water Source and Implementation Strategy



Note: Negative levelized costs indicate monetary savings generated from avoided costs (wastewater and energy customer bills for Municipal and Industrial Conservation, avoided disposal costs for Produced Water) over time outweighing the upfront cost of adoption.

Results from the Assessment of Water Supply Alternatives in New Mexico

This section summarizes the results from the technical potential and levelized cost assessments for the water supply alternatives investigated in this study. Each subsection includes additional discussion of the context needed to interpret results and key considerations for implementation. A more detailed description of the assumptions, calculations, considerations, and additional results is provided in the companion technical report.

AGRICULTURAL CONSERVATION

In 2020, there were approximately 786,000 acres of irrigated land in New Mexico, withdrawing roughly 3 million acre-feet (AF) of water.[1] About 78% of the state's total water withdrawals go to agriculture, consistent with agricultural water demand in other states in the Southwest. On average, surface and groundwater sources supply irrigation water in roughly equal proportion, though surface water availability varies markedly year to year and has been declining. Flood (58%) and sprinkler (40%) are the major irrigation methods (Valdez et al. 2024).

There are many strategies to conserve agricultural water, including conveyance and irrigation system improvements, deficit irrigation, dynamic fallowing, crop switching, and soil health management. Individual farms typically implement these strategies, though some irrigation districts have taken steps to coordinate conservation efforts across farms to better align current and future water use with water availability. For example, the Pecos Valley Artesian Conservancy District (PVACD) has spent decades purchasing land in the district from willing sellers and retiring it, while also measuring and limiting annual groundwater withdrawals to three AF per acre to meet state diversion limits and balance groundwater extraction with recharge. PVACD's approach offers a model for locally led conservation, compensating irrigators while reducing irrigable acreage and overall demand to enhance long-term water supply reliability. Coupled with an in-district agricultural water clearinghouse, it could support market-based reallocation of water among crops (Howe et al. 2013; Pecos Valley Artesian Conservancy District, n.d.).

[1] The USDA reports a much lower figure — 546,000 irrigated acres — in 2022. Their estimate of total agricultural land (irrigated and non-irrigated) is more aligned with OSE estimates of irrigated land.

Depending on withdrawal limits, extent of land retirement adopted, and magnitude of financial incentives, we estimate that this alternative could reduce agricultural water withdrawals by 278,000 to more than 600,000 AFY, or 11–30% of current total agricultural withdrawals. The costs to administer this agricultural conservation program could range from $6/AF–$14/AF to install water withdrawal metering equipment to all unmeasured points of diversion and perform ongoing monitoring of water withdrawal rates, as a prerequisite. Additional costs of then implementing agricultural water conservation strategies to bring water current withdrawals rates in line with appropriate limits range from $150/AF–$160/AF for incentivized deficit irrigation and/or temporary fallowing programs, to more than $500/AF for district-led land retirement programs (based on inflation-adjusted costs from Russell, 1989).

Locally led agricultural conservation could reduce agricultural water withdrawals by 278,000 to more than 600,000 AFY, or 11–30% of current total agricultural withdrawals.

Conveyance lining can generate 213,000–264,000 AFY of savings across New Mexico, depending on whether on-farm laterals are included in implementation, though realizing this full potential could interfere with existing aquifer recharge and return flows. The technical potential of this and other identified conservation strategies requires further investigation at the basin-level to determine the appropriate level of implementation that minimizes these impacts. Beyond these administration costs, there could be additional implementation costs that will vary by region and the specific ground in question, such as land purchases, opportunity cost of foregone agricultural production, and potential litigation. These costs should be evaluated on a case-by-case basis within each irrigation district and/or basin.

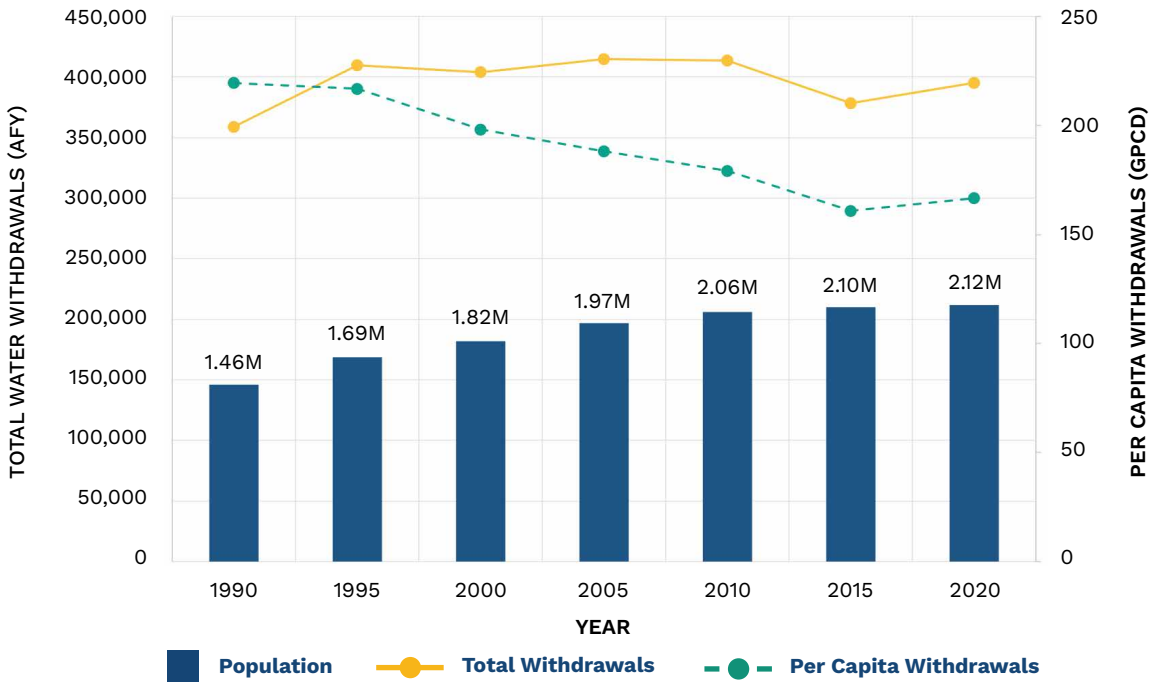
Implementing such an effort requires collaboration with district irrigators to establish the level of water supply risk associated with a business-as-usual approach and earning the support of irrigators and local community members. Its success and yield will depend on comprehensive basin-wide measurement of groundwater and surface water withdrawals, local water supply availability and perceived water supply risk, and the magnitude of financial incentives. The appropriate portfolio of conservation strategies will account for the hydrologic conditions, crop planting decisions, and potential impacts to return flows specific to each basin and/or irrigation district. Irrigators and community members must also weigh the potential risks to farm production/revenues and local employment from strategies such as incentivized fallowing and crop switching to the same risks posed by future water supply shortages and/or curtailment.

Many of New Mexico's agricultural water users enjoy senior water rights, typically placing them at the top of the priority system. Reducing total water use will help irrigators adapt to declining surface water availability and increased groundwater pumping costs within the existing water rights system. The objective of such reductions is not to create winners and losers across water use sectors but instead to implement voluntary, compensated water use reductions within agriculture to promote the sector's long-term resilience. Continued aridification and chronic, unplanned reductions in the absence of proactive local efforts will likely expedite the process of acceptance and implementation of such reductions, especially if state-based financial incentives are sufficiently attractive.

MUNICIPAL AND INDUSTRIAL WATER CONSERVATION

Municipal and industrial water use represents water withdrawals for homes, businesses, and institutions from both water utility and self-supplied sources (e.g., private groundwater wells), corresponding to the public water supply, domestic, commercial, and industrial water use categories reported by the Office of the State Engineer (Valdez et al. 2024). Between 1990 and 2020, municipal and industrial water withdrawals in New Mexico have remained relatively stable between 350,000 AFY and 415,000 AFY, despite a 45% increase in population (Figure 1). This pattern of efficiency improvements corresponds to an overall 24% decrease in water withdrawals per person, from 219 to 167 gallons per person per day (GPCD) (or 0.25 AF per person per year to 0.19 AF per person per year) over the same period. The decoupling of water use from population growth highlights both the significant progress in conserving water and its role in supporting population growth and economic development with existing supplies. As innovation in conservation technologies and practices continues, there are still significant opportunities to build on this success.

FIGURE 4: Municipal and Industrial Water Withdrawal Trends in New Mexico, 1990–2020



Note: Compiled from data for public water supply, domestic, commercial, and industrial water use categories reported by OSE in five-year increments (Longworth et al. 2008; 2013; Magnuson et al. 2018; Valdez et al. 2024; Wilson 1992; Wilson et al. 1997; 2003).

Estimated municipal and industrial water use in New Mexico is approximately 390,000 AFY, representing 22% of the state's total water withdrawals. Residential uses account for 63% (246,000 AFY), including 43% for outdoor and 20% for indoor uses. Together, commercial, industrial, and institutional (CII) uses comprise 30% of municipal and industrial water use (117,000 AFY), the majority of which is non-seasonal and associated primarily with indoor uses; approximately 27,800 AFY reflects seasonal demand, including consumptive uses for irrigation and cooling water makeup. Finally, we estimate that leakage in the water distribution system represents 7.1% of total M&I use, or approximately 27,800 AFY, though this estimate can be further refined with additional data collected through statewide implementation of standardized water loss reporting.

Available technologies and practices can further reduce current municipal and industrial water use by 164,000–196,000 AFY.

Building on the savings already achieved in New Mexico, we estimate that available technologies and practices can further reduce current municipal and industrial water use by 164,000–196,000 AFY, equivalent to a savings of 42%–50% (Figures 2 and 3). Water savings are found across all major sectors, with the residential sector representing the largest potential savings (84,200–102,000 AFY), followed by the CII sector (67,900–81,500 AFY), and more distantly by reduction in utility water losses (11,900–12,200 AFY).

TABLE 1: Current Day Water Demands and Technical Potential for Municipal and Industrial Water Users, by Sector

Sector	Current Day Demand (AFY)	Water Savings Potential	
		Low Estimate (AFY)	High Estimate (AFY)
Residential Total	246,000	84,200	102,000
Indoor	*78,200*	*33,200*	*49,100*
Outdoor	*167,000*	*51,000*	*53,000*
Commercial, Industrial, Institutional Total	117,000	67,900	81,500
Non-Seasonal	*88,900*	*51,700*	*62,100*
Seasonal	*27,800*	*16,200*	*19,400*
Utility-Side Leakage	27,800	11,900	12,200
Total Municipal and Industrial	**390,000**	**164,000**	**196,000**

Note: Column subtotals may not match reported totals due to rounded estimates.

Note: Low estimates correspond to adoption of water conservation measures moderately beyond current minimum state requirements and/or industry performance, while high estimates correspond to adoption of measures reflecting leading-edge technologies and/or industry-leading performance.

Reducing consumptive use is especially valuable because it makes more water available for other uses, without negatively impacting the return flows that communities generate from treated wastewater. Of the 390,000 AFY in municipal and industrial water demand, about half, or roughly 195,000 AFY, is consumptive use. We estimate that water conservation measures, primarily through outdoor landscape transformation, can reduce consumptive use by 67,100–72,500 AFY. Consumptive water savings are largest for the residential sector (51,000–53,000 AFY), followed by the CII sector (16,200–19,400 AFY). Landscape transformation efforts that replace lawns with native and low water-use plants and upgrade irrigation systems reduce consumptive use, with costs ranging from $1,000/AF to $1,600/AF — a significant upfront investment but still less than many alternatives in this study.

Water conservation measures that reduce non-consumptive use are among the most cost-effective water supply alternatives evaluated in this study but can reduce downstream flows for other users. Replacing showerheads, bathroom faucets, and clothes washers with more efficient models actually have "negative" costs because they can save $1,600/AF to $4,800/AF over their lifetimes from lower wastewater and energy bills over time, which outweigh the upfront costs to purchase and install them. Other conservation measures — like managing water system leakage and replacing toilets and dishwashers — cost more but are still less expensive than most other water supply alternatives evaluated.

Many of these strategies are already being implemented in New Mexico and could be expanded to realize additional water savings (Albuquerque Bernalillo County Water Utility Authority, n.d.; City of Las Cruces, n.d.; City of Rio Rancho, n.d.; City of Santa Fe, n.d.; Los Alamos County, n.d.; New Mexico Office of the State Engineer, n.d.; New Mexico Water Conservation Alliance, n.d.). For example, many utilities offer incentives to encourage customers to buy water-efficient devices; New Mexico can enshrine more efficient performance requirements for fixtures and appliances in state standards and codes. Likewise, the New Mexico Environment Department (NMED), through its LeakTracer Funding Program, provides funding for leak detection in rural communities. This program could be expanded.

While reductions in consumptive use are especially valuable, there are also compelling reasons to seek reductions in non-consumptive uses. For example, reducing both consumptive and non-consumptive uses lessens the amount of water withdrawn from rivers, reservoirs, and aquifers and can defer or avoid the need for investment in new infrastructure to capture, store, and distribute that water. These reductions can give water managers more flexibility and improve the amount and timing of water left in the natural environment for downstream uses. Overall, any reduction in demand — whether consumptive or non-consumptive — can help communities cope with drought and aridification.

The impacts of reducing non-consumptive water use depend not only on the source of water supply but also on the location of treated wastewater discharge within the basin. Reducing non-consumptive water use in communities where water is withdrawn and discharged to surface water has no net effect on downstream flows, since any reduction to discharge is offset by a reduction to withdrawals. On the other hand, some groundwater-reliant communities that discharge to surface water face a tradeoff between extending their water supply's longevity and providing downstream flows. This tradeoff, combined with downstream flow obligations for other users and interstate compact compliance, requires basin-level evaluation to understand the full impacts of reducing non-consumptive water use in these areas.

MUNICIPAL AND INDUSTRIAL WASTEWATER REUSE

Municipal and industrial wastewater reuse refers to the process of intentionally collecting, treating, and repurposing wastewater from municipal and industrial sources for other beneficial uses. For this analysis, we estimate wastewater effluent from a centralized wastewater treatment plant and septic systems, which represents indoor water use and unintended entry of stormwater and groundwater into sanitary sewers (i.e., inflow and infiltration). Communities in New Mexico currently discharge an estimated 196,000 AFY of treated wastewater to surface water and groundwater bodies. Of this volume, roughly 169,000 AFY (86% of total volume) is from centralized wastewater treatment plants and 27,500 AFY (14% of total volume) is from septic systems. Fully implementing the water conservation improvements identified in this study would reduce the amount of wastewater generated to 130,000–151,000 AFY (66%–77% of current total volume).

The NMED regulates recycled water systems and larger graywater systems supplying more than 250 gallons per day that supply treated wastewater for water uses that do not require drinking-quality water through the Groundwater Discharge Permitting program (New Mexico Environment Department 2003; 2007).[2] The potential for this "fit-for-purpose" approach to water supply, also called non-potable reuse, depends on the water demands for non-potable uses like irrigation, cooling tower makeup, and toilet flushing. We estimate the total non-potable water demand in New Mexico is approximately 103,000–122,000 AFY. Serving all these demands would require upgrading wastewater treatments plants to produce recycled water as well as installing a separate "purple-pipe" delivery system. Further, meeting indoor non-potable demands would require a dual-plumbing system, which would be cost-prohibitive in existing buildings.

We estimate the total non-potable water demand in New Mexico is approximately 103,000–122,000 AFY.

Centralized reuse systems delivering non-potable water to customers can cost $2,330/AF for a 5 million gallons per day (MGD) facility to provide additional treatment capacity to meet water quality standards for non-potable reuse. The additional cost of building sufficient pumping, storage, and distribution infrastructure, if it does not already exist, can range from $2,260/AF for similar implementation scales as existing systems in New Mexico to $30,300/AF for full implementation that requires significant additional distribution infrastructure (i.e., serving a subset of customers with large non-potable water demands or providing non-potable water to all customers within a service area, respectively). However, there may be more limited but less expensive options to meet non-potable demands near centralized or more distributed reuse plants.

Augmenting drinking water supplies through aquifer storage and recovery, which is already allowed in New Mexico, and possibly through direct potable reuse, if it is approved, could create additional opportunities for water reuse. Potable reuse would require higher and more costly treatment but would not require a separate water delivery system or dual plumbing. For example, potable reuse facilities currently under construction, such as the 10 MGD (11,200 AFY) Pure Water Center project in El Paso, Texas, and the 30 MGD (33,600 AFY) Pure Water program in San Diego, California, will supply drinking water at estimated costs of $1,200/AF and $2,800/AF in 2025 dollars, respectively (City of San Diego 2015; Pskowski 2025; Mendoza-Moyers 2025).[3] These costs are considerably lower than those investigated in this study, underscoring the impact that additional water delivery infrastructure for non-potable reuse has on cost-effectiveness.

Small-scale systems for individual properties can also provide non-potable water by recycling graywater, though these systems supply smaller volumes than centralized systems that also include blackwater (i.e., wastewater with significant biological contaminants). When used for outdoor irrigation, these systems can supply 20,600–32,900 AFY of non-potable water, with costs ranging from $5,200/AF to $6,300/AF for laundry-to-landscape systems that divert graywater from clothes washers and $2,600/AF to $4,200/AF for systems that divert graywater from an entire building. The lower cost for the latter case suggests that the benefit of reduced wastewater bills from recycling additional graywater outdoors can outweigh the cost of treatment and storage for the additional diverted volume.

[2] NMED does not require a permit for graywater recycling systems that discharge less than 250 gallons per day and meet the conditions outlined in its Graywater Irrigation Guide. Most individual households generate less than 250 gallons of graywater per day and therefore would not require a permit to recycle that graywater.

[3] Estimated cost was derived from a reported capital cost of $295 million and a treated water unit cost of $500/AF, assuming a 30-year service life and 3% discount consistent with levelized cost assumptions presented in this study.

A key challenge with implementing wastewater reuse in New Mexico is the potential impacts on downstream users. At the high end, the combination of wastewater reuse and stormwater capture could exceed the current non-potable water demands for municipal and industrial users in the state. At the same time, the downstream impacts of wastewater reuse depend on where water is withdrawn and discharged and how much of existing demand can be offset in each community. We estimate that approximately 80% of treated wastewater (154,000 AFY) is currently discharged to surface water, highlighting the role that treated wastewater plays in supporting downstream flows for other users, the environment, and interstate compact requirements.

For communities that withdraw from and discharge to the same water body, wastewater reuse results in no net change to return flows. For these areas, the reduced return flows from treated wastewater effluent are offset by roughly equivalent reductions in water withdrawals, for both consumptive and non-consumptive uses. For communities that withdraw from groundwater and discharge to surface water, wastewater reuse represents a net reduction to return flows, regardless of disposition. However, these communities face the same tradeoff between their water supply sustainability and supporting downstream flows described for conservation. The potential impacts of this tradeoff must also be considered on a case-by-case basis for communities within a basin when assessing the opportunities for wastewater reuse.

URBAN STORMWATER RUNOFF

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Urban stormwater runoff is generated when precipitation falls on rooftops, roads, and other impervious surfaces in urbanized areas. While long considered a nuisance, urban stormwater is increasingly viewed as an asset in water-scarce areas. Stormwater capture and use can augment water supplies while also supporting flood control, water quality protection, and other environmental and community benefits (Smith et al. 2022; Diringer et al. 2020) Stormwater capture can sometimes require less intensive treatment methods than wastewater reuse and can be more easily implemented at the building scale through, for example, household rain barrels or cisterns for landscape irrigation.

Current New Mexico regulations allow for the capture and use of stormwater on a property to meet outdoor irrigation demands (Holcomb et al. 2017; International Association of Plumbing and Mechanical Officials 2023). However, stormwater that leaves the property is considered “waters of the state” and cannot be captured without a corresponding water right for beneficial use unless it is released to its destination within 96 hours or infiltrated to recharge aquifers (Design of a Dam 2010; Holcomb et al. 2017).

We estimate that 61,300 AFY of urban stormwater runoff is generated from rooftops, parking lots, streets, and highways in New Mexico in an average year. In comparison, the total non-potable water demand that could be offset by capturing and using this runoff ranges from 54,200 to 59,800 AFY, depending on whether additional conservation strategies are also implemented.

The cost of adopting rain barrels at the building scale to capture and use stormwater runoff for outdoor irrigation is roughly $800/AF. In comparison, a large-scale implementation to capture stormwater can range from $1,900/AF for managed aquifer recharge to $2,460/AF for aquifer storage and recovery to augment water supplies. While building-scale rain barrel adoption is cheaper than centralized strategies, the potential for capturing and using stormwater runoff via rain barrels is ultimately limited by the non-potable water demand on the property. Realizing the full potential of stormwater runoff would therefore require implementation of both strategies in conjunction.

As with treated wastewater, urban stormwater runoff plays a significant role in surface water availability, particularly for intermittent flows and ephemeral streams. Under current New Mexico regulations, stormwater runoff is classified as "public water of the state," and any captured volume must be released within 96 hours of collection; however, the OSE discourages stormwater management practices that promote evaporative losses.

At the same time, stormwater runoff during large storm events can translate to high surface water flows beyond what downstream users can divert and can provide "credits" for excess flows applied toward interstate compact obligations, though limitations exist for the maximum credit volume that can be earned each year (Albuquerque Bernalillo County Water Utility Authority 2016).

The downstream impacts of stormwater capture, like wastewater reuse, depend on the local water supply context and how the captured water offsets existing uses. In communities that rely on surface water, for example, capturing stormwater to replace consumptive uses like irrigation generally does not reduce downstream surface water availability and may even increase flows by reducing withdrawals. In groundwater-reliant communities, however, capturing and using stormwater that would otherwise enter streams could reduce downstream surface water if it replaces consumptive uses.

Stormwater capture can also affect ecosystems — for example, diverting runoff during high-flow periods may diminish beneficial "pulse" flows that support habitats. These examples illustrate why stormwater projects must consider downstream hydrologic and ecological effects to maximize benefits and minimize adverse impacts.

PRODUCED WATER

New Mexico is the second-largest producer of oil and gas in the United States and has seen a dramatic increase in production since 2010, due in part to technological advances in horizontal drilling and hydraulic fracturing (Thomson 2025). Oil and gas extraction in New Mexico consumes about 49,300 AFY of water. This water is almost entirely used in operations for unconventional oil and gas production, including drilling, hydraulic fracturing, and enhanced resource recovery (Allison et al. 2018; Cooper et al. 2022; Scanlon et al. 2017). Based on reported data for years 2020 through 2024 provided by the Oil Conservation Division of New Mexico Energy, Minerals, and Natural Resources Department, roughly 22,900 AF of the water consumed as part of the resource extraction process is produced water that is recycled within the industry (59%); the remainder is brackish (25%), saline (10%), and fresh (6%).

The expansion of oil and gas activity has raised concerns about proper disposal of waste byproducts, including wastewater generated during well completion and extraction processes, also known as produced water. Between 2020 and 2024, the volume produced water generated by the oil and gas industry in New Mexico increased by 85% from 176,000 to 325,000 AFY. Produced water typically has a much higher total dissolved solids (TDS) than seawater, ranging anywhere from 20,000 milligrams

per liter (mg/L) in the San Juan Basin to 129,000 mg/L in the Permian Basin, and contains several other contaminants regulated under federal and state standards (Cooper et al. 2022; New Mexico Environment Department et al. 2024; Thomson 2025). Roughly 80% of produced water is either disposed of via subsurface injection into deep saltwater disposal wells, evaporated in lined ponds, or re-injected into oil and gas wells for new well stimulation. The remaining 20% is reused within the oil and gas industry, though reuse rates can vary across individual well operators (New Mexico Environment Department et al. 2024; Thomson 2025).

Subsurface disposal, including preliminary treatment and transport to recycling facilities or disposal sites, can cost anywhere from $5,300/AF to $7,800/AF of produced water (Texas Produced Water Consortium 2022; New Mexico Environment Department et al. 2024). However, more stringent permitting requirements driven by growing concerns around induced seismic activity, as well as increasing transport distances to suitable injection locations, are likely to drive cost increases for subsurface injection in the future (New Mexico Environment Department et al. 2024; Texas Produced Water Consortium 2022; Thomson 2025). At the same time, increasing water scarcity could require the oil and gas industry to reduce its freshwater consumption and increase brackish and saline water consumption or recycle more produced water. These challenges have led to increased interest in increasing the rate of produced water recycling within the wellfield, as well as treatment and transport for reuse outside of the wellfield.

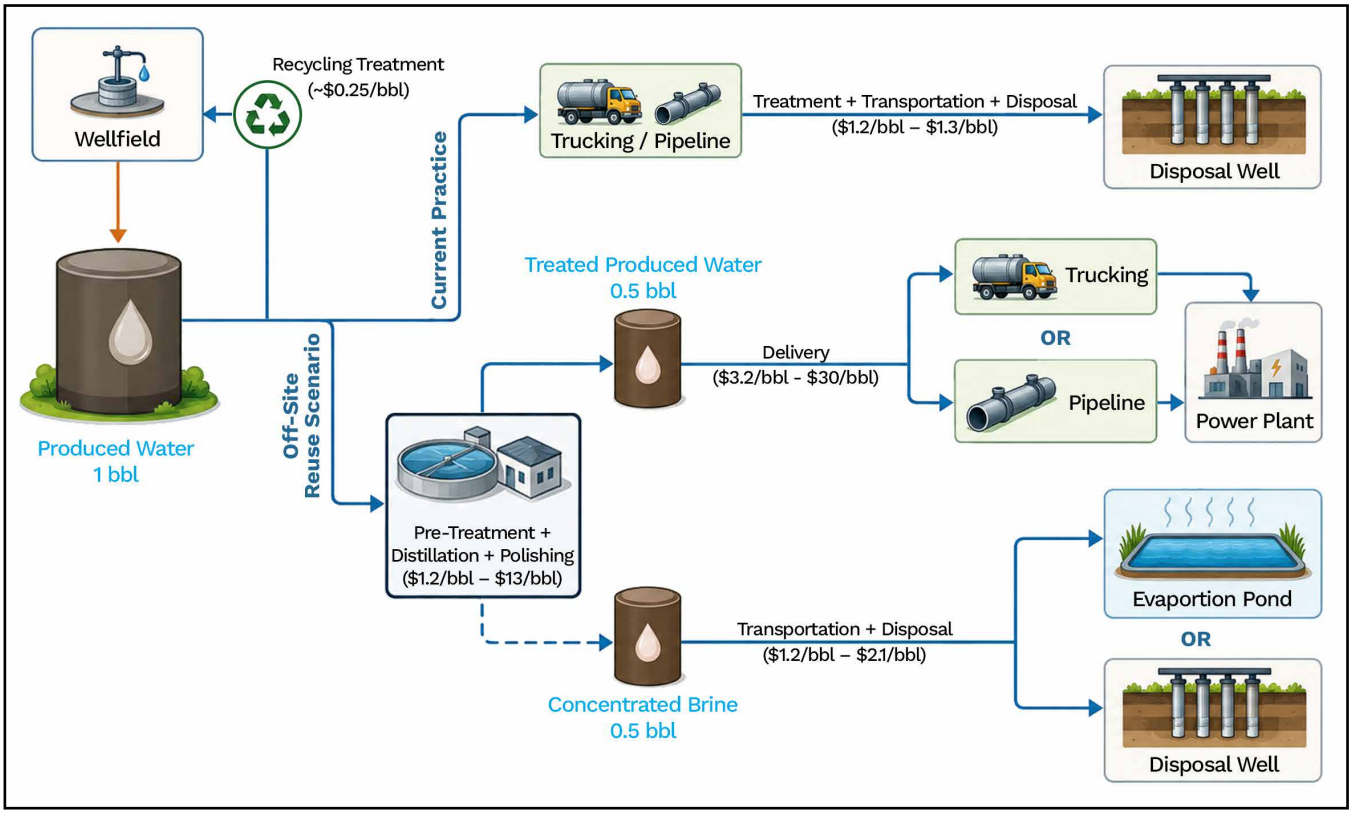
Total Dissolved Solids (TDS) is a measure of how much salt and other minerals are dissolved in water, typically expressed as milligrams per liter (mg/L). The EPA's secondary (i.e., not mandatory or enforceable) standard for TDS in drinking water is 500 mg/L, while seawater typically ranges from 30,000–40,000 mg/L. Untreated water is considered as freshwater for TDS less than 1,000 mg/L, brackish water for TDS between 1,000 mg/L and 10,000 mg/L, saline water for TDS between 10,000 mg/L and 100,000 mg/L, and brine for TDS greater than 100,000 mg/L (New Mexico Bureau of Geology and Mineral Resources 2015).

Produced water is already used within oil and gas operations, and expanding this usage could offset existing uses of freshwater, which totaled 3,200 AFY in 2024. Offsetting freshwater withdrawals with additional produced water recycling would generate $1,600 of monetary savings per AF of produced water from avoided disposal costs to the oil and gas industry. However, mismatches in the timing and location of produced water generation and recycling opportunities (N.M. Admin. Code § 20.6.8 2025), additional costs for storage and transmission that would outweigh disposal costs (Scanlon et al. 2017), and the additional costs to engineer produced water chemistry to be suitable as a well completion fluid (Cooper et al. 2022), can all limit the feasibility of increased recycling within the oil and gas sector.

In 2024, the total volume of produced water available to offset non-potable water demands in other sectors was 279,000 AFY, after accounting for the volume that was already recycled within the sector. However, only three full-scale examples of reuse outside of the oil and gas industry have been identified in the United States: non-food crop irrigation in California and the Powder River Basin in Wyoming/Montana, and aquifer storage and recovery in Colorado (Allison et al. 2018). The produced water used in these examples contains much lower TDS, ranging from 200 to 22,500 mg/L, than that found in the Permian Basin, which generates over 90% of produced water in New Mexico (Healy et al. 2011; Lester et al. 2015; Thebo et al. 2023). This disparity suggests that full-scale produced water reuse in New Mexico would require significant additional treatment and cost for full-scale implementation and cannot be directly compared to existing examples in the U.S.

Several treatment technologies are potentially available to treat produced water to a suitable quality for reuse. These technologies typically employ membrane filtration and/or distillation processes, each having their own advantages and disadvantages for treatment of produced water typically reflected by tradeoffs in operating costs (energy and equipment replacement) and treatment efficacy. Membrane filtration typically has higher operating costs for treating produced water than for treating seawater, due to higher rates of membrane fouling and replacement (Cooper et al. 2022; Hightower et al. 2022; Scanlon et al. 2020). Thermal distillation processes can have better performance, in terms of throughput, with the tradeoff of lower energy efficiency.[4] However, membrane processes alone are insufficient for treating high salinity water, such as the produced water generated in the Permian Basin in New Mexico (Bhojwani et al. 2019). Depending on the treatment technology and desired treated water quality, the costs to treat high salinity produced water, including pre-treatment, distillation, and post-treatment polishing, can range from $8,800/AF to $138,000/AF, (Bhojwani et al. 2019; Cooper et al. 2022; Hightower and Xu 2022; New Mexico Environment Department et al. 2025; Tavakkoli 2017; U.S. Environmental Protection Agency 2018).

FIGURE 5: Comparison of Produced Water Management, Current Practice and Off-Site Reuse Scenario



[4] Previous research suggests that some of the energy demand for thermal distillation could be met by flared natural gas that occurs as a part of the resource extraction process (Glazer et al. 2014).

Beyond the cost of treatment, delivering the treated water and disposing of concentrated brine waste both have significant impacts on life-cycle costs. These costs, when borne by oil and gas companies, are partially offset by avoided disposal costs for the volume of water delivered to other users. The avoided cost of produced water disposal provides a monetary benefit to oil and gas operators. An optimistic scenario could involve projects that treat and deliver produced water for reuse in nearby water-cooled power plants to offset their freshwater withdrawals (Figure 5). The treatment and conveyance costs for delivering treated produced water to offset power plant water demands range from $51,900/AF to $209,000/AF over the life of the project. The wide span of potential costs stem from significant uncertainties in treatment and transport costs. Transport costs can range between $43,400/AF to $72,700/AF for transport distances ranging from 15 to 45 miles for the low and high end of the estimated cost range, respectively.

Further, insufficient treatment and/or disposal of treatment byproducts can threaten public and environmental health and safety (Thebo et al. 2023). These cost estimates represent direct implementation by oil and gas companies, and do not include the potential administrative costs to the public such as regulatory compliance monitoring and program administration. Publicly-funded implementation would not realize the monetary savings from reduced disposal costs, resulting in an additional $6,050/AF of additional cost. The costs of treatment facility decommissioning and site remediation, as well as who bears these costs, is highly location-specific and should be accounted for when evaluating potential projects implementing this strategy. The volume of produced water that will be generated and available in the future will also depend on global market trends that influence oil and gas production levels in New Mexico. The relatively high cost of treatment and transport, coupled with the uncertainty of future produced water availability, creates the risk of overinvestment and stranded infrastructure assets that can limit the extent to which produced water can be considered a renewable water supply. The estimated volumes and costs reported in this study must be considered within the context of these risks when evaluating produced water reuse as a potential water supply strategy.

The volume of produced water that will be generated and available in the future will also depend on global market trends that influence oil and gas production levels in New Mexico.

BRACKISH GROUNDWATER DESALINATION

New Mexico has anywhere from 486,000,000 to 878,000,000 AF of brackish groundwater across the five deep aquifers throughout the state for which estimates are available. While this represents a large amount of water, the portion of this water that is feasible to extract is unknown and the amount that could be sustainably used is highly limited. A key issue is that these deep aquifers receive little to no annual recharge, which severely limits the sustainable rate of extraction and makes this water resource nonrenewable. Additionally, the hydrologic characteristics and potential interactions with overlying aquifers and streams are not well understood. This information is crucial to better understand and quantify the extractable volume, and potential impacts, of large-scale pumping and treatment to augment water supply. To address current data gaps, the NMBGMR's Aquifer Mapping and Management Program is currently compiling data from a network of over 600 monitoring wells, with the goal of mapping all aquifers in the state by 2037 (Timmons et al. 2025; New Mexico Bureau of Geology and Mineral Resources, n.d.).

The cost of brackish groundwater desalination depends on factors unique to each aquifer and intended water use. These include the choice of treatment process, brine waste disposal method, facility capacity, locations of production wells and treatment facility sites, and transport distance for treated water. Based on a survey of reported costs for existing brackish groundwater desalination projects in New Mexico, Texas, and California, the cost of brackish groundwater desalination can range from $520/AF to $1,900/AF. Two feasibility studies for potential desalination facilities in Sandoval County, NM, and Santa Teresa, NM, estimated levelized costs far outside of this range, roughly $2,900/AF in both cases, though the reasons for this disparity require further investigation of the individual cost components for comparison with the existing projects surveyed for this study (Universal Asset Management et al. 2011; Xu 2023). Filling the data gaps described earlier in this section can help reduce this uncertainty around costs and should be prioritized for investment toward developing this water source.

Beyond the technical and cost uncertainty, little is known about the potential impacts of pumping brackish groundwater on overlying aquifers and streams. The OSE requires a water right to pump any groundwater from depths less than 2,500 feet, regardless of salinity category. A water right is generally not required for pumping from depths greater than 2,500 feet, except in cases where deep aquifer pumping induces leakage in overlying aquifers and streams (Thomson 2025). If brackish groundwater becomes a larger component of New Mexico's water supply portfolio, a similar water right or permitting system may be necessary for all deep aquifer pumping to comprehensively monitor and manage the rate of deep aquifer drawdown and potential impacts to freshwater sources. However, most of New Mexico's basins are already fully allocated, and securing a commensurate water right could require purchase of existing water rights, increasing the overall cost of implementation.

Summary and Conclusions

New Mexico faces significant challenges from drought, aging infrastructure, and the increasingly frequent and destructive impacts of climate change that strain the state's already overallocated rivers and aquifers. These challenges will strain the ability of communities to grow and thrive and can reduce opportunities for economic development throughout the state. Securing sustainable water supplies over the long term will require significant investment to extend the useful life of current water supplies and develop new supply alternatives. The state has identified several of these water supply alternatives as part of its recent 50-Year Water Action Plan, though implementation requires a comprehensive understanding of the available opportunity for these strategies. In this study, we investigate each of these water supply alternatives to provide a first-order assessment of their technical potential and cost-effectiveness. This assessment serves as a first step toward identifying and prioritizing existing opportunities for implementation and areas where further investigation is needed.

New Mexico's agricultural sector uses about 78% of the state's developed water. New Mexico can provide technical assistance and resources that support efforts that build on the success of existing efforts to limit water use at the district level, through conservation planning and implementation, while preserving flexibility for local decision making. With support for local conservation planning that preserves flexibility for irrigation district-level decision making, agricultural water use could be reduced by more than 600,000 AFY, roughly 20% of recent withdrawals. Costs will vary by region and conservation strategy but could range from about $170/AF to more than $3,000/AF. The potentially significant adverse impacts of planned, incentivized, voluntary reductions in irrigated acreage should be measured against the potential impacts of unplanned, uncompensated, and mandatory reductions caused by overdrawn aquifers or diminished streamflow.

New Mexico's agricultural sector uses about 78% of the state's developed water.

Municipal and industrial water users have a similar opportunity to build on past progress in conservation. Implementing conservation strategies that replace fixtures and appliances with more efficient models, transform outdoor landscapes to use less water, and better manage utility water loss, could reduce consumptive water use by 67,000–73,000 AFY (around 18% of recent withdrawals) and non-consumptive water use by 85,000–111,000 AFY (22%–28% of recent withdrawals). Costs will vary by region and practice but could range from about $1,000/AF to $1,610/AF for landscape transformation that reduces consumptive use and -$4,800/AF to $8,500/AF for indoor conservation practices that reduce non-consumptive water use. Several indoor conservation practices can produce monetary savings over the life of the strategy that outweigh the initial cost of adoption. Implementing the full suite of indoor and outdoor conservation strategies could, in the aggregate, generate enough monetary savings to offset the cost of adoption and provide a "least regrets" strategy for adapting to reductions in water supply.

The total potential of treated wastewater for non-potable reuse offers flexibility for small- and large-scale implementation to offset withdrawals from groundwater and surface water sources. Non-potable reuse of treated wastewater can provide 130,000–151,000 AFY of supply. The cost of additional wastewater treatment for centralized reuse is roughly $2,330/AF, with additional costs to construct a separate recycled water delivery system ranging from $2,260/AF to $30,300/AF depending on service area coverage, with the high range reflecting major additional costs for providing non-potable water to all potential customers in a service area. Small-scale systems to recycle graywater within a property can cost anywhere from $2,500 to $6,300, with lower costs for systems that divert graywater from multiple sources within a building. Realizing the full potential of wastewater reuse would likely require additional strategies beyond non-potable reuse, such as direct or indirect potable reuse.

Stormwater runoff can also be captured and used for similar purposes and can provide 54,200–59,800 AFY to offset non-potable demands, albeit with additional legal and hydrologic considerations. The cost of building-scale stormwater capture and use systems for non-potable demand offsets is roughly $800/AF. Centralized strategies to capture stormwater runoff for managed aquifer recharge and/or aquifer storage and recovery can help realize the full potential of this water supply alternative, though with higher costs ranging from $1,900/AF to $2,500/AF. Both the reuse of wastewater and capture and use of stormwater runoff provide further opportunities to extend the usefulness of existing water supplies but must be considered within the context of potential adverse impacts to return flows, downstream water users, and interstate compact compliance. The high end reflects added costs of additional infrastructure to recover capture stormwater for water supply augmentation.

Depending on the disposition of water demands being offset and whether withdrawals come from groundwater or surface water, conservation, non-potable reuse of treated wastewater, and capture of stormwater runoff could each impact the transfer of groundwater to surface water that occurs for current water uses, as well as downstream flows for other users. These impacts can constrain the potential of these water supply alternatives to offset non-consumptive use (for surface water-reliant communities) or the total potential (for groundwater-reliant communities). However, communities must consider these impacts within the broader context of diminishing water supplies that could otherwise create water supply disruptions if they are unable to adapt in the future.

Oil and gas wells generated over 200,000 AFY of produced water, on average, between 2020 and 2024. While this represents a significant potential volume, produced water is a non-renewable water supply and the feasibility of reusing it outside of the oil and gas industry is highly uncertain, driven by public and environment health concerns, availability of cost-effective treatment methods at scale, large transport distances required to deliver treated produced water to prospective users, and future availability driven by global oil and gas market trends. These challenges require a combination of community acceptance, additional research and pilot testing, and favorable economic conditions to build the necessary confidence to be considered a reliable and cost-effective strategy for water reuse.

Increasing the rate of produced water recycling within the oil and gas industry, already a common practice across New Mexico today, can offset up to 3,200 AFY of freshwater use while generating monetary savings for oil and gas producers. The treatment and transport of produced water for off-site uses is far less common, with only three other examples found in the U.S. Treating and transporting produced water for reuse in nearby water-cooled power plants can provide 28,900 AFY and represents the highest cost of implementation among water supply alternatives investigated in this study, ranging from $22,500/AF to $70,600/AF, depending heavily on the required transport distance to deliver treated water.

Brackish groundwater represents a non-renewable water supply that could provide emergency water supply or support interstate compact compliance. However, the technical potential is highly uncertain and requires further investigation. The cost to pump, treat, and deliver brackish groundwater for water supply augmentation and subsequent brine disposal varies from $520/AF to $2,900/AF, based on actual and estimated costs from other brackish groundwater desalination projects in the southwest. Through the Bureau of Geology and Mineral Resources' ongoing Aquifer Mapping and Monitoring Program, New Mexico is already making efforts to reduce this uncertainty and better characterize the available volume and estimated cost of treatment and transport for water supply augmentation.

Ultimately, the appropriate implementation for each of these water supply alternatives will depend on community- and basin-level conditions. The advantages and disadvantages of each alternative must be considered in the context of broader water supply constraints. Across most of the state, the challenges to water security are shifting from prioritizing among competing demands to supporting community resilience and adaptation to anticipated reductions in available water supply.

Identifying the statewide technical potential available from these water supply alternatives is just a first step in tackling New Mexico's water problems. The critical next step will be the adoption and implementation of policies and programs to achieve those savings while accounting for the current and future hydrologic conditions in each basin. A holistic understanding of these water supply alternatives within this broader context can inform decisions made to meet these challenges now and in the future. This study provides a robust assessment to guide the state and individual communities as they perform further data collection and investigation and inform investment and policy decisions that help secure a sustainable and resilient water future for New Mexico.

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