Thornton Water Efficiency Plan 2025

WITHOUT WATER *life would be* PRETTY DRY | THORNTONWATER.COM | THORNTON

Table of Contents

Executive Summary

The city of Thornton has historically maintained one of the lowest residential daily per capita water consumption rates among cities in the Front Range due to numerous efforts that Thornton has pursued, to create and instill solid water conservation ethic throughout the community. The Water Efficiency Plan outlined in this document builds upon past successes by pursuing strategies to promote water-efficient technologies and help change customer water use behaviors over the long term. In addition, this Water Efficiency Plan will assist customers through education and incentives designed to promote increased water efficiency.

This Water Efficiency Plan establishes long-term water efficiency goals that encourage the efficient use of available water resources and reduce the additional water needed to serve existing and future customers while maintaining a high-quality urban environment. The Water Efficiency Plan guides the planning of water efficiency programs consistent with the city's water resources management strategy and community values. This Plan replaces the 2018 Water Efficiency Plan approved by the Colorado Water Conservation Board (CWCB). It fulfills the requirements of the State of Colorado Water Conservation Act of 2004 (HB 1365) by following the guidance provided by the CWCB.

Keys to Success

The Water Efficiency Plan defines how Thornton will achieve greater water use efficiency. As such, high expectations are placed on each department, division, and employee to help implement the Plan and achieve greater water savings. One key to the success of this Plan is cross-departmental cooperation, which is necessary to make improved water use efficiency a priority and a reality. The second key to this Plan's success is the community's continued support in embracing the city's water use efficiency program as they have historically done.

Image 1. Thornton Water employees

Sustainability Connections with Water Efficiency

While this Plan focuses on water efficiency, it is important to point out the larger connection that water demand management in Thornton has with sustainability and climate adaptability. Saving water saves energy. Conserving water leads to less energy being used to treat water at the treatment plant and pump water through the distribution system. In addition, saving energy saves water. Most of the nation's electric power plants use water for cooling purposes in the power generation process. Increasing energy efficiency reduces the amount of water needed for energy production. Therefore, for every gallon of water saved, the benefits are leveraged into other areas that ultimately help reduce our community's greenhouse gas emissions and combat climate change.

Sustainable Development

Water efficiency measures play an important role in sustainable development. Installing ultra-efficient plumbing fixtures and low-water-use landscapes during construction is a cost-effective way to achieve water savings in commercial and residential developments. City Code is regularly reviewed and updated to include water efficiency best practices. The Water Efficiency Plan proposes programs to encourage sustainable development.

Foster Partnerships

Developing partnerships is, and will continue to be, a valuable component of the city's water efficiency programs. After all, the success of this program ultimately hinges on the partnerships the city cultivates with the citizens of our community to help achieve the goals set out in this Plan. In addition to partnering with our citizens, exploring partnerships with corporate, non-profit, governmental and community organizations to help leverage awareness of water use efficiency can assist with the effectiveness of the water efficiency programs.

Efficiency Goals – Past and Future

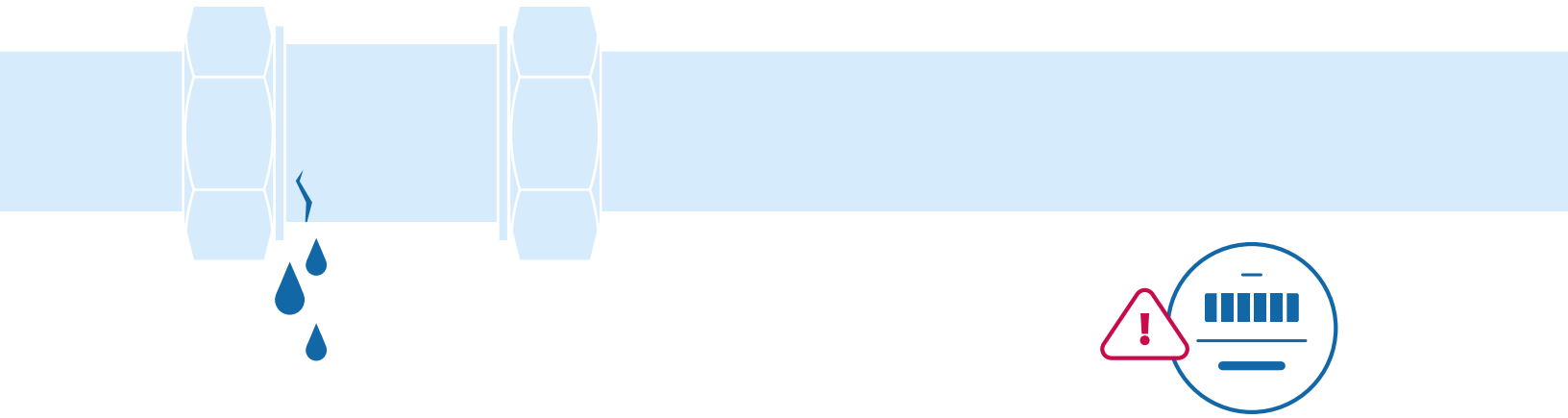
Thornton recognizes that water efficiency is essential to the city's long-term water supply planning strategy. By investing in water efficiency programs, Thornton can reduce the amount of water the city must acquire or develop to meet its build-out demand. Water efficiency goals are established with this in mind and intend to benefit both the city and its customers.

The 2009 Water Conservation Plan set a goal of establishing residential water use at 85 gallons per capita and an overall 900 AF of savings annually by 2012, up to 1,500 AF annually by 2017, and up to 2,800 AF annually by 2027. Over 20 years after the original plan, residential gpcd usage has decreased by 39%. The five-year average residential gpcd in 2023 was 75 gallons per capita per day, down from 106 in 2001. Many of the programs that helped achieve this goal will continue to be implemented through 2031.

The 2018 Water Efficiency Plan set forth landscape, irrigation and commercial water efficiency programs in each customer class to achieve savings from all of Thornton's water customers. The activities were selected to aim for 1,071 acre-feet annually by 2024. To ground truth the estimated savings of the 2018 plan, an analysis of per account usage demonstrated that an estimated annual savings of 1,463 AF was achieved from 2017 to 2023. The more conservative estimate of 1,071 acre-feet annual savings is used in this document when discussing the 2018 – 2024 plan period. These savings were predominately in the residential and irrigation sectors. Commercial sector water usage increased due to significant growth during this timeframe and will be a major focus of water efficiency programming moving forward.

The 2025 Water Efficiency Plan update has outlined in section 3.3, current activities and activities that will be brought on-line at the pace of approximately one new program implementation each year through 2030. These initiatives target all customer sectors. The 2025 Plan sets specific goals, including sustaining the existing 1,071 acre-feet annual water savings and achieving an additional 1,251 acre-feet of savings annually by 2031, for a total of 2,322 acre-feet of annual water savings by 2031. To put these water savings in perspective, the city can supply approximately 6,966 typical single-family residences with 2,322 AF of water. The implementation of a diverse selection of 29 city property, residential, commercial and irrigation customer programs is recommended in the Plan.

A large percentage of these savings are estimated to come from leak detection and outreach from Advanced Metering Infrastructure (AMI) technology that will allow for quicker identification of water leaks.



Current Water Efficiency Activities

Thornton has had efficiency measures and programs in place for many years. The following list includes Thornton's current water efficiency activities.

Currently Implemented:

- Customer Service, Water Waste Response and High-Water Use Consultations
- Residential, Commercial and Multifamily Toilet Rebates
- Residential and Commercial Smart Irrigation Controller Rebates
- Residential and Commercial Rain Sensor Rebates
- Residential and Commercial Sprinkler System Consultations
- Residential Lawn Removal Program
- Residential Garden in a Box Program
- Residential Water-Wise Landscape Rebates
- Public Outreach, Festivals, Presentations, Youth Education, Videos, etc.
- WaterSmart Water Efficiency Customer Portal
- Water Restrictions (as needed)
- City Code includes Conservation of Water Resources (Water waste is always prohibited)
- Permanent Water Use Rules
- Tiered Rate Billing Structure
- Landscape Codes Incorporating Water-Wise Principles
- Colorado Water-Wise Council Participation
- Leak Repair on Distribution System
- Reusable Water Rights Operations
- Water Line Replacement Program
- City Property Water Efficiency Retrofits

Image 2. Thornton Value of Water Video Series, www.youtube.com/user/COTWaterConservation

Evaluation and Selection of Efficiency Measures and Programs

Thirty-five future measures and programs were screened based on four criteria and selected for evaluation to estimate each program's cost and benefit. The screening criteria are listed below.

1. Authority is given to Thornton to implement measures/programs.
2. Ability to sustain water savings over the long term.
3. Ability to defer or avoid costs by implementing the measure or program.
4. Acceptability of the measure/program by Thornton community and customers.

The measures and programs that met the initial screening criteria were compared based on cost, water savings and net benefit. The net benefit was calculated in terms of the cost of water saved over the estimated life of the program savings compared to the cost of developing future water supplies.

The evaluation process showed a high net benefit from continuing current programs. In addition, sixteen new measures and programs were identified as having a high net benefit in the evaluation and selection process.

These include:

- Commercial Water Use Benchmarking
- Water Loss Accounting
- Advanced Metering Infrastructure (AMI) Installation and Implementation
- Thornton Environmental Sustainability Task Force
- Distribution Water Loss Reduction Program
- City-owned Property Non-functional Landscape Assessment
- Water Supply and Demand Scenario Planning
- Water Efficiency Program Cost-Benefit Assessment
- Commercial/HOA Landscape Water Budget Program
- Custom Commercial/HOA Irrigation System Rebate
- Income-Qualified Residential Toilet Replacement Program
- Custom Commercial Building Incentive Program
- Residential, Commercial/HOA Landscape Programs
- Non-residential Water Use Agreement Ordinance and Management
- Landscape Code and Tap Fee Ordinance Update

Implementation Plan, Monitoring, Evaluation, and Revision

This document includes an implementation plan outlining a path the city will pursue over the next several years to enhance water use efficiency. However, for water efficiency planning to succeed, the city's approach must be flexible enough to allow for strategy modifications. As technological advancements are made and brought onto the market and further research indicates greater promise with other focuses, this Plan allows the city to alter course when appropriate. Before and during implementation, the measures and programs set out in this Plan will be monitored for effectiveness. Depending on the results of this ongoing evaluation, it might be necessary to adjust programs and approaches to more effectively accomplish the city's overall goal.

Implementing the Water Efficiency Plan is a long-term endeavor that requires continuous monitoring and evaluation. Thornton intends to update the Plan every seven years, as required by the Water Conservation Act of 2004.

Image 3. Farmers Highline Canal

Introduction and Background

This section summarizes Thornton's key characteristics relevant to the water system, including the geographic area served, demographic information, and other key characteristics of the service area. It also outlines the importance of water efficiency planning, some key trends in integrated planning, and the role of this Water Efficiency Plan in other planning initiatives in Thornton. This efficiency plan covers the period from 2025–2031. 2022 has been selected as a baseline year, due to it being an average weather and water demand year.

Service Area Characteristics

Boundaries

The Thornton water and wastewater service area is approximately 39 square miles and extends from the Boulder Turnpike on the south to 168th Avenue on the north, from Zuni Street on the west to Yosemite Street on the east. The service area includes portions of unincorporated Adams County consisting of the Western Hills, Sherrelwood, Welby, Holly Crossing, and Wright Farms neighborhoods. A map of Thornton in relation to the greater metropolitan area is provided in Figure 1. A map of Thornton's water service area is included in Appendix B.

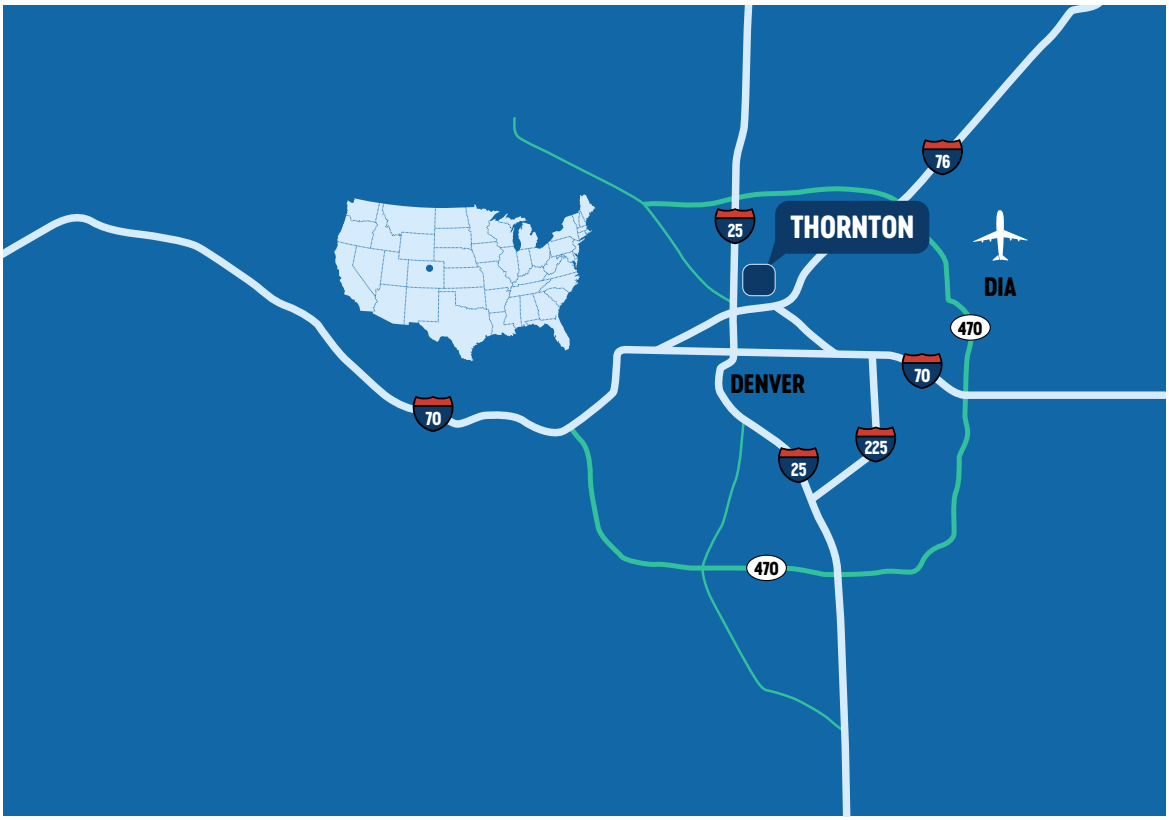


Figure 1. Location of Thornton, Colorado

Demographics

Thornton's existing water supply system serves a population of 165,453 – an estimated 148,632 people residing within the city's corporate boundaries and 16,830 people in the extended service area. In addition, the city provides water service to 922 commercial, industrial, and institutional customers, as well as 813 irrigation accounts, including treated and raw water. Thornton further provides bulk-treated water deliveries to the City of Westminster.

The city currently estimates it will provide water service to 258,830 people at its build-out. This number includes 242,000 Thornton residents and 16,830 residents of unincorporated areas in Thornton's service area. This represents an increase of 56% over the 2022 population served. As Thornton continues to grow, it is estimated that the service area population could approach 184,794 by the end of this planning period with an average annual growth rate of 2%. For the past ten years, the growth rate has averaged 2.12%. Note that the 6.56% growth rate in 2015 is artificially high due to the city aligning population counts with third-party population estimates produced by the U.S. Census and the Colorado State Demography office. However, improving economic conditions also played a role.

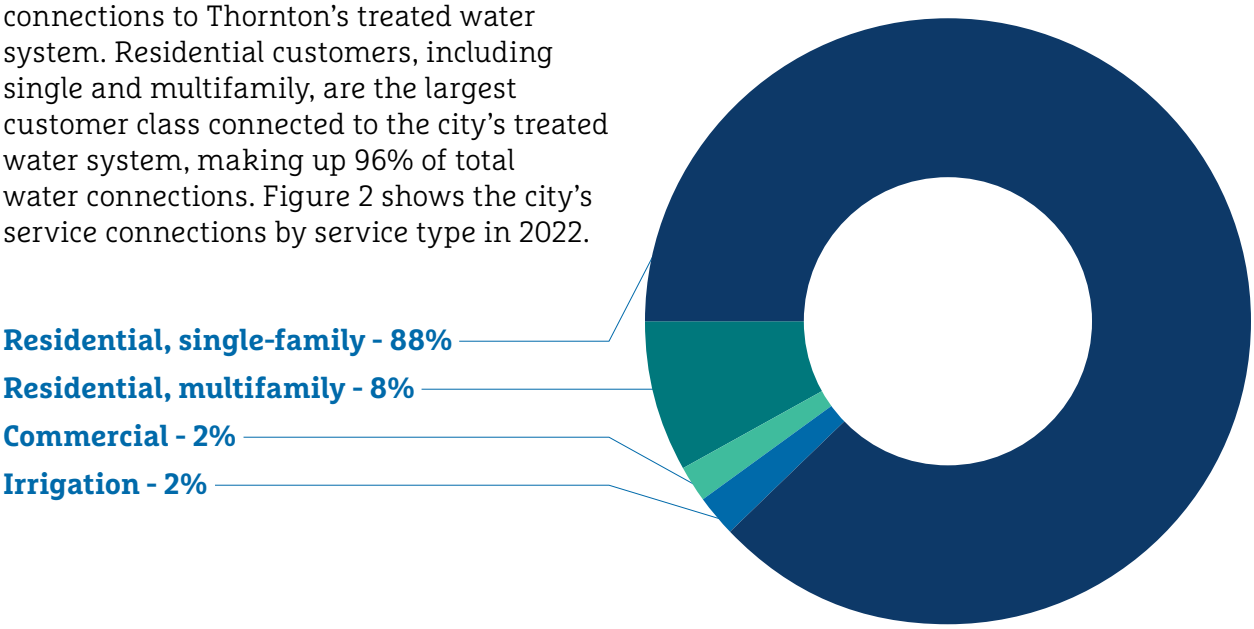
As of 2022, there were 43,048 metered connections to Thornton's treated water system. Residential customers, including single and multifamily, are the largest customer class connected to the city's treated water system, making up 96% of total water connections. Figure 2 shows the city's service connections by service type in 2022.

Table 1. Yearly Rate of Growth, 2015-2022

Year	Growth Rate
2015	6.56%
2016	1.81%
2017	2.46%
2018	2.23%
2019	2.33%
2020	1.84%
2021	0.30%
2022	1.71%
2023	3.13%

Source: city of Thornton, City Development Department

Figure 2. Service Connections by Service Type, 2022



Of the city's total service connections, 88% are within Thornton's municipal corporate boundary (Figure 3). From 2015 to 2022, the number of accounts served by Thornton increased 13% from 38,205 to 43,058. The number of connections in Thornton's extended service area is static, with no changes since 2009.

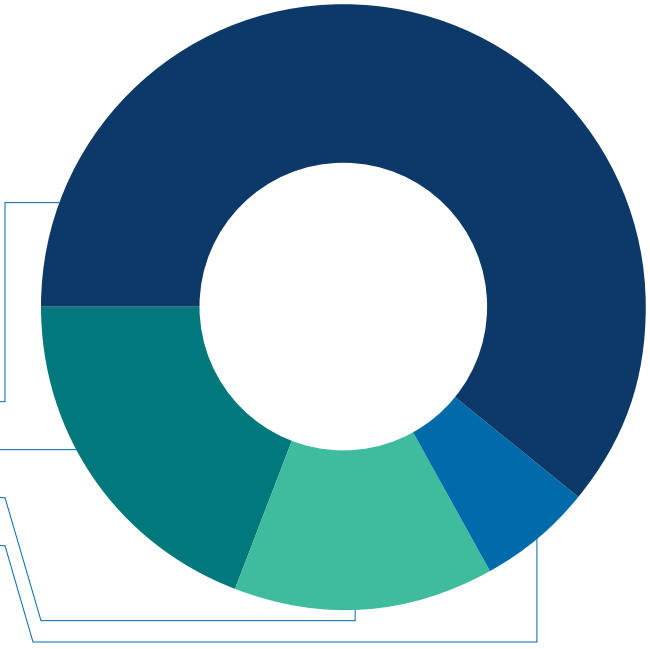
Figure 3. Service Connections, Inside vs. Outside City, 2022

Thornton's service area includes residences, businesses, schools, parks, and open space. Most of the existing service area consists of residential development. As Thornton continues to grow, development projections are integral to planning for the community's future needs. Projected growth spans as far south as 120th Avenue and north to State Highway 7, along Quebec Street. The growth will focus on single-family and multifamily housing along the Quebec Street corridor and North Metro Rail Line. Commercial development is projected to occur along the I-25 corridor and E-470 in the northwest portion of the service area. However, there are significant areas within the service area that remain undeveloped.

Housing

Most of the existing service area consists of residential development. In 2022, there were 53,475 housing units in Thornton, of which single-family dwellings (detached and attached) made up the largest portion at 75% (Figure 4). Since 2008, residential unit growth has continued, although not at the unconstrained rate of the early 2000s. Of the available housing stock, 58% were built before 2000.

Figure 4. Thornton's Housing Distribution, 2022



Future housing trends indicate that single-family housing is slightly outpacing multifamily. In the near term, single-family households will likely see the most units completed of all the housing types. In the long run, with the opening of the N-Line Commuter rail and the community-driven feedback being implemented as identified in the 2020 Thornton Comprehensive Plan, multifamily is likely to continue to grow in its share of Thornton's housing stock and could potentially outpace single-family housing construction.

Business and Economy

The top employment sectors include Retail Trade, Health Care and Social Assistance, Construction, Manufacturing and Professional, Scientific and Technical Services. Table 2 displays the top 10 employers in Thornton. In many cases, residents are employed outside of Thornton. Comparatively, Thornton's 2022 resident median household income is 3% higher than the Denver metro area, at $93,873.[1]

Table 2. Top 10 Employers in Thornton, 2022

Employer	Product/ Service
Amazon	Distribution
Adams 12 Five Star Schools	K-12 Education
City of Thornton	Municipal Government
North Suburban Medical Center	Hospital
Walmart Stores	Retail Trade
King Soopers	Grocery Stores
Appliance Factory Outlet	Distribution
American Furniture Warehouse	Retail Trade
Main Event	Entertainment
Top Golf	Entertainment

Image 4. Thornton Water Resource Team

[1] https://businessinthornton.com/site-selection/data/
https://www.deptofnumbers.com/income/colorado/denver/

Water Efficiency Planning

Why a Water Efficiency Plan?

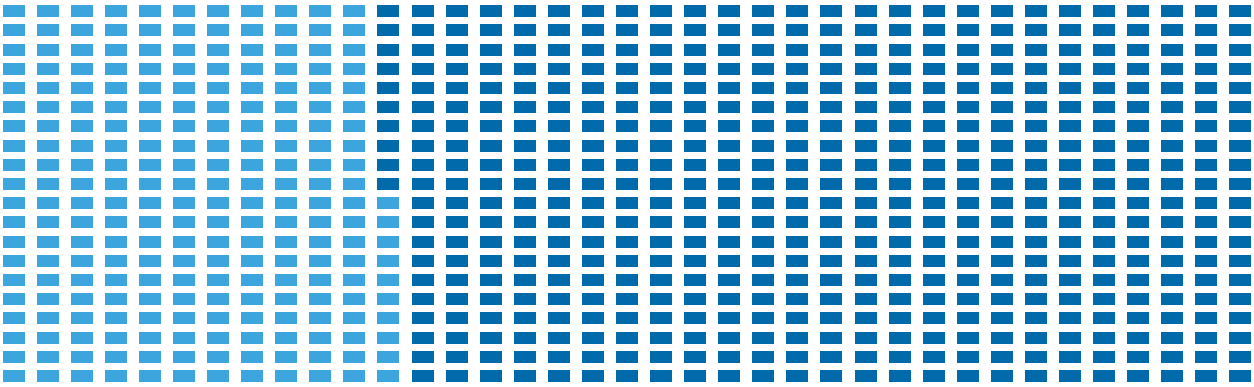
This Water Efficiency Plan is an update to Thornton's Water Conservation Plan adopted in 2018. The Colorado Water Conservation Board (CWCB) requires a water utility provider to develop or update its Plan every seven years following the latest guidelines. Thornton recognizes that water efficiency is an essential component to the city's long-term water supply planning strategy. Through water efficiency, Thornton can reduce the amount of water the city must acquire or develop to meet its build-out demand while maintaining quality-of-life standards. The current and proposed water efficiency programs in this Plan will be crucial in balancing water supply and demand during those years, creating a buffer for unknown factors that could affect water supply in the future. Water efficiency can also lead to significant cost savings and reduce overall resource use (e.g., energy, water). The water efficiency goals in this Plan were developed with this in mind and are intended to benefit both the city and its customers. Thornton's continued desire is to create a legacy of strong water efficiency and conservation ethics for the benefit of current and future generations.

Colorado's Water Plan

The State of Colorado updated the Colorado Water Plan in 2023, incorporating planning for the supply gaps from the 2019 Technical Update to the Colorado Water Plan. The technical update contains estimates of the gaps statewide and for each of the major Colorado watersheds through 2050. The analysis includes estimates of the supply gap under the six scenarios identified during the update process: Baseline, Business as Usual, Weak Economy, Cooperative Growth, Adaptive Innovation, and Hot Growth. The Technical Update estimates that 230,000 to 740,000 additional acre-feet of water could be needed to meet future municipal and industrial water demands alone. Statewide agricultural gaps are estimated to increase from 2.6 to 3.5 million acre-feet by 2050, while future potential reductions in streamflow may significantly increase risks to environmental and recreational attributes.

An additional 230,000 to 740,000 acre-feet of water could be needed to meet future water demands

▭ = 1,000 acre-feet of water



Thornton recognizes its role in responsibly managing its water supply and is invested in long-term water efficiency strategies that align with the State's goals. This Water Efficiency Plan illustrates Thornton's ongoing commitment to be a good community steward of a precious natural resource.

Integrated Planning and Water Efficiency

Image 5. New Commercial Development in Thornton

Land Use and Water Efficiency Nexus amidst limited water supplies, changing climatic conditions, and growing community support for more sustainable water management, the traditionally silo-ed land use and water planning approach is being re-evaluated. In many cases, in the past, the water sector has yet to be involved in land use planning or development processes, resulting in pressures on existing water resources. When water utilities are involved in land use planning and development decision-making, the best approach to water supply management can be implemented. Development and redevelopment allow the water sector, regulatory agencies, and the land use and development community to coordinate efforts better and achieve mutually beneficial goals. Thus, land use planning can encourage water-efficient land use patterns through urban growth boundaries, infill development parameters and densities, housing type requirements, open space preservation, and green infrastructure. These greater water efficiencies then translate to efficiency and diversification of supply. Thornton recognizes the importance of linking land use to water efficiency by aligning this Water Efficiency Plan with the objectives and goals outlined in the city's Comprehensive Plan. Since 2020, the Water Resources staff has been actively engaged in the land use planning process, assisting with providing estimated water demand impact analysis for new development and redevelopment projects.

Water and Energy Efficiency Nexus

The connections and interdependencies of water and energy systems are often called the "water energy nexus." Water is used in all phases of energy production and electricity generation. In Colorado, power plants consume approximately 64,000 acre-feet annually.[2] Most water is used to cool and condense steam in a thermoelectric power plant. Likewise, energy is used to pump, heat, and treat water for diverse uses. An estimated 13% of the United States' energy use is embedded in water use.[3] Therefore, a synergistic relationship exists between water and energy resources, particularly around efficiency. One approach already capitalizing on this relationship is energy policy. Colorado's new, clean energy policies reduce the energy generation sector's water needs. Another approach is the integration of water and energy into joint efficiency programs. As the need for more efficiency grows, utilities are implementing joint water and energy efficiency programs to curb demand at a reduced cost. For example, Xcel Energy offers an energy-efficient showerhead demand-side management program, reducing both water use and the amount of energy to heat the water, which translates to co-benefits for the consumer and Xcel Energy. As part of implementing this Plan, Thornton plans to develop a stronger relationship with Xcel Energy and identify opportunities for collaboration and alignment of program offerings.

Representatives from the City of Thornton, Adams 12 School District, United Power, and GRID Alternatives have worked together to create an Energy Action Plan with the help of Xcel Energy's Partners in Energy. Upon implementing this Energy Action Plan, Thornton is on track to reduce Greenhouse Gas (GHG) emissions from stationary building energy use by at least 56% by the year 2030, attributable to improvements in utility source fuel mixes, energy efficiency measures, and renewable energy supplies.

Review of Current Planning Initiatives

Thornton has undertaken several planning initiatives that influence water supply, demand, and efficiency efforts. The planning initiatives are described in more detail here, including any relevant connections to this Water Efficiency Plan.

Comprehensive Plan (2020)

In 2020, the city completed the 10-year rewrite of the Comprehensive Plan. City Council approved the Plan on July 15, 2020. Thornton's Comprehensive Plan provides a broad overview of how the city will grow and where future development and redevelopment will occur. The technical update of the Comprehensive Plan examines a wide range of themes, including Building a Safe and Healthy Community, Cultivating Identity and Image, Providing Great Services and Amenities, Fostering Economic Vitality, Providing Resources and Building Relationships, Creating Quality and Diverse Neighborhoods, Growing Smarter and Greener and Connecting Community, People and Places. The Comprehensive Plan provides strategic direction for the city's future and projections to the year 2040.

The Comprehensive Plan serves as the "umbrella" plan that provides guidance to all other functional master plans, including the Utility Water and Wastewater Master Plan. The most recent Comprehensive Plan can be obtained from the City Development Department.

[2] Nuding, A. 2013. "Conservation Synergy: The Case for Integrating Water and Energy Efficiency Programs." Western Resource Advocates. http://westernresourceadvocates.org/publications/conservation-synergy/
[3] Sanders, K. and M. Webber. 2012. "Evaluating the Energy Consumed for Water Use in the United States." Environmental Research Letters 7(3):1-11. https://iopscience.iop.org/article/10.1088/1748-9326/7/3/034034/pdf

Capital Improvement Program

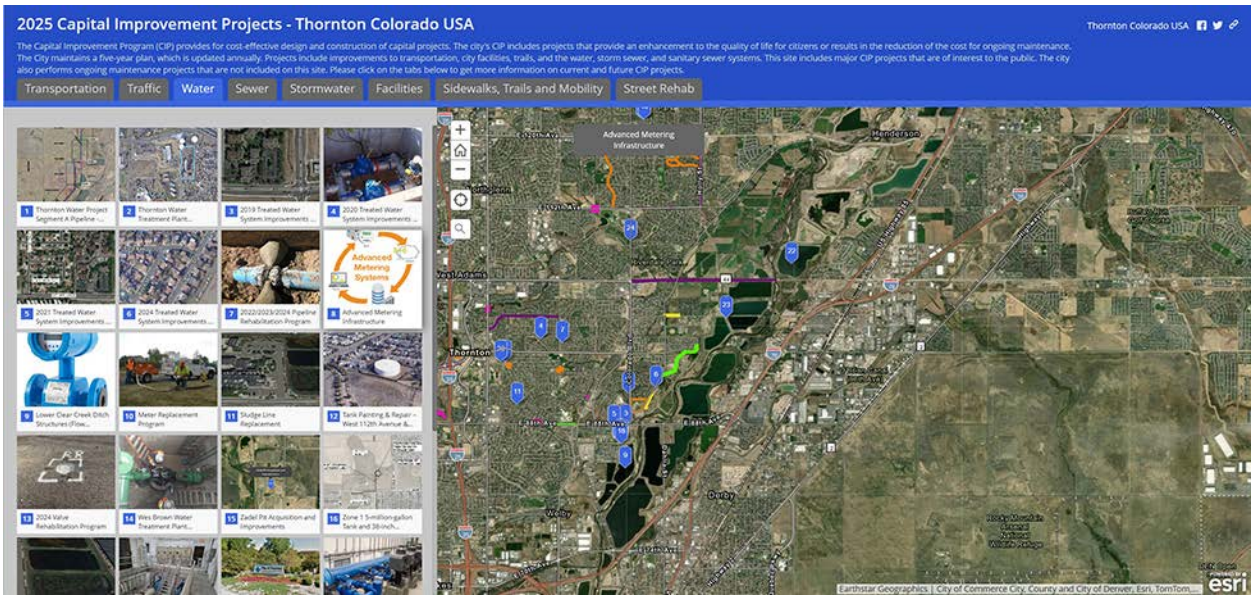


Image 6. Capital Improvement Program Map

The Capital Improvement Program provides cost-effective design and construction of capital improvement projects. The city maintains a five-year plan and budget, updated annually, which can be found in the annual Budget Book. Projects include improvements to transportation, traffic, streets, sidewalks, water, storm, and sanitary sewer systems. Details of the current capital improvement projects can be viewed on Thornton's website, ThorntonCO.gov.

Utility Water and Wastewater Master Plan

Updated in 2020, the Utility Water and Wastewater Master Plan for Thornton examines the city's existing water and wastewater utilities and projected water and wastewater flows. It proposes strategies to help the city meet future water and wastewater utility infrastructure demand. It also provides direction to achieve the goals and objectives outlined in the Comprehensive Plan for the city's water and wastewater utilities. For detailed project information, reference the city's Utility Water and Wastewater Master Plan.

Drought Management Plan

The Thornton Drought Management Plan, adopted and last amended in 2023, helps the city prepare for the onset and severity of drought and respond aptly to ensure that the basic health and safety needs of customers are met during a drought. The Drought Management Plan complements this Water Efficiency Plan, helping the city to achieve overall efficient and prudent use of the city's water resources over the short- and long-term. To achieve this goal, the Plan provides drought management actions, drought mitigation strategies, public information strategies, and relevant background information.

Parks and Open Space Master Plan

Thornton's Parks and Open Space Master Plan was updated in 2017. The Plan establishes goals, objectives, recommendations, and implementation strategies for citywide and regional parks, trails, and open space planning. It also serves as a supplemental document to the Thornton Comprehensive Plan. Water is integrated into many of the goals and policies to enhance Thornton's environmental and natural resources, recreation, and visual appeal.

Naturally Thornton Native Grass Conversion

Thornton manages over 140 miles of trails and 2500+ acres of parks and open space for residents to enjoy aesthetically and personally. Daily operations and maintenance are coupled with planning for the future of these spaces. In 2019, the city began developing a long-term plan for transitioning low-use spaces from traditional, water-intensive turf-grass into sustainable, Colorado-friendly water-wise landscapes and grass.

Development Applications

All work completed in the city must follow the most recent version of Thornton's Standards and Specifications for the design and construction of public and private improvements. Standards and Specifications provide a certain minimum of materials and methods that must be met for the design of a given project. Those relating to the many facets of water include Section 200: Water System Standards; Section 300: Sanitary Sewer System Standards; Section 400: Storm Drainage Design; Grading; and Water Quality Technical Criteria; and Section 800: Landscape Improvement. The city is currently undertaking a comprehensive code update. The kickoff to the project was in 2023 and is estimated to be completed in 2025/2026.

New Development Water Demand Forecasting and Non-residential Water Use Agreement

Thornton participated in a Sonoran Institute Growing WaterSmart workshop in 2021 that sparked improved coordination between City Development, Policy Planning, and Water Resources staff. The overall goal developed at the workshop is as follows:

"Reduce water demand significantly below initial projections through build-out to retain a buffer to provide for:

- Flexibility for future growth patterns
- Planning for uncertainties such as aridification
- And, remaining fiscally responsible and be stewards of the city's resources"

Defining that goal and an action plan led to a Water Resources review and an annual water demand estimating process for all new development applications at each stage of development. In 2023, an ordinance was adopted to establish a Water Use Agreement requirement for non-residential water customers using over ten acre-ft of water annually.

South Platte Basin Implementation Plan

Thornton is a part of the South Platte River Basin. The South Platte Basin Implementation Plan identifies the needs, challenges, and potential solutions for water issues facing the South Platte River Basin in Colorado. The Plan was developed to meet the projected water supply needs of all within the basin. It is also a contributing document of Colorado's Water Plan,[4] the State's first water plan.

Image 7. Standley Lake during the 2013 Drought

Thornton Water Climate Vulnerability Assessment

An update to the Climate Change in Colorado report was released in 2023. The report's conclusions were very much the same as the prior report; that is, temperature will increase yearly, and the effects on precipitation are not as well known. Some models show increased precipitation, while others show less. What can be concluded, however, is that with longer, warmer summers, soil moisture deficits will be more common, and that has the potential to affect runoff. These reports prompted Thornton to investigate further the vulnerability of its water supply to climate change and global warming. Many conclusions and recommendations came out of this 2015 investigation. They were outlined in the Thornton Water Climate Vulnerability Assessment 2015, the first document to account for climate change and Thornton's water system's potential vulnerabilities and resiliency. The vulnerability assessment was updated in 2020.

Environmental Sustainability Master Plan

Thornton is in the early stages of developing an Environmental Sustainability Master Plan (ESMP). The ESMP will be an actionable and prioritized plan that builds on current environmental sustainability efforts and identifies a future vision, goals, and actions to enhance environmental sustainability in Thornton. This effort will be completed in consultation with the Environmental Sustainability Task Force, which includes members of the community serving in an advisory role through development of the ESMP.

[4] For more information, visit: https://cwcb.colorado.gov/colorado-water-plan

Chapter 1: Profile of Thornton Water Supply System

This section summarizes the key characteristics of Thornton's water system as it existed in 2022. Included are descriptions of key facilities and water sources, water supply reliability and limitations, and water costs and pricing.

1.1 Overview of Existing Water Supply System

Raw Water Supplies – Surface Water

The city maintains a significant portfolio of water rights associated with its stock ownership in several ditch and reservoir companies. The city also owns several water rights it has developed since the 1970s. The priorities of the water rights that Thornton relies upon for its water supplies range from the early 1860s to 2000s. The water associated with these water rights is delivered into storage at several reservoirs owned by the city and into reservoirs where the city shares ownership with other entities. Thornton's raw water supply originates primarily from melting snow in the mountains of the South Platte River headwaters and Clear Creek basins.

Thornton has acquired and developed a substantial reservoir storage capacity to store water diverted from its water rights. As of December 2024, Thornton has 45,254 acre-feet of storage capacity on-line within its system. A summary of Thornton's reservoir storage capacity can be found in Table 3.

The Clear Creek basin is divided into upper and lower systems for Thornton's operational purposes. Water from the upper system is delivered into storage at Standley Lake from the Farmers' High Line Canal and the Croke Canal. The water stored in Standley Lake is conveyed to the Thornton Water Treatment Plant through an eleven-mile pipeline.

Table 3. Thornton Reservoir Storage Capacity

Reservoir	Storage Capacity (acre-feet)
Standley Lake	11,832
West Gravel Lake No. 1	503
West Gravel Lake No. 2	1,723
West Gravel Lake No. 3	614
Brannan West	168
Brannan East	340
South Tani	7,241
East Gravel Lake No. 4	2,807
South Dahlia	1,777
North Dahlia	2,568
East Sprat Platte	1,526
West Sprat Platte	983
Cooley West Complex	4,165
Cooley East Complex	2,568
Hammer	2,110
Rogers	2,212
Duck Lake	378
Wellington	1,739
Total	**45,254**

Water from the lower system is delivered into storage at Brannan Lakes, the Cooley West and East complexes, and the West Gravel Lakes from the Lower Clear Creek Canal and the Colorado Agricultural Canal. The water stored in Brannan Lakes can be pumped back into the Lower Clear Creek Canal and conveyed to the West Gravel Lakes for storage. The water stored in the West Gravel Lakes is pumped to the Wes Brown Water Treatment Plant.

Image 8. East Gravel Lakes

Thornton's South Platte River basin system consists of interconnected reservoirs along the South Platte River, which store water delivered primarily from the Burlington Canal. Thornton's reservoirs that take delivery of water conveyed through the Burlington Canal are South Tani Reservoir, East Gravel Lake No. 4, South Dahlia Reservoir, North Dahlia Reservoir, East Sprat Platte Reservoir, and the Cooley West and East complexes. These reservoirs are all connected through a series of pipes. The water stored in these reservoirs is pumped to the Wes Brown Water Treatment Plant and the Thornton Treatment Plant from East Gravel Lake No. 4. The Cooley West reservoir complex can also be filled with water delivered from the Lower Clear Creek Canal. A Cooley West reservoir complex pump station can return water to the South Platte River to operate exchanges. Water stored in the Cooley West reservoir complex can also be pumped back up to East Gravel Lake No. 4, which can be pumped to the Wes Brown Water Treatment Plant and the Thornton Treatment Plant.

Additional components of the South Platte River basin system are Duck Lake and Wellington Reservoir, which are located high in the mountains. Duck Lake is on Geneva Creek, and Wellington Reservoir is on Buffalo Creek. Water stored in these reservoirs is then released and conveyed down the South Platte River, where Thornton recaptures it at the Burlington Canal. A map of Thornton's raw water system can be found in Appendix A.

Water stored in Standley Lake can be delivered to East Gravel Lake No. 4 through a Thornton Water Treatment Plant pipeline. Water stored in East Gravel Lake No. 4 can be pumped through the same pipeline to the Thornton Water Treatment Plant. Thornton also delivers the city-owned Thorncreek Golf Course with raw water from Big Dry Creek.

Raw Water Supplies – Groundwater

Thornton has developed a series of alluvial wells adjacent to the South Platte River. There are fifteen wells that pump groundwater into the city's reservoirs: six wells at North Dahlia Reservoir, one well at South Tani Reservoir, and four each at East Sprat Platte Reservoir and the Cooley West Complex.

Thornton has constructed six non-tributary groundwater wells that supply water for park irrigation at Community Park, Grange Creek Park, and the city's sports fields at the Margaret W. Carpenter Recreation Center.

Treated Water Facilities

Image 9. Operating Thornton's Water Treatment Plant

Image 10. Pipe Gallery at Thornton Treatment Plant

Thornton operates two water treatment plants with a combined capacity of 75 million gallons per day (MGD). The Wes Brown Water Treatment Plant, located at 3651 East 86th Avenue, has a capacity of 50 MGD. The Thornton Water Treatment Plant, located at 920 Thornton Parkway, has a capacity of 25 MGD. The service area contains approximately 646 miles of water lines distributing treated water to customers. Thornton shares interconnections with the treated water systems of Denver Water, the City of Northglenn, and the City of Westminster. The interconnections with Denver Water and the City of Northglenn are for emergency situations. The City of Westminster is a wholesale treated water customer for Thornton, and the interconnection serves as the single delivery point to Westminster.

Wes Brown Water Treatment Plant
50 Million Gallons Per Day

Thornton Water Treatment Plant
25 Million Gallons Per Day

75 Million Gallons Per Day

1.2 Water Supply Reliability, System Limitations, and Future Needs

Risks to the city's water supply reliability lie more in infrastructure and water quality than in securing adequate water sources. Thornton owns an adequate supply to meet projected demands while reliably meeting present needs and potential vulnerabilities. Water rights have been acquired to meet projected demands through the estimated build-out of the city in 2065. However, the infrastructure to deliver this water supply still needs to be built and remains a risk. The city has extensively planned for short- and long-term strategies to deal with adverse conditions caused by droughts. Climate change implications are beginning to be incorporated into planning efforts. The water quality of the supply is also a concern. The following sections describe each of these three risks, as well as steps being taken by the city to address them, in more detail. Table 4 below summarizes Thornton's water supply system reliability, limitations, and future needs.

Table 4. Summary Table of System Reliability, Limitations, and Future Needs

Water Supply Focus Area	Description	Means of Addressing Limitation or Need
Designated Critical Water Supply Shortage	The city's water supplies come from the South Platte Basin, which has been identified as a gap area in the Statewide Water Supply Initiative.	The city has acquired sufficient reliable water rights to meet anticipated demands at full build-out.
Aging Infrastructure	Leaks in an aging distribution system contribute to non-account water leaks.	The city has a leak detection and pipeline replacement program that systematically replaces distribution pipes.
Drought Planning and Response	Thornton is in a geographic area that experiences periods of drought that must be planned for and mitigated when they occur.	Long-term planning, including climate change vulnerability assessments, allows Thornton to ensure enough reliable water supplies are available to meet demands even in stress years. The city's Drought Management Plan mitigates the impacts drought has on its water supplies.
System Infrastructure Improvements & Additions	New infrastructure will be needed to connect existing parts of the Thornton Water Project supply to the city's system. Infrastructure was damaged in the 2013 and 2015 floods.	The Thornton Water Project delivery infrastructure additions will meet this need. Flood damage repairs from the 2013 flooding have been completed.
Water Quality	Water quality in the South Platte Basin fluctuates, causing water treatment challenges.	Thornton has invested in state-of-the-art water treatment technologies. Meeting water quality requirements is an ongoing task that requires constantly adapting to changing inputs from source water bodies.

Water Supplies

Through long-term planning, drought planning, and proactive acquisition of adequate water rights, Thornton anticipates minimal risks associated with available water supplies.

Designated Critical Water Supply Area

The South Platte basin, where Thornton's water supplies originate, has been identified as a "gap" area by the 2019 Technical Update to the Colorado Water Plan, meaning that even with all the water supply projects identified, there will still be a significant shortage of regional water supplies by the year 2030. However, Thornton has acquired sufficient and reliable water rights to supply anticipated demand through build-out. The city still needs to construct the infrastructure to deliver the water from the Cache la Poudre River to treatment facilities. Until the projects are completed; this continues to be a risk for the city's water supply. Thornton will continue developing to meet future demands by 2030 and beyond.

Image 11. Cache La Poudre River

Long-Term Planning

The city planning process uses a record drought from the 1950s that is assumed to last three years to estimate the firm yield needed from the city's water supply to meet demand during extreme droughts. Thornton has developed a computer model to estimate the minimum firm yield required from its raw water system over time. As Thornton's infrastructure expands, the firm yield of the system will continue to increase.

Drought Restrictions

During supply shortages brought on by drought, Thornton's Drought Management Plan provides guidance to achieve short-term water savings. It complements this Plan, which promotes long-term water use efficiency. The goals of the Drought Management Plan are to aid the city in:

1. determining the onset and severity of drought,
2. reducing water demands, and
3. increasing water supplies to sufficiently ensure that all customers' basic health and safety needs are met.

Drought response is divided into three levels (Stages 1, 2, and 3) according to drought severity, which is assessed based on factors including projected demand, reservoir storage levels, projected stream flows and water rights yields, availability of alternative supplies, water quality, and drought indices. Depending on the severity, the Plan outlines demand-side management and supply-side management strategies, and public information strategies to mitigate drought effects. Demand-side management strategies aim to reduce customer water use. In contrast, supply-side management strategies aim to maximize opportunities to obtain water supplies for the city. Public information strategies raise awareness and foster willingness to comply with water restrictions.

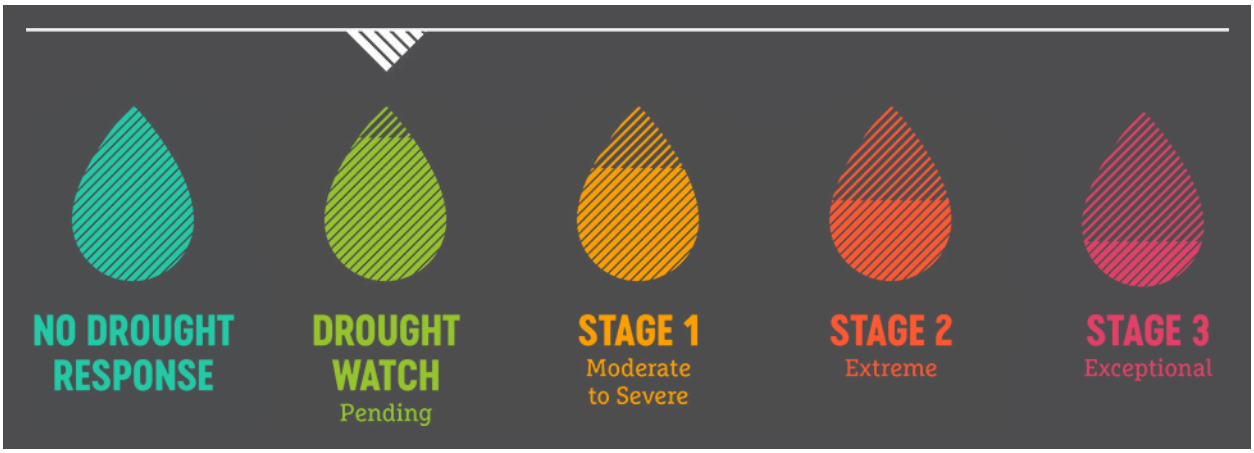


Image 12. Example of Drought Status Outreach on ThorntonWater.com

The city's Drought Management Plan was adopted in 2003 due to a severe drought throughout the State. Thornton followed the steps and options outlined in its Drought Management Plan to efficiently and wisely manage its water supplies. A mix of voluntary and mandatory water restrictions was enacted between 2003 and 2006 to ensure an adequate amount of water remained in storage to meet the city's critical needs in subsequent years.

Similar restrictions were put in place from May 2012 through June 2013. During the periods when water restrictions were in effect, Thornton water customers responded well and reduced their water usage, thereby avoiding the need to enact a stricter program. From 2012 to 2013, the city saw a 17% reduction in total water use when 2-day per week watering mandatory restrictions were enacted. In September 2018 voluntary watering restrictions were enacted. Voluntary restrictions yield approximately 10-15% savings.

In 2021 permanent watering rules were enacted, that include no more than 3 days of watering per week for turfgrass and no watering between the hours of 10AM and 6 PM. The city's Drought Management Plan was updated in 2023 to reflect the new watering rules.

Drought Emergencies

In emergency conditions, the Drought Management Plan includes two recommendations for augmenting supplies. The first recommendation is to lease water in the short term from farmers. This approach requires negotiating agreements with farmers ahead of an actual drought emergency. The second recommendation is temporarily terminating the water lease with the city of Westminster. This approach would save Thornton about 2,240 acre-feet of water per year; However, it would have a negative financial impact on the city.

Climate Change Impacts

Thornton recently completed a climate vulnerability assessment in support of a more comprehensive approach to water resources management and adaptation. Climate change experts project that heat waves, drought, and wildfires will increase in frequency and severity in Colorado by the mid-21st century.[5] Flood events could become more frequent and precipitation more variable with temperature. The city is looking at these long-term effects along the Front Range and on its water system and how they will impact future demand. The safety factor used in demand projections provides ample reserves for climate variability in the near term.

System Infrastructure

Thornton continues to plan and invest in infrastructure repairs and expansions. These efforts must continue for the city to deliver adequate water supplies to its customers.

Improvement Projects

Thornton has identified several major infrastructure projects that are required to adequately deliver and treat water supplies to the city's customers:

- The city intends to construct the Thornton Water Project, including a pipeline and associated infrastructure to utilize its water rights from the Cache la Poudre watershed. The timeline for this project is 2027 at the earliest.
- There are plans to add another 5MG storage tank in 2025 and a 3MG tank in or around 2027.
- The city also has ongoing improvement projects for storage reservoirs and the distribution system.

Flood Mitigation

After flooding damage in 2013 and 2015, the city has completed extensive flood mitigation projects in and around our supply reservoirs. Flood protection will continue to be an important consideration when assessing the resilience of Thornton's water system. Repairs to streets, parks, trails, drainages, water resources facilities, power lines, and public buildings can strain existing resources and present future vulnerabilities. Thornton has critical water supply reservoirs that are adjacent to the South Platte River; adequately protecting these facilities is a priority for the city.

[5] "Climate Change in Colorado: A Synthesis to Support Water Resources Management and Adaptation," Colorado Climate Center. https://climatechange.colostate.edu

Water Quality

Image 13. Testing the Source Water Quality

Image 14. Microbiology Analysis for Coliform

Source water quality plays an integral role in water treatment costs and strategies. These costs are reflected in the rates that customers pay for the drinking water service they receive. Better source water quality can lower treatment costs as fewer chemicals are needed. Some challenges that may increase costs include lake treatment for algae, removal of metals, and pH control. Thornton has a diverse water portfolio with varying water quality amongst its South Platte River, Clear Creek, and the Cache la Poudre River sources. Water quality is an ever-present concern, and the city is committed to providing high-quality drinking water to residents and businesses. A Water Quality Consumer Confidence report is distributed to water customers annually.[6]

[6] More information about city of Thornton water quality can be found here: www.cityofthornton.net/government/infrastructure/water/Pages/water-quality.aspx

Capital Projects and Facility Improvements

To plan future costs associated with developing the city's raw water, treated water, and wastewater systems, city staff developed an itemized list of capital projects, and operations and maintenance items necessary to accommodate Thornton's projected growth over the next 20 years. These projects include new raw water storage facilities, upgrades to existing water treatment plants, installation of new pipelines, replacement of existing pipelines, non-potable irrigation projects, new facilities, staffing requirements, fuel costs, and vehicle needs. A general summary of the projected costs through 2028 associated with these potential facilities is shown in Table 5.

Table 5. City of Thornton Summary of Planned System Improvements Through 2028

Category	2024-2028
Water Supply Projects	$6,310,000
Water Treatment Projects	$78,707,867
Water Distribution Projects	$45,485,000
Thornton Water Project	$152,595,880
Water System Operations & Maintenance	$13,304,190
Wastewater System Operations & Maintenance	$7,277,408
Sewer Projects	$14,450,001
Grand Total	**$318,130,346**

The Thornton Water Project

The Thornton Water Project is the primary source of water supply for the city's future needs. After investigating numerous possible future water supply systems along the Front Range from Pueblo to Fort Collins, Thornton decided that the best option was to acquire shares in the Water Supply and Storage Company (WSSC). This ditch company diverts its water rights from the Poudre River north of Fort Collins. Enough WSSC water, including significant amounts of storage, was very high quality and was relatively inexpensive compared to sources such as the Upper Clear Creek. Acquiring farms irrigated by WSSC water was necessary to gain access to the WSSC water. The city allocated over $51 million ($146 million in 2024 dollars) to purchase the water rights and farms in 1985 and 1986.

The Thornton Water Project (TWP) is needed for two reasons: to bring high-quality water to the city and to provide additional water to enhance the reliability of supplies to meet the demands of existing and future water customers.

Image 15. Construction of Thornton Water Pipeline

On May 8, 2024, after many years of effort, working through the land use and permitting process, engaging the Larimer County community, staff, Planning Commission and County Commissioners, and a Colorado Supreme Court Case, the Thornton Water Project received approval to move forward in Larimer County. Thornton's water future comes from reservoirs north of Fort Collins. It will travel 70 miles via pipeline to bring Thornton Water customers a much-needed, high-quality water source. This approval brings a long-planned-for project closer to completion. Our community will see tremendous benefits in the quality of the water and the drought resiliency this water source provides. For up-to-date information on this project, visit ThorntonWaterProject.com.

Thornton's combination of senior and junior water rights and storage creates a robust water system that can meet the city's current needs, even during drought. Furthermore, while drought conditions and below-average snowpack can affect the entire State, it is much more common for shortages to be localized. For example, the South Platte River basin may experience below-average snowpack in one season, resulting in below-average river flows. In contrast, the Poudre River basin collects above-average snowpack in the same season, resulting in higher-than-normal river flows for most of the diversion season. Extending Thornton's water system to include water rights from the Poudre River provides much-needed protection from localized droughts.

Water Supply Projects

In 2008, the city purchased the Zadel property and its water rights. The city worked with a geotechnical engineer to assist with final negotiations, evaluation, and inspection of the reservoir clay liner. As of 2024, the Zadel reservoir construction is complete. The surrounding area has been fenced, and dryland seeded.

The Cooley East Reservoir pump station was completed and filled in 2023. In 2024, work was done to study flooding impacts in this area and add a sump pump system to the pump station vault. At Cooley South Reservoir, improvements to the riprap along the shore and sediment removal will continue.

In addition to reservoir projects, each supply facility requires regular maintenance and equipment updates. Facility enhancement projects focus on improving the safety and reliability of the water system.

Three non-potable well pumps were replaced in 2024 to ensure the ability to water parks with non-potable water now and in the future.

Water Treatment Projects

Treatment plant operations and maintenance (O&M) costs include chemicals and power required to deliver the treated water from the plant and throughout the distribution system. Thornton's source water quality challenges require investment in advanced water treatment technologies.

The Thornton Water Treatment Plant (TWTP) was replaced by a new plant that came online in 2022. The new plant is a 25 million gallon per day (MGD) plant is an advanced conventional treatment plant with flocculation/sedimentation basins, ozone, and deep bed biofilters. It treats water from Standley Lake and East Gravel Lakes. The Wes Brown Water Treatment Plant (WBWTP) was expanded in 2005 and converted to a 50 MGD ultra-filtration treatment technology.

A major source of Thornton's water supply is the South Platte River, which is more challenging to treat than the city's water sources in the Clear Creek River basin. The nutrient levels in the South Platte River are typically two to three times higher than in the Lower Clear Creek River. Phosphorus levels are of particular concern as they can support the rapid growth of algae in water storage reservoirs during summer months, resulting in taste and odor issues in the drinking water. While taste and odor from algae are not health concerns, the problem is a priority to mitigate for improved customer satisfaction.

Regulation 85

CDPHE promulgates Regulation 85 (Nutrients Management Control Regulation), which addresses nutrient loading to watersheds from point (wastewater treatment plants/ WWTPs) and non-point sources (stormwater/MS4). As part of this rule, existing WWTPs with discharges greater than 1 MGD must meet standards for nitrogen and phosphorus in their effluent by 2027; new WWTPs must immediately comply. Reg 85 also established Policy 17-1 (Voluntary Incentive Program for Early Nutrient Reductions). WWTPs may earn credits for reducing effluent nutrient concentrations before the 2027 compliance deadline. A separate rule, Regulation 31 (Basic Standards and Methodologies for Surface Water), sets standards for nutrients in Colorado rivers and lakes. This regulation can also drive stricter point source discharge limits through Total Maximum Daily Loads (TMDLs). Reductions in nutrient levels in the South Platte River are already being observed from Reg. 31, Reg. 85, and Policy 17-1, but won't be fully realized for up to a decade due to delayed rule implementation, permitting backlogs, and extended watershed assessment timelines.

PFAS

Per- and poly-fluoroalkyl substances (PFAS) are a group of manufactured chemicals that have been used in industry and consumer products since the 1940s. PFAS have characteristics that make them useful in various products, including nonstick cookware, waterproof clothing, stain-resistant carpets and fabrics, firefighting foam, and certain manufacturing processes. There are thousands of different PFAS. The domestic production or use of some PFAS (like PFOA and PFOS) has been largely phased out, but others continue to be used.

PFAS tends to break down extremely slowly in the environment and can build up in people, animals, and the environment over time. PFAS have been found in water, air, and soil across the nation and around the globe. Because of this, PFAS can end up in the water sources communities rely on for drinking water. Scientific studies show links between certain levels of PFAS exposure and harmful health effects in humans and animals.

Image 16. Thornton Water Quality Analysts setting up a new LC/MS instrument for measuring PFAS.

In 2022, the EPA, to regulate PFAS, announced that the safe drinking water standards for PFAS will be lowered. As a result of lowering the limits, Thornton's test results exceeded the new proposed limits. Thornton is a plaintiff in a lawsuit against chemical manufacturers over the contamination of drinking water. Settlement funds will be used to remove PFAS. A recent USGS study indicates that PFAS could be detected in about 45% of U.S. drinking water. Since the release of the updated Health Advisory Levels in June 2022, Thornton has been a leader in the State in addressing the risks of PFAS.

- Transparently inform the public on PFAS levels in the drinking water and our strategy to address the new regulations.
- Procuring laboratory instrumentation (LC/MS liquid chromatography-mass spectrometry) to conduct further monitoring of PFAS in our system
- Improving current treatment processes and source water blending strategies to reduce PFAS in drinking water
- Procuring engineering and construction consultants to evaluate the effectiveness of preliminary PFAS treatment designs
- Entered a multijurisdictional lawsuit against the manufacturers of PFAS for costs related to PFAS treatment
- Pursuing grant funding through CDPHE's State Revolving Fund for PFAS monitoring and treatment
- Supporting legislation that removes PFAS from entering the water source and holding polluters accountable

Distribution System Projects

The following new treated water storage tanks will be required due to increased demand and emergency and fire flow needs:

1. Zone 1, 5-million-gallon storage tank, estimated construction date of late 2024 or early 2025.
2. Zone 1, 5-million-gallon storage tank, estimated construction date of 2040.

Thornton replaces roughly 5,000 linear feet of pipeline each year. Nine different pipeline replacements are anticipated to occur in 2024. The city identifies these pipeline replacement areas based on an annual review of pipe breaks and pipe age data assessments computed into master plan software. Some projects use pipelining technology to rehabilitate deteriorated pipelines throughout Thornton's water distribution system instead of replacing them when possible. The pipeline rehabilitation and replacement program continues to invest in and protect the underground water pipeline that delivers water to our customers.

Standley Lake Pipeline

Thornton and the city of Northglenn share approximately 36,960 lineal feet of a 48-inch diameter pipeline that conveys water from Standley Lake to each city. Thornton is the sole owner of the 36-inch diameter pipeline, which extends approximately 21,176 lineal feet from the bifurcation at the 48-inch pipeline to the Thornton Water Treatment Plant.

Image 17. Utility Operations Water Lines Crew

Non-potable Irrigation Analysis for Future Parks

The city's Parks Department identified planned park sites planned over the next 20 years. Implementing additional non-potable irrigation systems might be feasible by utilizing existing raw water conveyance facilities already in place throughout the city. The parks identified include the following:

1. Phase II - 136th Avenue and Holly Street Sports Complex - multi-purpose fields at the southwest corner
2. Community Level Park with multi-purpose fields

Sewer Projects

The capital projects identified in the sewer fund portion include all facilities and upgrades required to support a build-out extended service area. The current major facility includes Phase 2 of the Big Dry Creek Parallel Interceptor.

Yearly capital improvement projects include the Wastewater O&M projects, which consist of the rehabilitating and/or replacing deteriorating 50-year-old sanitary sewer lines on a priority basis. This maintenance project rehabilitates concrete sewer mains throughout the system. The Wastewater O&M project also consists of rehabilitating deteriorated concrete manholes with a spray-on concrete lining application and then finishing each manhole with a waterproofing epoxy coating.

Water and Wastewater Operations and Maintenance

Operations and maintenance costs are determined and itemized by year based on equipment and staffing needs, fuel costs, and vehicles.

Incremental Cost Analysis

An incremental cost analysis was performed to estimate the cost of each additional gallon of new capacity associated with the anticipated water supply facilities and wastewater facilities necessary through 2030 to accommodate the city's projected demands. Incremental costs were separated into five categories: water supply projects, water treatment projects, water distribution projects, Thornton water projects, and sewer projects. These five categories include anticipated projects such as:

- **Water supply projects:** costs for raw water operational facilities such as pipelines and pump stations, reservoirs, and canal conveyance improvements, costs for water rights acquisitions, water rights transfers, and water rights protection
- **Water treatment projects:** chemical storage tanks, biological pre-treatment processes, and ultra-violet treatment equipment
- **Water distribution projects:** treated water storage tanks throughout the service area, waterlines for the treated water system, booster pump stations, and non-potable systems
- **Thornton water project:** pipeline construction, new facilities, ditch structures, farm revegetation, water right protection
- **Sewer projects:** lift station improvements and sanitary sewer lines

The estimated incremental costs are in 2024 dollars and annualized over the useful life of the anticipated projects. Table 6 summarizes the incremental cost per gallon for these five categories through 2028.

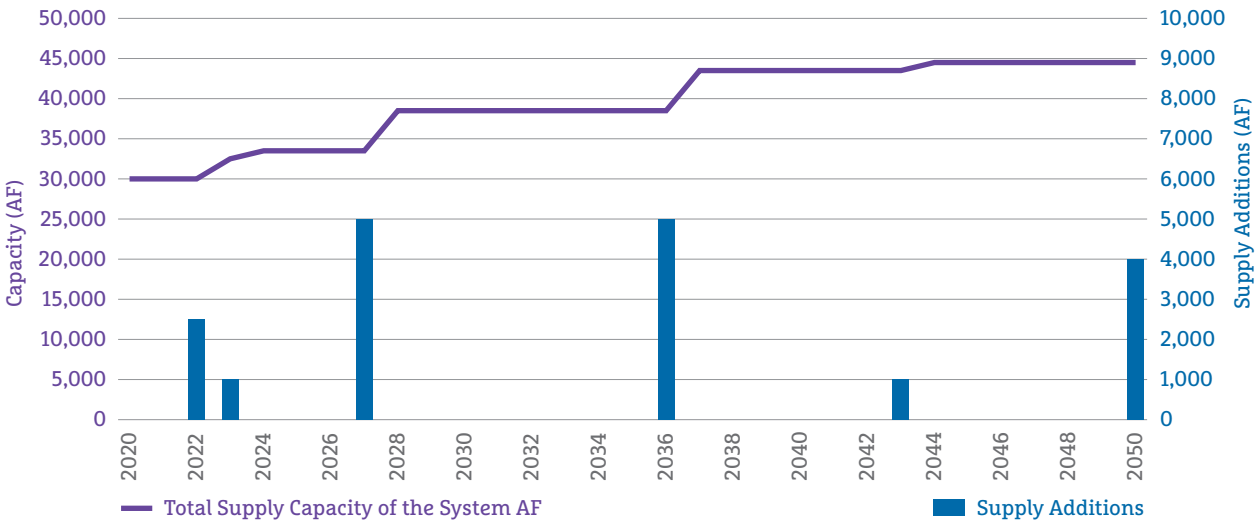
Table 6. Incremental Supply Costs

Category	Incremental Costs (per gallon)
Water Supply Projects	$0.000387
Water Treatment Projects	$0.04831
Water Distribution Projects	$0.02792
Thornton Water Projects	$0.09366
Sewer Projects	$0.00887
Total Simple Incremental Supply Cost	**$0.18263**

Preliminary Capacity Forecasts

Thornton has acquired sufficient water supplies to serve anticipated service area demands beyond 2035. However, substantial infrastructure requirements are necessary to deliver this water to Thornton. Figure 5 illustrates the anticipated volumes of water supply additions and the associated timing of these additions.

Figure 5. Preliminary Annual Supply-Capacity Forecast through 2050



1.3 Water Costs and Pricing

The city uses an increasing block rate structure and an estimated indoor water budget. The first block is tied to indoor water consumption, approximated with the Average Winter Consumption (AWC). The remaining tiers are based on the customer's Monthly Outdoor Allowance (MOA), determined by customer class and meter size. The allowance size may be adjusted administratively, when necessary, based on water supply projections and to support the water efficiency goals of the city. Customers who stay within their water budget, represented by the AWC plus the MOA, pay significantly lower prices than those in tiers three and four. MOA increases based on lot size, starting at 16,000 gallons per month for smaller lot sizes and increasing incrementally. A full description of the domestic rate structure can be found in Table 7.

Image 18. AMI Water Meter

Table 7. Inside and Outside City Domestic Water Rates, 2025

Rate	Inside City Effective January 1, 2025	Outside City Effective January 1, 2025
Tier 1 – Price per 1,000 gallons up to AWC	$6.99	$10.49
Tier 2 – Price per 1,000 gallons up to AWC + MOA	$6.99	$10.49
Tier 3 – Price per 1,000 gallons up to AWC + 20,000	$10.49	$15.74
Tier 4 – Price per 1,000 gallons over AWC + 2x MOA	$20.98	$31.47

Image 19. Thornton Water employee installing a new water meter

Chapter 2: Profile of Water Demands and Historical Demand Management

This section summarizes historical water demand trends, demand management activities, and future demand forecasts within Thornton's service area.

2.1 Historical Water Demands

Potable Demands

Potable water demand in Thornton is driven primarily by residential consumption, making up 56% of the 25,175 acre-feet of total demand in 2022 (Figure 6). This amount was significantly lower than the 30,944 acre-feet projection for 2022. Over 90% of that demand occurs within the city's boundary (Figure 7). 2022 was chosen as a baseline water demand year in this plan due to average weather conditions.

Figure 6. Treated Water Demand by Service Type, 2022

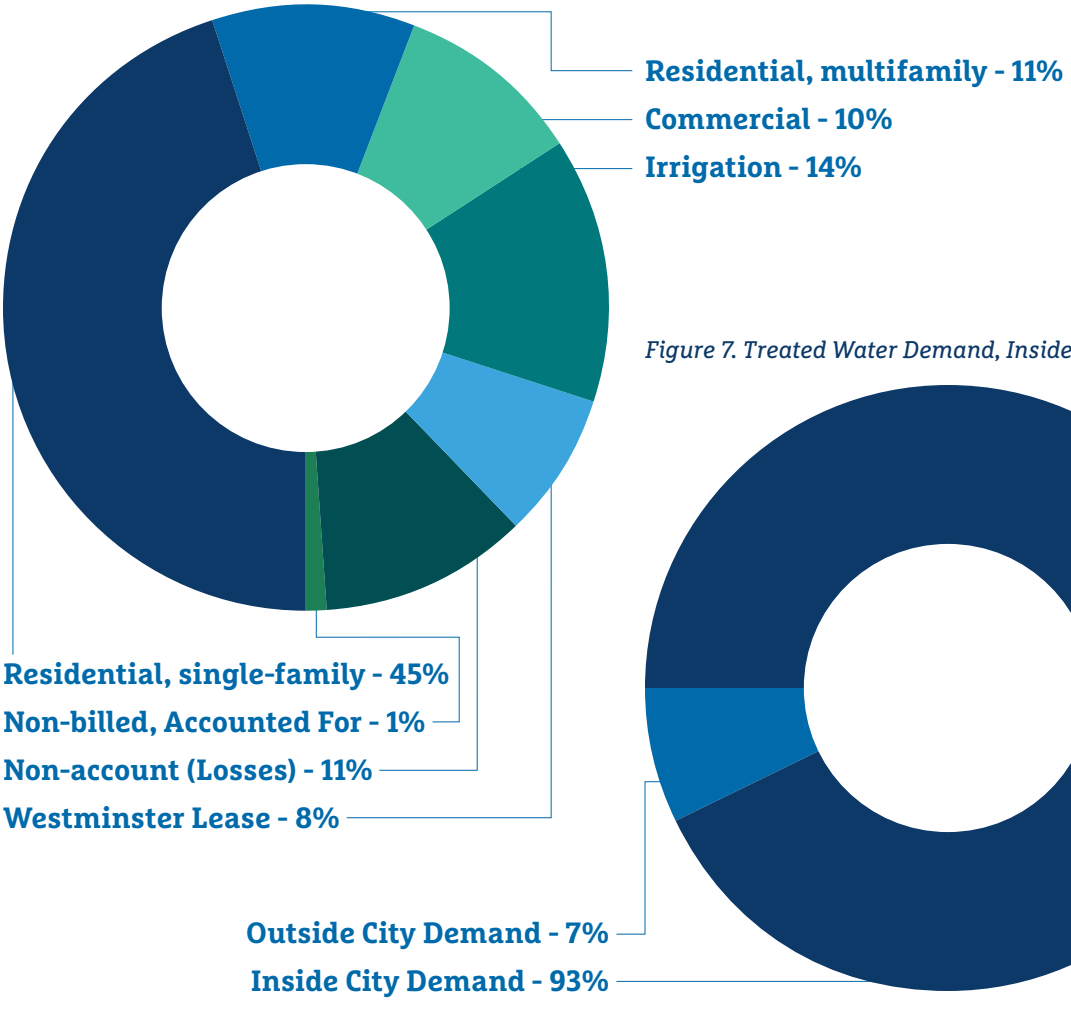
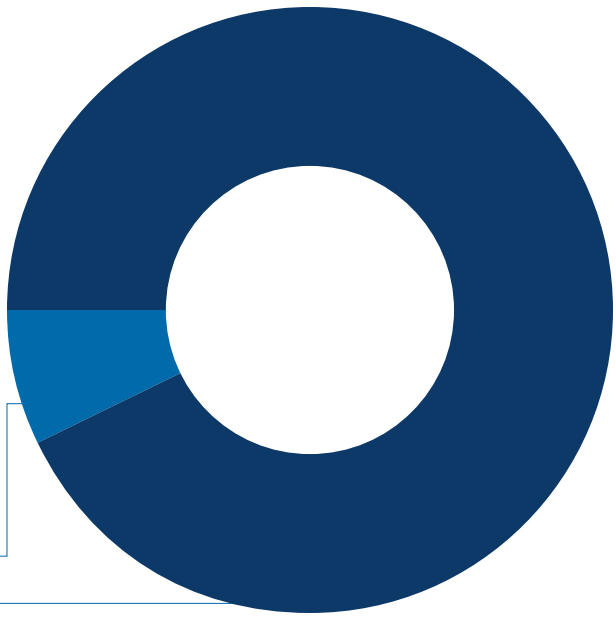


Figure 7. Treated Water Demand, Inside vs. Outside City, 2022



The city's 2022 billed potable water demand is 6% higher than its 2016 billed potable water demand. However, there have been fluctuations in that period, with 2020 seeing the highest use (Figure 8). These fluctuations have generally followed weather patterns, with drier years seeing increased water demand due to increased irrigation. In 2023, May and June had increased precipitation and water users responded by turning off sprinkler systems and saving water. Over this same timeframe, residential per capita consumption decreased by 6%, as shown (Figure 9).

Figure 8. Potable Water Demands, 2016-2024

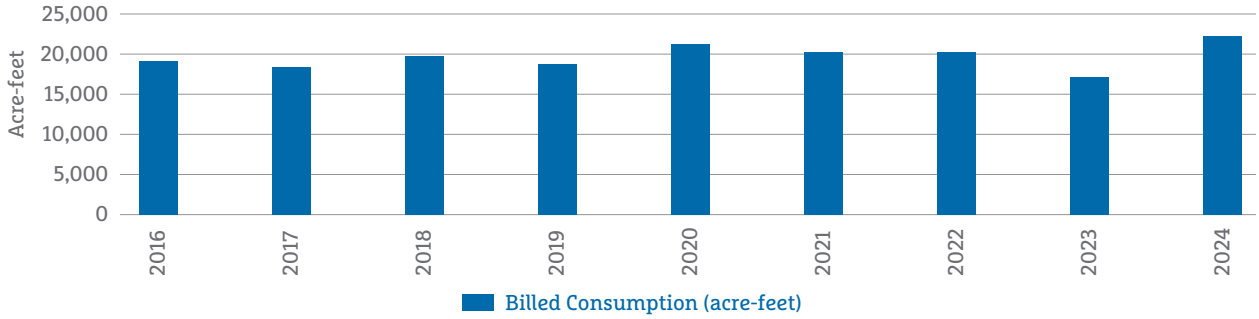


Figure 9. Residential Annual per Capita Demand, 2008-2024

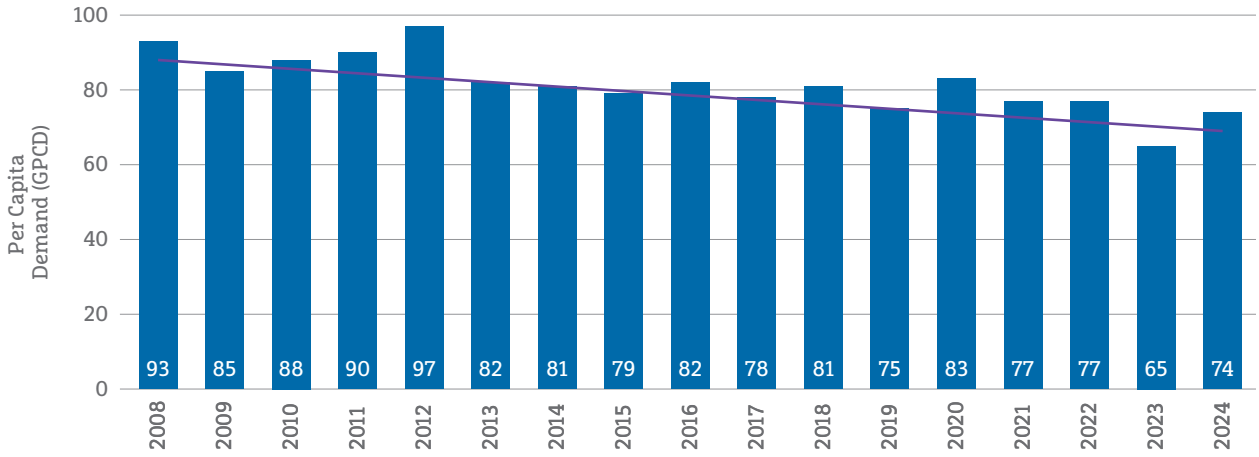
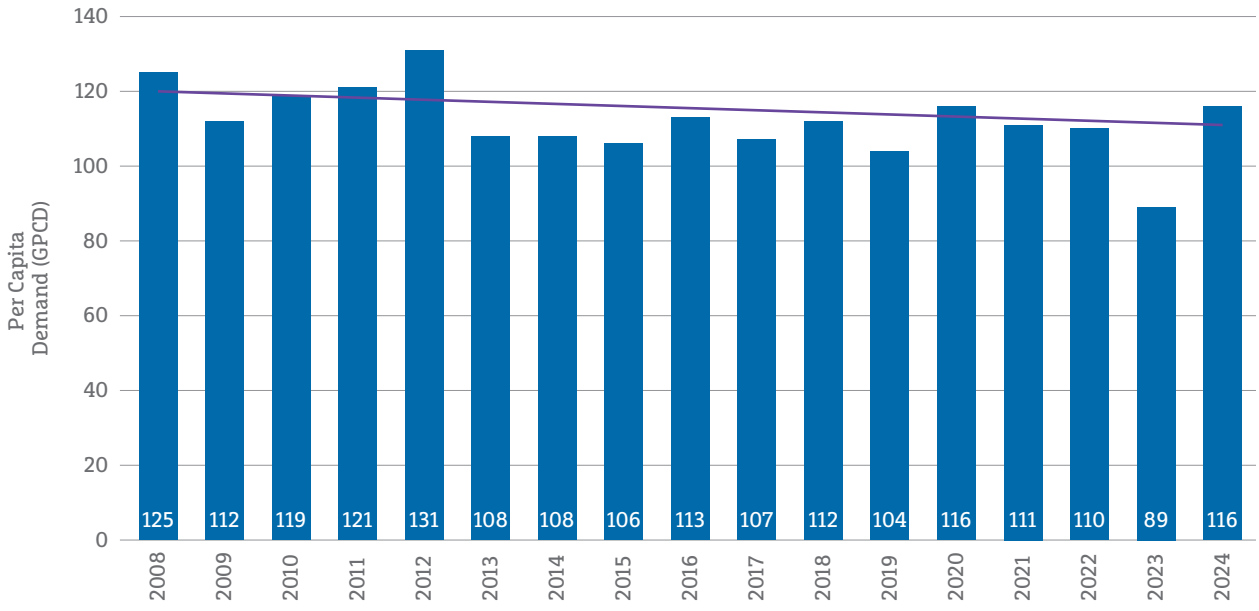


Figure 10. Annual per Capita Demand – Residential, Commercial, and Irrigation, 2008-2024



For almost two decades, Thornton has provided non-potable water for the city's Thorncreek Golf Course, select parks and one commercial customer. In recent years, the amount of irrigation done with non-potable water has increased, but it is also dependent on the weather. The non-potable water is drawn from several different sources. Thorncreek Golf Course is provided with non-potable water diverted from Big Dry Creek. In 2006, the city started using non-potable surface water to irrigate Civic Center Park. This lake is filled with water diverted from Clear Creek. Also in 2006, the city started using non-tributary groundwater to irrigate Community Park and Grange Creek Park. In 2007 and 2008, the city began irrigating Cherry Park and Woodglenn/Brookshire Park, respectively, with non-potable surface water. Also in 2008, the city started irrigating the multi-purpose fields at the Margaret W. Carpenter Recreation Center with a combination of non-potable surface water and non-tributary groundwater. McKay Sports Complex began using non-potable irrigation in 2013. In recent years, non-potable consumption was 494 acre-feet in 2020, in 2021, it was 487 acre-feet, and in 2022, it rose to 525 acre-feet.

System Water Losses

The city follows procedures outlined by the American Water Works Association M36 Water Audits and Loss Control Program to monitor distribution system water loss. Distribution system loss is a measure of the percentage of produced water that fails to reach customers and cannot otherwise be accounted for through authorized usage, so it does not fully equate to non-account water as it doesn't include water used for fire hydrant flushing or new line disinfection.

In 2024, water utilities received direction from the State that changes to House Bill 10-1051 require covered entities to submit an M36 Water Loss Audit. Water Resources staff worked with Utility Billing, Utilities Operations, and Water Treatment staff to gather the data needed for the water loss audit reporting. CWCB will provide training opportunities through the Colorado Water Loss Initiative (CWLI) to learn more about this reporting.

System loss under 10% is generally acceptable, although Thornton continues looking for opportunities to reduce losses. Due to the increasing trend in water line breaks, primarily in the older sections of Thornton's distribution system, the city developed and implemented a pipeline rehabilitation and replacement program to replace aging pipelines. Under the program, the city has replaced approximately 5,000 linear feet of old pipe each year. Table 8 to the right shows annual percentages of distributed water loss.

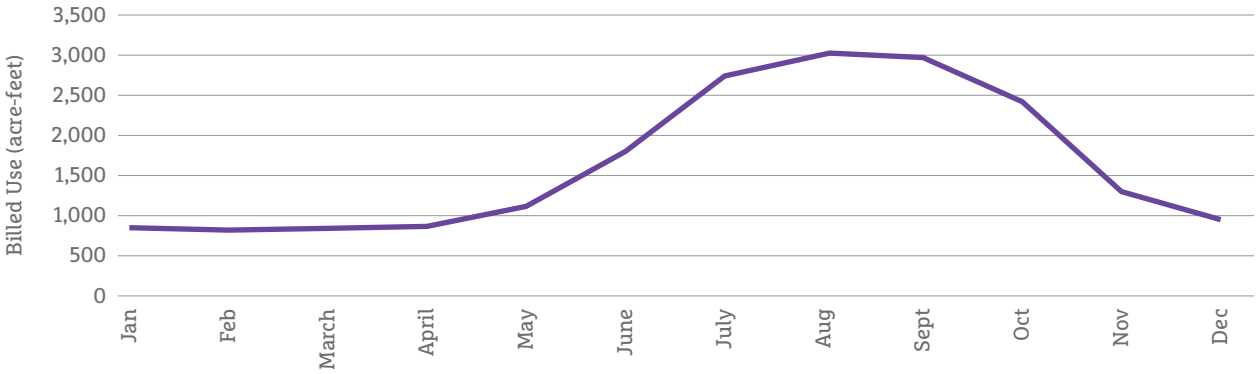
Table 8. Non-Revenue Water, 2016-2023

Year	Water Loss as a Percent of Total Distributed Water
2016	9%
2017	10%
2018	9%
2019	12%
2020	10%
2021	11%
2022	9%
2023	10%

Annual and Peak Day Demands

Seasonal demand leads to variation between average daily demand and peak daily demand. Peak days are during irrigation season, typically from May through October. Figure 11 shows the average monthly acre-feet of billed water use from 2016-2024. The increased demand in the summer months is a result of customers irrigating landscapes. In drought years, the city experiences an increased volume of these days earlier in the year.

Figure 11. Average Monthly Potable Billed Water Use, 2016-2024



In 2024, Thornton's peak daily demand for treated water was 44.26 MGD, with an hourly peak of 84.18 MGD. Both of these peaks occurred in July of 2024.

Thornton's system peak production capacity has increased from 70 MGD in 2020 to 75 MGD. Production capacity has increased since 2020 because the Thornton Water Treatment Plant can consistently produce around 25 MGD, while the Wes Brown Treatment has a peak production of 50 MGD.

HB 10-1051 Data Reporting

In 2010, the Colorado General Assembly adopted HB10-1051 which requires covered entities (retail water providers who sell 2,000-acre feet or more of water annually) to report, on an annual basis, water use and conservation data to be used for statewide water supply planning. The bill directed the CWCB to adopt guidelines for reporting water use and conservation data by covered entities to report to the legislature regarding the guidelines. HB10-1051 directed the CWCB to develop reporting guidelines through a public participation process, including outreach to stakeholders from water providers with geographic and demographic diversity, non-governmental organizations, and water conservation professionals. The reporting Guidelines include clear descriptions of customer categories, uses, and measurements, how the Guidelines will be implemented, and how data will be reported to the Board. Thornton has reported data through the CWCB online reporting tool since 2013.

2.2 Past and Current Demand Management Activities and Impact to Demands

Water conservation and efficiency through demand management activities are critical to Thornton's water system. Thornton has had a Water Efficiency Plan in place since 2001. Beginning in 2003, the city implemented demand management activities, consisting of various measures and programs, that have fostered an ethic of efficiency throughout the community. In 2021, Thornton incorporated Permanent Water Use Rules into the City Code. The following rules apply from April 1 through October 31 of each year. Turf may be watered no more than three days per week, selected at the customer's discretion. Turf shall not be watered between 10 a.m. and 6 p.m., except for short periods to adjust or repair an irrigation system. Thornton defines a conservation/efficiency measure as a technology or practice that directly reduces water use, while a conservation/efficiency program is an action or policy that encourages, requires, or otherwise leads to the implementation of water-saving measures.

In Thornton's Water Conservation Plan, a list of conservation measures and programs were identified for consideration, including those required to be considered under Colorado's water conservation planning statute (C.R.S. §37-60-126). The list of conservation demand-side programs included public education, technical assistance, rate structures, regulations, and incentives. Various supply-side programs that increase the distribution system efficiency were also identified and matched to meet the city's conservation goals.

The 2009 Water Conservation Plan set a goal of establishing residential water use at 85 gallons per capita and an overall 900 AF of savings annually by 2012, up to 1,500 AF annually by 2017, and up to 2,800 AF annually by 2027. Over 20 years after the original plan, residential gpcd usage has decreased by 39%. The five-year average residential gpcd in 2023 was 75 gallons per capita per day, down from 106 in 2001. Many of the programs that helped achieve this goal will continue to be implemented through 2031.

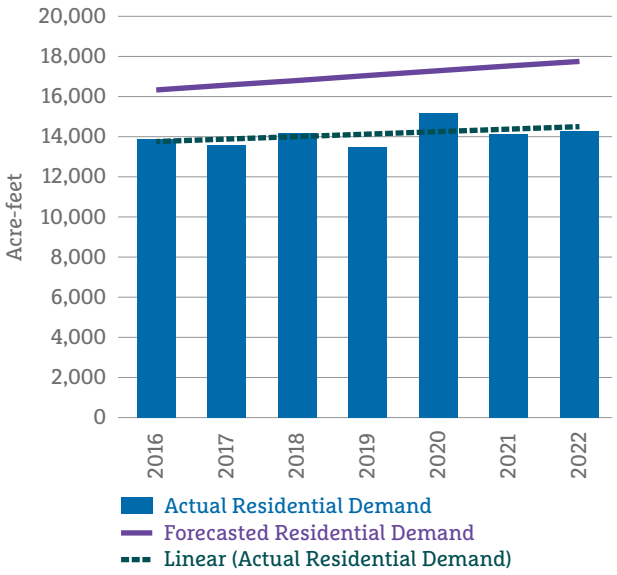
The 2018 Water Efficiency plan set forth landscape, irrigation and commercial water efficiency programs in each customer class to achieve savings from all of Thornton's water customers. The activities were selected to aim for 1,071 acre-feet annually by 2024. To ground truth the estimated savings of the 2018 plan, an analysis of per account usage demonstrated that an estimated annual savings of 1,463 AF was achieved from 2017 to 2023. The more conservative estimate of 1,071 acre-feet annual savings is used in this document when discussing the 2018 – 2024 plan period. These savings were predominately in the residential and irrigation sectors. Commercial sector water usage increased due to significant growth during this timeframe and will be a major focus of water efficiency programming moving forward.

2.3 Demand Forecasts

It is instructive to review demand in the three customer classes – residential, commercial, and irrigation – to discern successful results and anticipate future opportunities.

For the graphs below, demand is obtained from Utility Billing data, and forecasted demand is from the Water Resources Treated Water Demand model, which contains conservative estimates for demand through build-out in 2065. The years 2016 through 2022 from the demand model are the baseline years for demand projections. Low annual precipitation was the biggest demand driver during the interval, with 2016, 2018, and 2020 standing out.

Figure 12. Residential demand from billing data vs. forecasted demand, 2016-2022



Residential consumption over the 2016 plan years shows the variability with precipitation mentioned earlier, with 2020 as the lowest precipitation and highest use year in the interval. Examining the linear trend line compared to the residential demand forecast indicates that demand is growing due to population growth but at a significantly lower rate than forecast, which can be attributed to the implementation of goals to lower gallons per capita per day (GPCD) for residential water use in the 2016 Water Efficiency Plan. Figure 9 on page 35 shows a steady decline in GPCD over the 2016 plan years due to the increased communication and programs implemented by the Water Resources division.

Commercial consumption over the 2016 plan years also shows variability with precipitation. By examining the trend line compared to forecasted demand, it is evident that the trend is in line with the forecast, but the actual volumes are lower. A focus of this Plan will be to concentrate on commercial customers to lower demand.

Figure 13. Commercial demand from billing data, forecasted demand, and trend line fitted to the billing data, 2016-2022

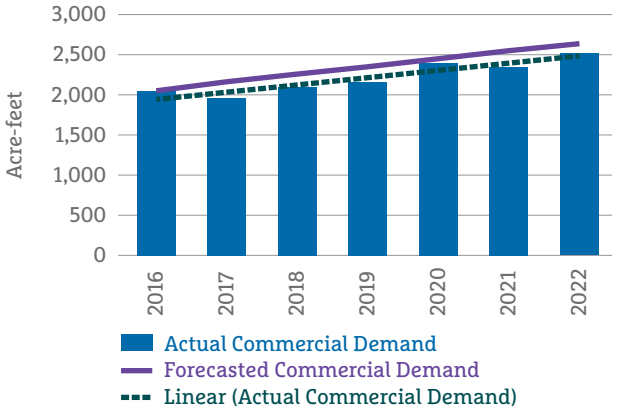
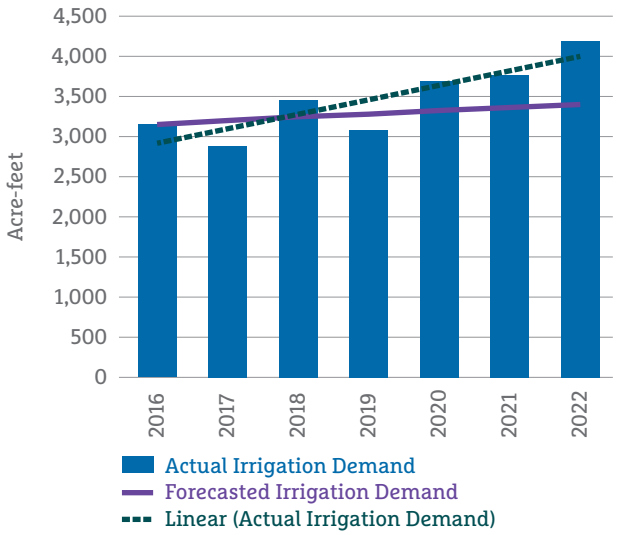


Figure 14. Irrigation demand from billing data, forecasted demand, and trend line fitted to the billing data, 2016-2022



Irrigation consumption during the 2016 plan years was higher than the forecast except in the wet years of 2017 and 2019. The higher consumption is due to the growth of Parks irrigated acreage, which, as of 2023, was 655 acres, and the use of potable water for irrigation instead of non-potable water due to water quality concerns and availability. Another source of growth was in HOA common areas.

Through full build-out in 2065, future water demands, are forecasted using the same methodology as in 2009, and non-potable demands are included to represent total system demands. The forecasts include a 10% safety factor for residential, commercial, and irrigation demand (city of Westminster and non-account water not included). The city is interested in integrating weather, land use, and economic factors into future forecasting efforts, though none of these factors are considered in the forecasts presented here.

The population projections used in this Plan are based on the projections provided by the city's Policy Planning Division. The current extended service area is essentially fully developed, and the city expects the population in these areas to remain relatively constant. The city's anticipated water service area population, including areas outside the city's corporate boundaries, is projected to be 165,995 in 2030.

The total system baseline demand forecast indicates 37,043 acre-feet of water will be needed to meet customer demand in 2031, this Water Efficiency Plan planning horizon, and 51,071 acre-feet total at build-out, in 2065. It is important to note that this baseline total system demand forecast includes Thornton's raw water demands. The baseline demand forecasts have not included adjustments for future water conservation activities considered in this Plan, addressed in Chapter 3. Table 9 shows Thornton's projected water demands from 2023 – 2031.

Treated totals include residential, commercial, and irrigation customer demand, the city of Westminster's full contract value of 2,240 acre-feet, and non-account water. Between 2025 and 2031, it is expected that Thornton will need 3,164 acre-feet to meet the new total demand. The residential customer class will continue to be the single largest group of water users in Thornton, with a projected annual demand of 20,304 acre-feet in 2031. The 2031 annual demands for the commercial and irrigation sectors are projected to be 3,542 acre-feet and 3,106 acre-feet, respectively. For planning purposes, an additional safety factor is applied to projections.

Table 9. Projected Demands Treated and Raw Water w/o Efficiency Savings for Thornton 2025-2031

Year	Treated Totals (acre-feet)	Safety Factor (acre-feet)	Raw Water (acre-feet)	Total (acre-feet)
2025	28,452	2,427	3,000	33,880
2026	28,935	2,472	3,000	34,407
2027	29,418	2,516	3,000	34,934
2028	29,900	2,561	3,000	35,461
2029	30,383	2,606	3,000	35,989
2030	30,865	2,650	3,000	36,516
2031	31,348	2,695	3,000	37,043

Chapter 3: Water Efficiency Goals and Activities

This section identifies Thornton's water efficiency goals and potential water efficiency activities to achieve those goals. Water efficiency activities were identified through a two-step screening and evaluation process and are divided into four broad categories: Foundational Activities, Targeted Technical Assistance and Incentives, Ordinances and Regulations, and Educational Activities.

3.1 Water Efficiency Goals

Thornton recognizes water efficiency as essential to its long-term water supply planning strategy. Both the South Platte Basin Implementation Plan and the Colorado Water Plan recognize innovative ways Thornton is helping to meet projected gaps in state water needs. Through water efficiency and related conservation measures, the city will reduce the amount of water that it must acquire or develop to meet its build-out demand. The water efficiency goals included in this Plan are intended to benefit both the city and its customers. In 2031 the 2025 plan, if fully implemented, will achieve additional savings of 1,251 acre-ft per year from the previous plan.

Table 10: Goals by Customer Class to be achieved by 2031

Goal Sector	Goal Measurement
Residential gallons per capita per day (gpcd)	5% reduction in 5-year average by 2031
Existing Commercial Buildings (program participants)	5% reduction by 2031
Existing Commercial Landscapes (program participants)	Less than 15 gallons/sq. ft. by 2031
Existing Irrigation Accounts (program participants)	Less than 15 gallons/sq. ft. by 2031
City Property Landscape Irrigation	Less than 15 gallons/sq. ft. by 2031
New Non-residential Development Landscapes	Less than 12 gallons/sq. ft. by 2031
New Residential Development	Less than 5 AF/acre/year/development
Majority of New Commercial Accounts	Less than 10 AF/year/account
Distribution System Loss	10% reduction in Total System Losses

Residential Goals

Thornton will reach its residential goals through a varied approach of new leak detections technology (AMI), water efficiency programs and technical customer service and education.

Participation in Thornton's programs has been high in the past 7 years. These programs and services are included in the 2025 plan due to their demonstrated effectiveness.

Commercial and HOA Goals

Commercial goals will be approached through AMI leak detection technology, custom efficiency project rebate programs and updated city landscape codes. The new development code requires a Water Use Agreement when a non-residential account is estimated to use ten acre-feet or more. Customers that exceed water use agreements will pay higher rates for the excess water.

Image 20. Thornton and Adams 12 Five Star School Staff Discussing Efficiency Goals for shared industrial vehicle wash

Landscape Goals

Landscapes for new developments in the city are required to adhere to the Development Code. The Development Code requires that turf grass account for a minimum of 25 percent (up to a maximum of 50 percent) of the area needed to be landscaped in front and side yards of new development projects. However, the city accommodates consideration and review of xeric landscape designs through the "deviation" provisions within the landscape standards of the Code. The Landscape Code will be updated by the end of 2025 and new residential developments will have no minimum requirement for high-water demand turf. There are no restrictions on backyard landscaping in new developments. Homeowners of newly constructed homes can use our Water-Wise Landscape rebate to landscape their un-landscaped backyards.

Image 21. Native grasses at Trail Winds park

Water Loss Goals

In 2024, Thornton began reporting annual M36 AWWA Water Loss Audit data and will continue to look for opportunities to improve water data accounting for things like water breaks, hydrant flushing, and accounting of construction hydrant meters. Improvements to data collection will help reduce the city's total water loss. The continued pipeline rehabilitation will also continue to reduce the amount of water lost to leaks in aging infrastructure.

Image 22. Thornton Utilities Operations staff maintain water lines, hydrant and valves

This 2025 Water Efficiency Plan builds upon the successes by pursuing strategies to help continue long-term water savings for the city. Chapters 3 and 4 detail Thornton's new water efficiency goals and strategy.

Table 11. Estimated Efficiency Program Savings

Year	2018 – 2024 Annual Savings (AF)	Expected Annual Savings from 2025 - 2031 (AF)	2025 – 2031 Cumulative Total (AF)
2025	1,071	1,113.6	1,113.6
2026	1,071	1251.1	2,364.7
2027	1,071	1251.1	3,615.8
2028	1,071	1251.1	4,866.9
2029	1,071	1251.1	6,118.0
2030	1,071	1251.1	7,369.1
2031	1,071	1251.1	8,620.2

3.2 Summary of Selection Process

There are four major steps for selecting water efficiency activities:

1. **Potential Activity Identification** – This introductory step aims to cast a wide net in identifying the many possible efficiency activities available for all customer classes.
2. **Development of Screening Criteria** – Two sets of criteria are used for screening and evaluating conservation activities: qualitative activity screening and quantitative activity evaluation.
3. **Activity Screening** – This step takes a high-level view of potential activities and removes those that are either infeasible or otherwise not of interest to the city.
4. **Activity Evaluation** – The final step in the selection process uses quantitative criteria to thoroughly vet potential activities to determine which align with the city's desired course of action. The chosen activities then move on to the implementation phase.

Activity Identification

A comprehensive list of efficiency activities was identified for consideration, including those required to be considered under Colorado's water conservation planning statute (C.R.S. §37-60-126). Other activities were drawn from known best practices and knowledge of different activities implemented elsewhere. Many of the activities listed in Table 12 are currently implemented at Thornton.

The activities examined include both demand and supply-side programs. The list of demand-side measures includes public education, technical assistance, rate structures, regulations, and incentives. Various supply-side programs were identified, including programs that increase distribution system efficiency. All activities are generally organized into one of four categories with additional sub-categorization, as described in the sections below.

Image 23. HOA Water-Wise Landscape Conversion

Foundational Activities

When planning for demand management, certain activities are considered foundational. These activities are directly under the utility's control and can be crucial to the success of other programs. The foundational activities ensure that the utility operates efficiently, provide information necessary for the implementation of other programs, and provide the incentive for customers to participate in many of the activities in which they are targeted. Foundational activities can be grouped into the following general categories:

- **Metering** – Activities in this category increase the accuracy of the usage information available to the customer and the utility.
- **Demand Data Collection and Billing Systems** – Activities in this category help the utility compare data between customers of the same type and can be used to show customers where their usage stands compared to established benchmarks.
- **Water Efficiency Oriented Rates and Tap Fees** – Actions in this category are focused on incentivizing water efficiency for customers using financial means.
- **System Water Loss Management and Control** – These activities aim to make the utility more efficient in delivering water to the customer.
- **Planning** – Planning activities can have far-reaching effects on water use by guiding general trends.
- **Staffing** – Proper staffing and support are necessary for the success of the activities discussed throughout this chapter.

Targeted Technical Assistance and Incentives

Targeted Technical Assistance and Incentive activities are first categorized by the focus area of the activity.

The general focus area categories include:

- Installation of Water Efficient Fixtures and Appliances
- Low Water Use Landscapes
- Water Efficient Industrial and Commercial Water-Using Processes
- Incentives such as rebates and grants

Before

After

Image 24. Residential Water-Wise Landscape Conversion

Ordinances and Regulations

City ordinances and regulations are the most direct method of enforcing water conservation. They can significantly impact water use across customer classes. For the purposes of this Plan, ordinances and regulations were grouped into three categories depending on the regulation type and further categorized by the city based on customer impact.

The regulation categories include:

- General Water Use Regulations
- Landscape Design/Installation Rules and Regulations
- Indoor and Commercial Regulations

Educational Activities

Designed to increase customer awareness of their water use, educational activities are divided into two categories: the need for conservation, and their ability to conserve.

The program categories include:

- Customer Education
- Technical Assistance

Screening Criteria

The identified measures and programs were screened based on the degree to which the measures and programs match the city's efficiency goals. The screening criteria developed and used to determine whether to move forward to a more thorough evaluation are:

- **Authority of Thornton to implement measures/programs.** If the city lacks the legal authority to implement the measure/program, it was excluded from consideration.
- **Ability to sustain water savings over the long term.** If a measure or program could not provide sustainable long-term water savings, it was excluded from consideration.
- **Ability to defer or avoid costs by implementing the measure or program.** If implementing a measure or program demonstrated an increased potential for deferring or avoiding additional water purchases, it was granted additional weight for consideration.
- **Acceptability of the measure/program by the Thornton community and customers.** Customers and community members naturally receive some programs and measures better than others. For example, incentives are typically preferred to mandates.

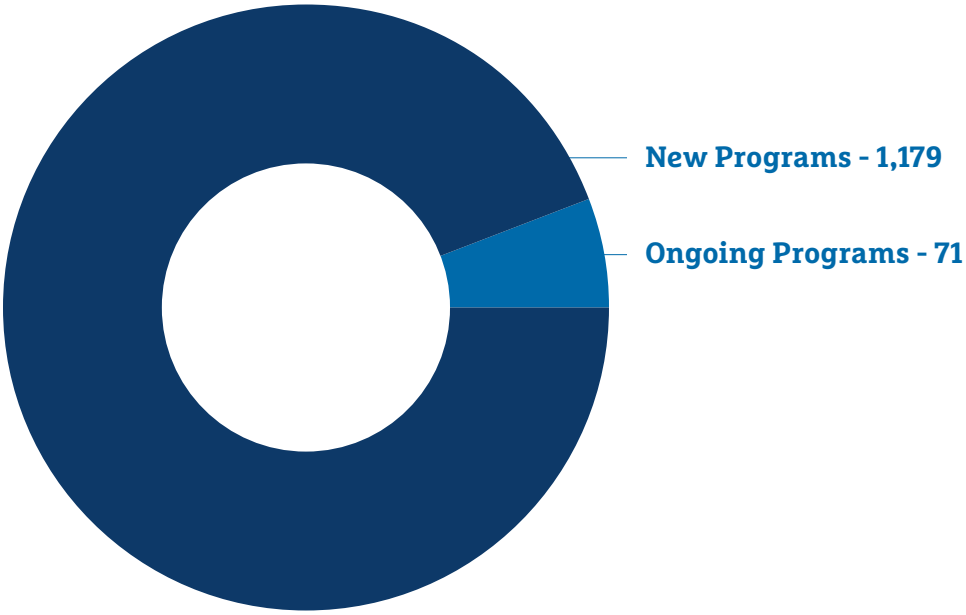
Activity Screening & Evaluation

The screening and evaluation process first pares the list of potential activities down to those of interest to the city. The evaluation process further pares the list to those that will be included in the implementation stage of this Plan. Thirty-six activities made it through the initial qualitative screening process and on to quantitative evaluation, of which twenty-two demand management activities have been selected for implementation as part of this Plan. Note that some evaluated activities were re-evaluated from the 2018 Water Conservation Plan while others are new, adding to the city's demand management activities.

3.3 Demand Management Activities

The activity screening and evaluation steps outlined above identified 36 demand management programs for implementation as part of this Water Efficiency Plan. In total, the identified activities estimate a total projected cost of $4.3 million in operating costs over the 7-year planning horizon (2025-2031) and new activities are estimated to result in an additional 1,251 acre-feet in annual water savings. Figure 15 shows the estimated annual savings by ongoing programs and new programs. Table 13 details all ongoing and new programs, their start date and estimated annual savings.

Figure 15. Breakdown of Annual Savings by ongoing and new programs (acre-feet)



Participation in the 2018 Water Efficiency Plan's programs was high, resulting in an estimated 1,071 acre-ft of annual savings from 2018 – 2024.

Table 12. Participation in Residential Rebate Programs	
Ongoing Residential and Commercial Program Participation, 2018-2024 (Number of Participants)	
Toilet Rebates	3,443
Smart Irrigation Controllers/Rain Sensor Rebates	1,991
Sprinkler Consultations	1,011
Landscape Conversions (acres)	9.5
Customer Service Activities (calls, emails, high water use consultations, water waste response)	38,787

The effective programs from the previous plan will be continued in the next seven years. Advanced Metering Infrastructure (AMI) is expected to increase annual savings significantly and will require increased staff time for managing the system and customer service. Table 13 shows conservative estimates for the annual savings of new programs, which are dependent on staff and budget capacity.

Table 13. Implementation Schedule for Water Efficiency Measures and Programs

Foundational Activities	Annual Saving per Participant (Gal)	Annual Savings (Acre-Ft)
2008 Pipeline Replacement and Rehabilitation Program	N/A	18.8
2013 City Parks Water Efficiency Program	N/A	17.2
2018 Residential WaterSmart Portal and Water Reports	1,536	7.2
2022 Residential/Mixed-Use/Commercial Development Water Demand Forecasting	N/A	N/A
2024 Commercial Water Use Benchmarking	N/A	N/A
2024 AWWA M36 Water Loss Accounting	N/A	N/A
2024/2025 Advanced Metering Infrastructure (AMI) Installation	N/A	N/A
2025 Advanced Metering Infrastructure (AMI) Implementation	7,681	1,015.0
2025 City of Thornton Environmental Sustainability Task Force	N/A	N/A
2026 Distribution System Water Loss Reduction Program	N/A	132.0
2028 City-owned Property Non-functional Landscape Assessment	N/A	N/A
2029 Water Supply and Demand Scenario Planning	N/A	N/A
2030 Water Efficiency Program Cost-Benefit Assessment	N/A	N/A
Targeted Technical Assistance and Incentives		
2003 Residential Toilet Rebate	13,000	8.0
2008 Residential Sprinkler Consultations	6,000	2.0
2008 Commercial/HOA Sprinkler Consultations	74,021	1.1
2011 Commercial Toilet Rebate	12,383	1.9
2013 Residential Smart Irrigation Controller and Rain Sensor Rebate	8,448	5.2
2013 Commercial Smart Irrigation Controller Rebate	10,000	0.6
2016 Residential Water-Wise Garden Discount	5,000	2.3
2017 Residential Turf Replacement Program	7,000	1.1
2018 Residential Water-Wise Landscape Rebate	11,200	1.7
2018 Commercial/HOA Water-Wise Landscape Transformation Grant	609,840	3.7
2022 Commercial Indoor Water Use Assessments	N/A	N/A
2025 Commercial/HOA Landscape Water Budget Program	331,615	25.4
2025 Custom Commercial/HOA Irrigation System Rebate	39,881	0.6
2025 Income-Qualified Residential Toilet Replacement Program	13,000	1.6
2026 Custom Commercial Building Incentive Program	128,762	5.5
2027/2028 Residential, Commercial/HOA Landscape Design	N/A	N/A
Ordinances and Regulations		
2003 Landscape Code Update	N/A	N/A
2003 Conservation of Water Resources Ordinance	N/A	N/A
2021 Conservation of Water Resources/Water Use Rules Ordinance Update	N/A	N/A
2024 Non-residential Water Use Agreement Ordinance and Management	N/A	N/A
2025 Landscape Code and Tap Fee Ordinance Update	N/A	N/A
Educational Activities		
2004 Public Outreach and Education/Youth Water Festival	N/A	N/A
2010 Demonstration Gardens & Garden Tours	N/A	N/A
Estimated Annual Water Savings (acre-feet)		**1,251**

3.4 Water Efficiency Impacts on Demand Forecasts and Supply Planning

Revised Demand Forecast

The demand forecasts in Chapter 2 were modified by incorporating the water efficiency measures and programs selected for implementation. Thornton possesses adequate water supplies and capacity within its existing system to meet demand over the planning horizon used in this Plan.

Identification of Project-Specific Water Savings

While accurate water savings estimates were used in the development of this Plan, achieving these results for the measures and programs identified are highly dependent on the level of public participation. The measures and programs identified with this planning effort will not enable the elimination of future capital improvement projects necessary to meet the city's projected demands. The water efficiency savings contemplated with this planning effort are envisioned to help reduce the amount of water the city must acquire or develop to meet demands at build-out. Water savings have been estimated based on the data available and the use of prudent assumptions; there is not enough certainty in the data to support water capacity design decisions. As additional data becomes available, the estimated water savings in this Water Efficiency Plan may need to be revised.

Revised Supply Capacity Forecast

Table 14 summarizes projected annual treated water system demands including wholesale accounts and compares potential system demand reductions due to efficiency savings.

Table 14. Revised Annual Supply-Capacity Forecast

Year	Projected Demand w/o Efficiency Savings (annual AF)	Planned Firm Yield of System (annual AF)	Projected Water Efficiency Savings (annual AF)	Projected Demand w/ Efficiency Savings (annual AF)
2025	28,452	33,500	1113.6	27,339
2031	31,348	38,500	1251.1	30,097

Image 25. Gravel Lakes

Forecast Modification and Benefits of Efficiency

Water supply planning and development require years of planning to ensure adequate water supplies are available when they are needed. Thornton's portfolio of water rights and supply includes water savings from existing and planned water efficiency programs. Figure 16 illustrates Thornton's projected demands and the estimated effects of water efficiency.

Figure 16. Supply & Projected Demands with and without Efficiency Savings

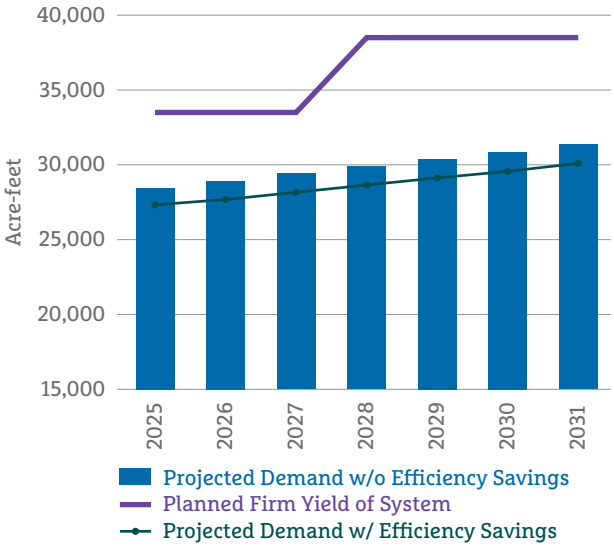


Image 26. Standley Lake

Revenue Effects

Thornton regularly updates its Water Rate and Connection Fee Report, with the most recent update occurring in 2024. This report establishes the cost of service, annual revenue requirements, tap fees, and water user charges needed to recover costs. The impact of water efficiency programs on projected demands was factored into the revenue analysis.

The selected water efficiency measures and programs will potentially impact revenue should the assumptions used to estimate water savings associated with the identified measures and programs prove to be on target. The city addresses the effects of conservation and efficiency on revenue in its water connection and rate studies.

Image 27. Blue Heron

Chapter 4: Implementation and Monitoring Plan

This section summarizes all the actions to implement the selected measures and programs. It also defines when the Plan will be updated to reflect ongoing efforts and incorporate new approaches for the city's overall water efficiency strategy.

4.1 Implementation Plan

Image 28. Water-Wise Garden Open House

The implementation plan is intended to help the city achieve its efficiency goals outlined in this Plan. Details of this effort are described in Table 15, which outlines the associated steps and timeline, resources, and key indicators for each program identified for implementation. However, other factors, including changes in development, water use intensity, or budget, could cause a delay in implementation or an indefinite cancellation of the programs identified for implementation.

Table 15. 2025-2031 Implementation Plan Summary				
Foundational Activities	**Description**	**Implementation Timeline**	**Key Players & Partners**	**Metrics**
2008 Pipeline Replacement and Rehabilitation Program	Thornton has implemented a systematic pipeline replacement program to improve water distribution system performance and control costs.	Currently Implemented	City staff, Contractor	Length of pipeline replaced/ reduction in distribution losses
2013 City Parks Water Efficiency Program	Targeted efficiency program for city parks. This program will help the city lead by example in reducing water use at city parks.	Currently Implemented	Facilities Manager(s), city staff	Water savings achieved in audited parks.
2018 Residential WaterSmart Portal and Water Reports	This program provides a customer portal, leak alerts and water use reports.	Currently Implemented	City staff, Contractor	Water use reduction compared to a control group; individual participating in household water savings
2022 Residential/ Mixed-Use/ Commercial Development Water Demand Forecasting	New development plans are reviewed by Water Resources to estimate annual water demand impacts to the water system.	Currently Implemented	City staff	Annual water demand is checked when the first year of water use data is available
2024 Commercial Water Use Benchmarking	Ongoing tracking of commercial water use by customer class. Assists in water demand forecasting for new commercial developments.	Currently Implemented	City staff	Annual water demand is checked when the first year of water use data is available
2024 AWWA M36 Water Loss Accounting	Ongoing system water loss accounting, reported annually in HB10-1051 CWCB report.	Currently Implemented	City staff	AWWA M36 method operational efficiency indicators, data validity score
2024/2025 Advanced Metering Infrastructure (AMI) Installation	Advanced metering infrastructure (AMI) is an integrated system of smart water meters, communications networks, and data management systems that enables two-way communication between utilities and customers.	In Progress	City staff, Contractor	Percent completion
2025 Advanced Metering Infrastructure (AMI) Implementation	AMI enables customers and Thornton to manage water usage in a timely manner, detect leaks, and operate the water distribution system. Currently, water usage is measured and recorded monthly. AMI is particularly beneficial in conservation efforts and during drought. Usage restrictions or conservation efforts can be instantly measured, and quick actions can be taken to modify water usage.	In Progress	City staff	Annual water savings from the availability of daily water use data and leak detection
2025 City of Thornton Environmental Sustainability Master Plan	An actionable and prioritized plan that builds on current environmental sustainability efforts and identifies a future vision, goals, and actions to enhance environmental sustainability in Thornton. This effort will be completed in consultation with the Environmental Sustainability Task Force, which includes members of the community serving in an advisory role through development of the ESMP.	In Progress	City staff, Contractor, Thornton residents	Documented initiatives and progress.
2026 Distribution System Water Loss Reduction Program	Program to detect and reduce accounted and unaccounted water loss.	2026	City staff	Improve AWWA M36 operational efficiency indicators
2028 City-owned Property Non-functional Landscape Assessment	Determine non-functional turf areas on city-owned property and assess areas for turf alternative projects.	2028	City staff	Number of acres to convert.

(continued)

Table 15. 2025-2031 Implementation Plan Summary				
Foundational Activities	**Description**	**Implementation Timeline**	**Key Players & Partners**	**Metrics**
2029 Water Supply and Demand Scenario Planning	Water demand scenario planning for multiple climate and city growth futures.	2029	City staff, Contractor	Report that documents scenarios
2030 Water Efficiency Program Cost-Benefit Assessment	Cost-benefit assessment to prepare for the next Water Efficiency Plan update.	2030	City staff	Cost-benefit spreadsheet for each program
Targeted Technical Assistance and Incentives	**Description**	**Implementation Timeline**	**Key Players & Partners**	**Metrics**
2003 Residential Toilet Rebate	The WaterSense Toilet Rebate program offers a rebate incentive for installing WaterSense-labeled toilets.	Currently Implemented	City staff	Number of rebates, water savings
2008 Residential Sprinkler Consultations	This program provides free sprinkler system evaluations for households. Customers are given recommendations for improving their systems and a customized watering schedule.	Currently Implemented	City staff, Contractor	Number of consultations, water savings
2008 Commercial/ HOA Sprinkler Consultations	This program provides free sprinkler system evaluations for HOAs and businesses. Customers are given recommendations for improving their systems and a customized watering schedule.	Currently Implemented	City staff, Contractor	Number of consultations, water savings
2011 Commercial Toilet Rebate	This program provides a rebate to commercial customers to installing high-efficiency WaterSense toilets.	Currently Implemented	City staff	Number of rebates, water savings
2013 Residential Smart Irrigation Controller and Rain Sensor Rebate	A rebate is provided to residential customers that covers the cost of weather or soil moisture-based controllers.	Currently Implemented	City staff	Number of rebates, water savings
2013 Commercial Smart Irrigation Controller Rebate	A rebate is provided to commercial and HOA customers that covers the cost of weather or soil moisture-based controllers.	Currently Implemented	City staff	Number of rebates, water savings
2016 Residential Water-Wise Garden Discount	Discount off qualifying plants offered to customers for a pre-designed garden.	Currently Implemented	Contractor	Number of gardens, water savings
2017 Residential Turf Replacement Program	Discounted service to residential customers to remove turf and replace with a perennial plant bed.	Currently Implemented	Contractor	Number of participants, number of sq. ft. removed, water savings
2018 Residential Water-Wise Landscape Rebate	This program provides a rebate to residents who remove a portion of lawn to replace with water-wise alternatives.	Currently Implemented	City staff	Number of participants, number of sq. ft. removed, water savings
2018 Commercial/ HOA Water-Wise Landscape Transformation Grant	This program provides a rebate to commercial and HOA customers that remove a portion of lawn to replace with water-wise alternatives.	Currently Implemented	City staff	Number of participants, number of sq. ft. removed, water savings
2022 Commercial Indoor Water Use Assessments	This program offers a free water use assessment to help businesses identify efficiency opportunities. Commercial water customers can sign up for a free water use assessment to increase water use efficiency.	Currently Implemented	City staff	Number of assessments
2025 Commercial/ HOA Landscape Water Budget Program	Contracted software service that creates a water budget using landscape area. Water use is tracked based on gallons/sq. ft. used.	In Progress, 2025	City staff, software contractor	Number of participants, water budget tracking
2025 Custom Commercial/HOA Irrigation System Rebate	Rebate program to assist with irrigation system improvements that demonstrate water savings potential.	Currently Implemented	City staff	Number of participants, water savings

(continued)

Table 15. 2025-2031 Implementation Plan Summary				
Targeted Technical Assistance and Incentives	**Description**	**Implementation Timeline**	**Key Players & Partners**	**Metrics**
2025 Income-Qualified Residential Toilet Replacement Program	Contractor service to replace old toilets with WaterSense model.	In Progress, 2025	City staff, Contractor	Number of participants
2026 Custom Commercial Building Rebate Program	Rebate program to provide funding assistance for commercial indoor water savings opportunities discovered during the commercial audit.	2026	City staff	Number of participants, water savings
2027/2028 Residential, Commercial/HOA Landscape Design	Contracted service to provide landscape design for water-wise landscape renovations.	2027/2028	Contractor	Number of participants, number of sq. ft. designed.
Ordinances and Regulations	**Description**	**Implementation Timeline**	**Key Players & Partners**	**Metrics**
2003 Landscape Code Update	New development landscape code was updated to incorporate water efficiency standards.	Currently Implemented	City staff	N/A
2003 Conservation of Water Resources Ordinance	Water waste rules and regulations incorporated into City Code.	Currently Implemented	City staff	N/A
2021 Conservation of Water Resources/ Water Use Rules Ordinance Update	Water Use Rules were added to Conservation of Water Resources Ordinance.	Currently Implemented	City staff	N/A
2024 Non-residential Water Use Agreement Ordinance and Management	Non-residential new development or water users are required to sign a Water Use Agreement if annual water demand is estimated to be 10 acre-ft or more.	Currently Implemented	City staff	N/A
2025 Landscape Code and Tap Fee Ordinance Update	Landscape and tap fee code is being revised to incorporate water efficiency best practices.	In Progress, 2025	City staff	N/A
Educational Activities	**Description**	**Implementation Timeline**	**Key Players & Partners**	**Metrics**
2004 Public Outreach and Education/Youth Water Festival	Comprehensive outreach strategy and public engagement programs.	Currently Implemented	City staff, contractor	Survey results, engagement metrics
2010 Demonstration Gardens & Garden Tours	Maintain Thornton's two demonstration gardens as public examples of water-wise landscapes.	Currently Implemented	City staff, Contractor	Number of garden event attendees

**Note: All metrics are tracked on an annual basis.*

Thornton has a 2025 Operations and Maintenance (O&M) budget of $512,939 for efficiency and conservation efforts. Implementing the selected O&M efficiency programs is estimated to cost $4.3 million from 2025 to 2031, or an average annual cost of $610,000. The Capital Improvement Project (CIP) costs for the Pipeline Replacement Program are estimated to average $3,500,000 annually through 2029. Staffing falls within the Water Resources Division of the Infrastructure Department. It includes a Senior Water Resources Administrator, 3 Water Resources Administrators/Analysts, and 1 seasonal Technician (4 FTEs and 1 seasonal technician). The estimated costs of the implementation of this Water Efficiency Plan for the period 2024 through 2031, as presented, are summarized in Table 16.

A complementary update to support the efforts outlined in this Plan to city codes and budget items will be implemented through 2031.

4.2 Plan Review, Monitoring, Evaluation, and Update

The Water Conservation Act of 2004 requires the Draft Water Efficiency Plan to be made available to the public for review and comment. Thornton will comply with this requirement by placing the Draft Water Efficiency Plan on the City Council meeting agenda, providing public notice of the Plan as an agenda item, allowing public review and comment, and adopting the Plan after the Colorado Water Conservation Board approves it. This process complies with the requirements of the city of Thornton's Charter, which include provisions for public advertisement, review, comment, and adoption by the City Council.

The measures and programs outlined in this Plan will be monitored to determine their effectiveness in achieving the city's long-term water savings goals. Measures and programs determined not to be significantly effective will be discontinued.

Thornton intends to update the Plan at least every seven years, as required by Colorado's water conservation planning statute. The city will continue to collect and analyze data regularly, and future envisions of the Plan will incorporate updated and new data sources.

Image 29. Carpenter Rec Center Xeriscape Garden

Table 16. Estimated Costs of the 2025-2031 Implementation Plan								
Operations and Maintenance Budget								
Foundational Activities	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**Total**
2013 City Parks Water Efficiency Program	In-house							
2018 Residential WaterSmart Portal and Water Reports	$78,870	$81,241	$83,628	$86,136	$88,720	$91,382	$94,124	$604,101
2022 Residential/ Mixed-Use/ Commercial Development Water Demand Forecasting	In-house							
2024 Commercial Water Use Benchmarking	In-house							
2024 AWWA M36 Water Loss Accounting	In-house							
2025 Advanced Metering Infrastructure (AMI) Implementation	In-house							
2025 Environmental Sustainability Task Force	In-house							
2026 Distribution System Water Loss Reduction Program	In-house							
2028 City-owned Property Non-functional Landscape Assessment	In-house							
2029 Water Supply and Demand Scenario Planning					$80,000			$80,000
2030 Water Efficiency Program Cost-Benefit Assessment	In-house							
Total Foundational Activities Budget	**$78,870**	**$81,241**	**$83,628**	**$86,136**	**$168,720**	**$91,382**	**$94,124**	**$684,101**

(continued)

Table 16. Estimated Costs of the 2025-2031 Implementation Plan								
Operations and Maintenance Budget								
Targeted Technical Assistance and Incentives	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**Total**
2003 Residential Toilet Rebate	$10,500	$18,300	$18,300	$18,300	$18,300	$18,300	$18,300	$120,300
2008 Residential Sprinkler Consultations	$15,955	$16,434	$16,927	$17,434	$17,957	$18,496	$19,051	$122,255
2008 Commercial/ HOA Sprinkler Consultations	$9,724	$9,928	$10,226	$10,533	$10,849	$11,174	$11,510	$73,944
2011 Commercial Toilet Rebate	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$35,000
2013 Residential Smart Irrigation Controller and Rain Sensor Rebate	$21,498	$16,498	$16,498	$16,498	$16,498	$16,498	$16,498	$120,486
2016 Residential Water-Wise Garden Discount	$7,725	$7,957	$8,195	$8,441	$8,695	$8,955	$9,224	$59,193
2017 Residential Turf Replacement Program	$25,750	$26,523	$27,318	$28,138	$28,982	$29,851	$30,747	$197,308
2018 Residential Water-Wise Landscape Rebate	$30,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$300,000
2018 Commercial/ HOA Water-Wise Landscape Transformation Grant	$29,168	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$389,168
2022 Commercial Indoor Water Use Assessments	In-house							
2025 Commercial/ HOA Landscape Water Budget Program	$10,000	$10,300	$10,609	$10,927	$11,255	$11,593	$11,941	$76,625
2025 Custom Commercial/HOA Irrigation System Rebate	$20,000	$30,000	$30,000	$30,000	$30,000	$35,000	$35,000	$210,000
2026 Income-Qualified Residential Toilet Replacement/ Leak Assistance Program		$27,810	$28,644	$29,504	$30,389	$31,300	$32,239	$179,886
2026 Custom Commercial Indoor Water Efficiency Incentive Program		$20,000	$20,000	$30,000	$30,000	$40,000	$40,000	$180,000
2027/2028 Residential, Commercial/HOA Landscape Design			$10,000	$10,000	$15,000	$15,000	$20,000	$70,000
Total Technical Assistance and Incentive Budget	**$185,320**	**$293,749**	**$306,718**	**$319,775**	**$327,925**	**$346,168**	**$354,509**	**$2,134,164**

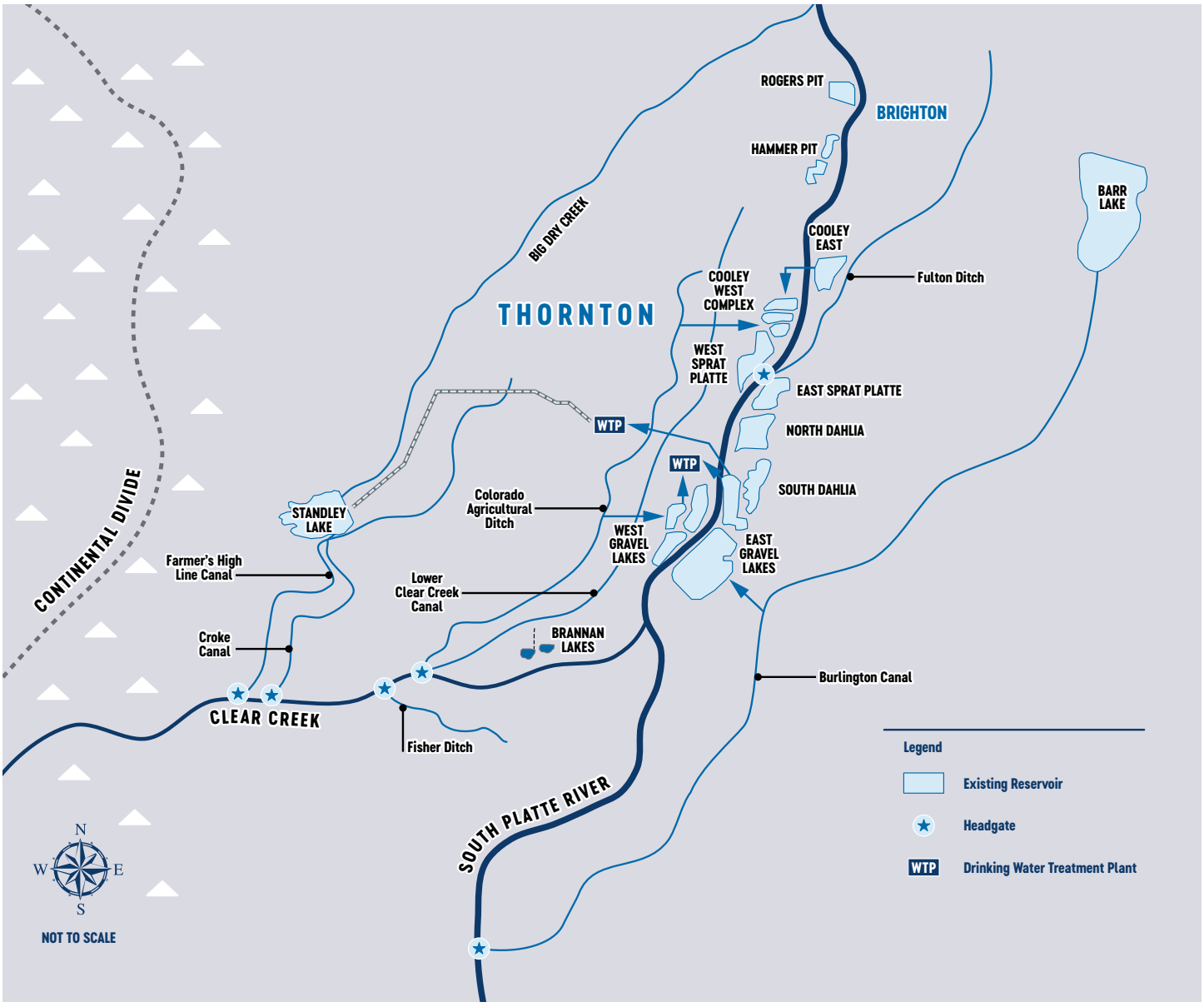
(continued)

Table 16. Estimated Costs of the 2025-2031 Implementation Plan								
Operations and Maintenance Budget								
Educational Activities	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**Total**
2004 Public Outreach and Education	$218,503	$225,058	$231,810	$238,764	$245,927	$253,305	$260,904	$1,674,271
Youth Water Festival	$7,842	$8,007	$8,247	$8,494	$8,749	$9,012	$9,282	$59,633
Demonstration Garden Tours and Maintenance	$13,121	$13,515	$13,920	$14,338	$14,768	$15,211	$15,667	$100,539
Conservation Kit Distribution	$2,702	$2,783	$2,867	$2,953	$3,041	$3,132	$3,226	$20,704
Landscape Workshops and Marketing	$6,581	$6,778	$6,982	$7,191	$7,407	$7,629	$7,858	$50,427
Total Educational Activities Budget	**$248,749**	**$256,141**	**$263,825**	**$271,740**	**$279,892**	**$288,289**	**$296,937**	**$1,905,573**
Operations and Maintenance Budget Total	**$512,939**	**$631,131**	**$654,170**	**$677,651**	**$776,537**	**$725,839**	**$745,570**	**$4,723,838**

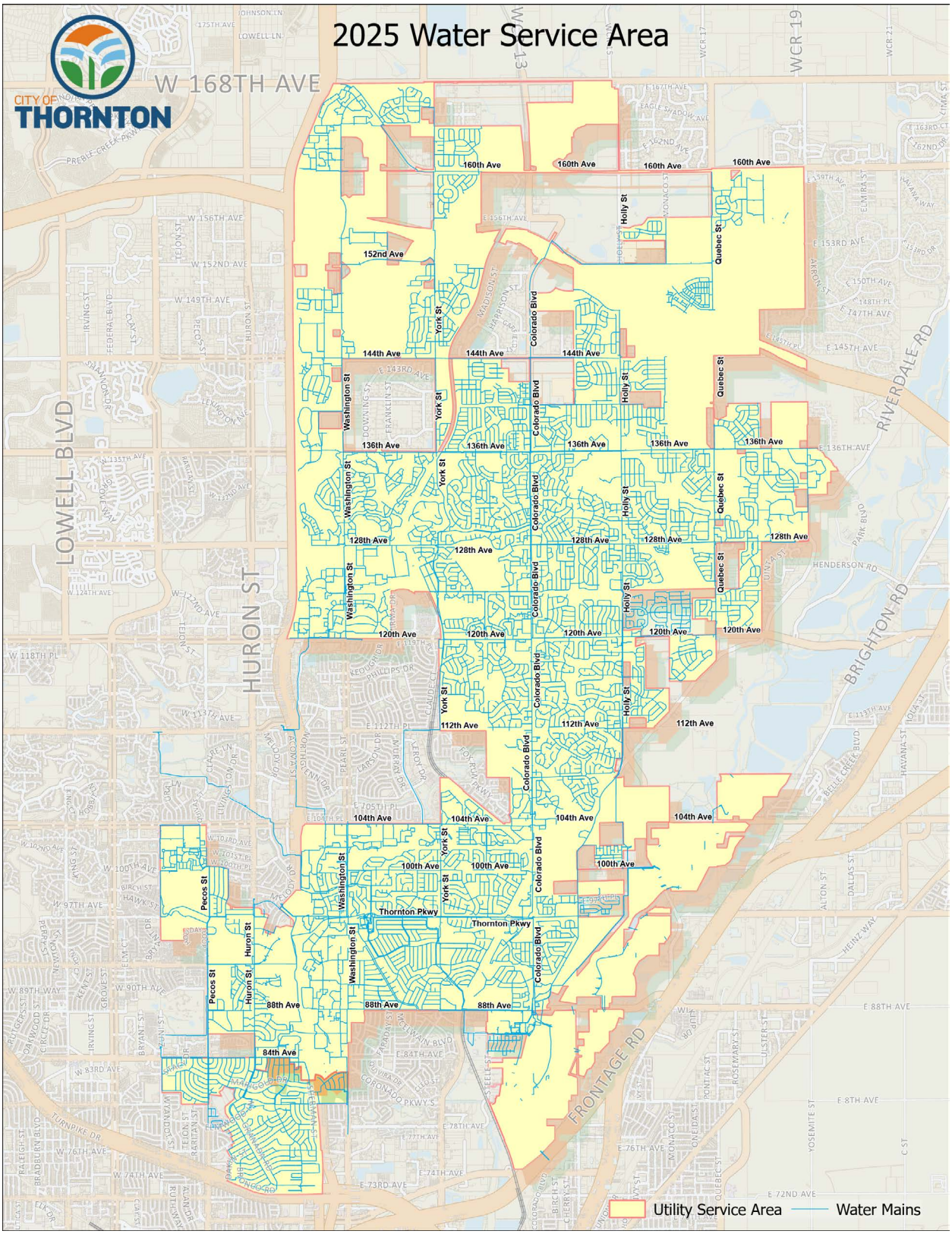
Capital Improvement Projects (CIP)	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**Total**
2008 Pipeline Replacement and Rehabilitation Program	$3,000,000	$3,250,000	$3,500,000	$3,750,000	$4,000,000	TBD	TBD	$17,500,000
2024/2025 Advanced Metering Infrastructure (AMI) Installation	$310,650	In-house						$310,650
Capital Improvement Projects (CIP) Total	**$3,310,650**	**$3,250,000**	**$3,500,000**	**$3,750,000**	**$4,000,000**	**TBD**	**TBD**	**$17,810,650**

Appendix A: Raw Water Map

City of Thornton - Clear Creek and South Platte System



Appendix B: Thornton Water Service Area



Questions? Contact us at:

Website — ThorntonWater.com
Email — water@thorntonwater.com
Phone — 720-977-6600