



# LONG-TERM WATER RESOURCES PLAN TOWN OF FREDERICK

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MAY 13, 2022



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*PREPARED BY*



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- A. Illustrative Implementation Timelines
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List of Abbreviations

Table with 2 columns: Abbreviation and Full Name. Includes entries like 10-Year Plan, 2008 Raw Plan, 2022 WEP, ac, AF, AFY, C-BT, Central Weld, CRDC, Frederick, GIS, gpcd, I-25, LBDC, LIRFs, Long-Term Plan, NISP, Northern Water, SVSD, SWSP, Technical Update, Town, WCR, WEP, WTP, WWTF.

List of Key Definitions

Dependable Yield Amount of water that can be delivered on a reliable basis. Typically determined by the historical yield in dry years, but Windy Gap supply

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	is also limited by West Slope storage space and tunnel capacity in wet years.
Dual Water System	System with separate infrastructure that enables potable supplies to be used for domestic demands and raw supplies to be used for outdoor irrigation.
Master Meter	Water meter through which the Town's potable water supply on the east side of I-25 is delivered by Central Weld to the Town for distribution.
Potable	Municipal water supply treated to drinking water quality standards.
Raw	Non-treated municipal water supply available for irrigation use. Synonymous with "non-potable."
Raw Losses	Losses occurring between the source of supply and the point of delivery to the Town's raw water customers.
Surcharge/Loss	Equal to 25% of the volume delivered to the Town's potable customer meters on the east side of I-25. Includes contractual obligations to Central Weld and other potable system losses.
Water Demand	Potable water demand is the volume of water required at the water treatment plant, including Surcharge/Loss. Raw water demand is the projected water use plus Raw Losses.
Water Meter	Instrument used to measure the volume of water delivered to a customer.
Water Use	Volume of water measured at the customer water meter.
Water Use Factor	Factors developed to represent baseline indoor and outdoor water use for each customer category (e.g., residential and commercial) per representative unit (e.g., per capita or per account).

### Acknowledgements

ELEMENT would like to thank the following Town of Frederick staff who were instrumental in the development of this Long-Term Water Resources Plan:

- Bryan Ostler, Town Manager
- Kevin Ash, Engineering Director
- Sarah Watson, Civil Engineer

Town staff and ELEMENT would also like to thank Frederick's Board of Trustees for its review and support of the Long-term Water Resources Plan. It is with your support that the Town of Frederick will continue to provide a reliable drinking water supply to residents and businesses into the future.

- Tracie Crites, Mayor
- Dan March, Mayor Pro Tem
- Kevin Brown, Trustee
- Mark Lamach, Trustee
- Adam Mahan, Trustee
- Rusty O'Neal, Trustee
- Windi Padia, Trustee

## 1. INTRODUCTION

The Town of Frederick (Frederick or Town herein) is located in southern Weld County, Colorado, situated along Interstate 25 (I-25) and generally north of Highway 52 (**Figure 1**). Frederick provides potable water service to customers located east of I-25 as well as raw water to customers within the Town’s boundaries. The Town has an agreement with Left Hand Water District to supply potable water to customers located west of I-25. The water demands considered as part of this Long-Term Water Resources Plan (Long-Term Plan) include potable demands for customers east of I-25 and raw demands throughout the Town’s entire “planning area” that extends to Highway 119 to the north, Weld County Road (WCR) 1 to the west, and WCR19 to the east (**Figure 1**).

Frederick was established in 1907 adjacent to the Denver Pacific Railway because local coal deposits in the “Carbon Valley” area were being used to supply fuel for locomotives. Over time, Frederick’s major industry shifted from coal mining to be more diversified with manufacturing, oil and gas operations, and construction. I-25 was completed in 1969 and linked the Carbon Valley with Interstate 70 and the rest of the Front Range region, thereby expanding opportunities for industrial and suburban-style growth and development. Frederick has been experiencing significant growth, which generally aligns with the job and population growth experienced in recent decades across the Colorado Front Range. Frederick is a sought-after community that features a high quality of life and local businesses that serve Town residents, and consequently is attracting an increasing number of Boulder- and Denver-area commuters.

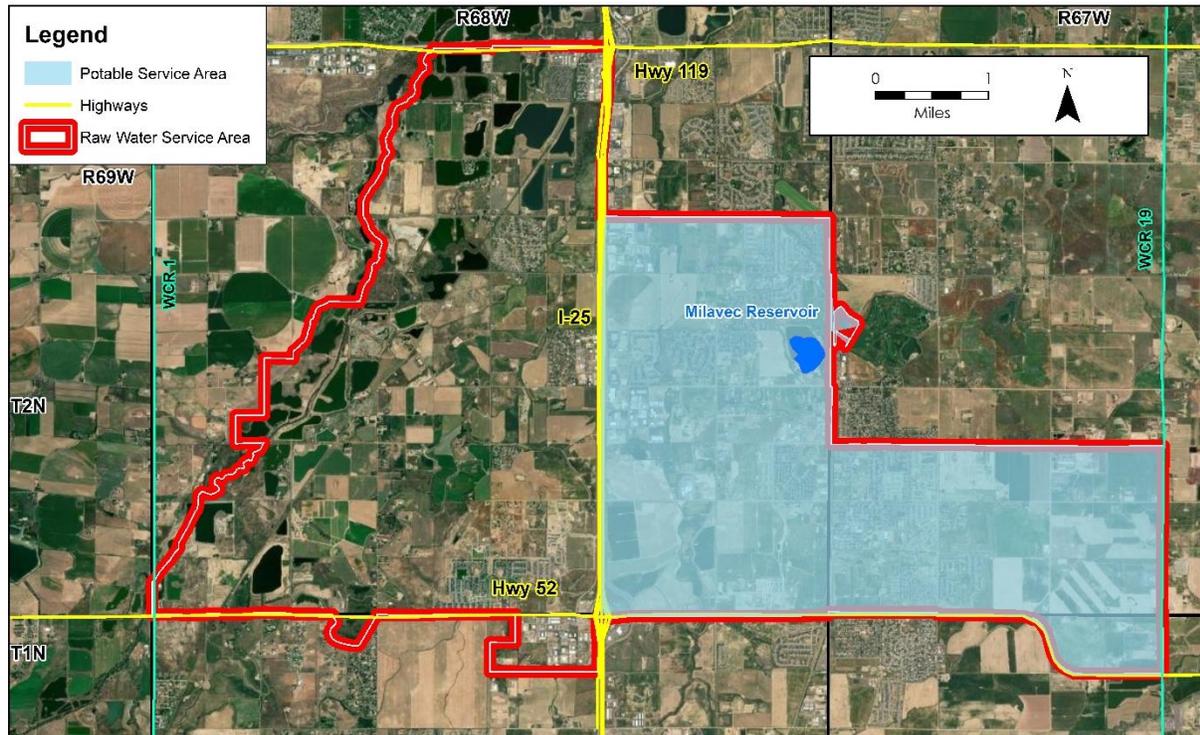


Figure 1: Town of Frederick General Location Map.

## 1.1 PURPOSE

Frederick has been experiencing significant population growth, and water demands are projected to continue increasing due to the relatively large amount of undeveloped land within its potable and raw service areas. The Town's current water supply portfolio is insufficient to meet its existing service commitments and projected raw and potable demands; however, Frederick is committed to developing and operating its water system to provide a dependable water supply to its current and future customers. To this end, the Town has undertaken efforts to update its water resources planning to evaluate demand-side and supply-side management options to provide a reliable water supply. This Long-Term Plan is intended to provide Town residents, staff, and the Board of Trustees with an understanding of the following:

1. Projected potable and raw demands over the next 50 years;
2. Demands that are capable of being met using supplies that the Town presently owns or is actively developing;
3. The range of projected future supply gaps; and
4. Recommended projects and implementation strategies for eliminating projected shortages.

The Town prepared water planning analyses as part of the Long-Term Plan effort to assess the ability of Frederick's water supply system to meet the Town's potable and raw water needs over the next 50 years. The Town used historical population and metered water use data to develop baseline potable water use factors, which were paired with growth projections and varying degrees of water efficiency<sup>1</sup> efforts and impacts of climate change to evaluate future potable demands. Potable demand projections are compared against the Town's existing and new supplies being developed to identify the range of projected shortages and identify recommended projects to close the supply gap.

Raw water demand projections were largely based on the Town's 2008 Raw Water Infrastructure Master Plan (2008 Raw Plan). The 2008 Raw Plan provides a comprehensive evaluation of then-current and future opportunities for the use of raw water supplies to meet non-residential irrigation demands throughout the Town. While prepared over a decade ago, the 2008 Raw Plan continues to provide the best-available representation of potential future raw water demands; however, refinements were made as appropriate using updated information provided by Town staff about recent and proposed development projects. The Town compared the raw water demand projections against its portfolio of ditch and storage water rights to assess the potential for future supply shortages and to demonstrate the need for the Town's pending Water Court application to change the use of a portion of its Lower Boulder Ditch shares.

This document is intended to support Frederick's decision-making regarding the implementation of water supply and demand-reduction projects, policy updates related to new development, and financial planning to address future water needs. Where necessary, the Town made reasonable planning assumptions based on the best-available information at the time of this effort; however, updates will be required as new information becomes available related to supply and demand conditions. The Long-Term Plan was developed under the direction of Town staff with input from the Board of Trustees.

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<sup>1</sup> The terms "water conservation," "water efficiency," and "demand management" are generally interchangeable throughout this report.

# TOWN OF FREDERICK LONG-TERM WATER RESOURCES PLAN

## 1.1.1 RELATED PLANNING EFFORTS

Frederick adopted a 10-Year Water Resources Plan on December 14, 2021 (10-Year Plan), which evaluated projected near-term potable and raw conditions and outlined a specific implementation plan for developing adequate supplies to meet projected demands over the next decade. The 10-Year Plan was intended to guide the path forward until additional potable supplies are anticipated to be available from the Northern Integrated Supply Project (NISP), as further discussed herein. The Town also updated its Water Efficiency Plan in 2022 (2022 WEP), building on the prior version prepared in 2011. The 2022 WEP evaluates potential demand reductions and the recommended timing for implementation of water conservation and efficiency programs to achieve the targeted reductions over the next 7 to 10 years.<sup>2</sup> Information from the 2022 WEP is integrated into the demand projections that were prepared as part of this Long-Term Plan. The Long-Term Plan complements the shorter-term planning efforts and is intended to guide actions that need to be implemented in the coming decades.

The Town’s Comprehensive Plan, which was most recently updated in 2016, is used by the Town to help guide decision making related to new growth. Town staff relied upon land use information presented in the Comprehensive Plan (**Figure 2**), along with recent development trends, to develop growth projections that were used by the Town to prepare the water demand projections presented herein.

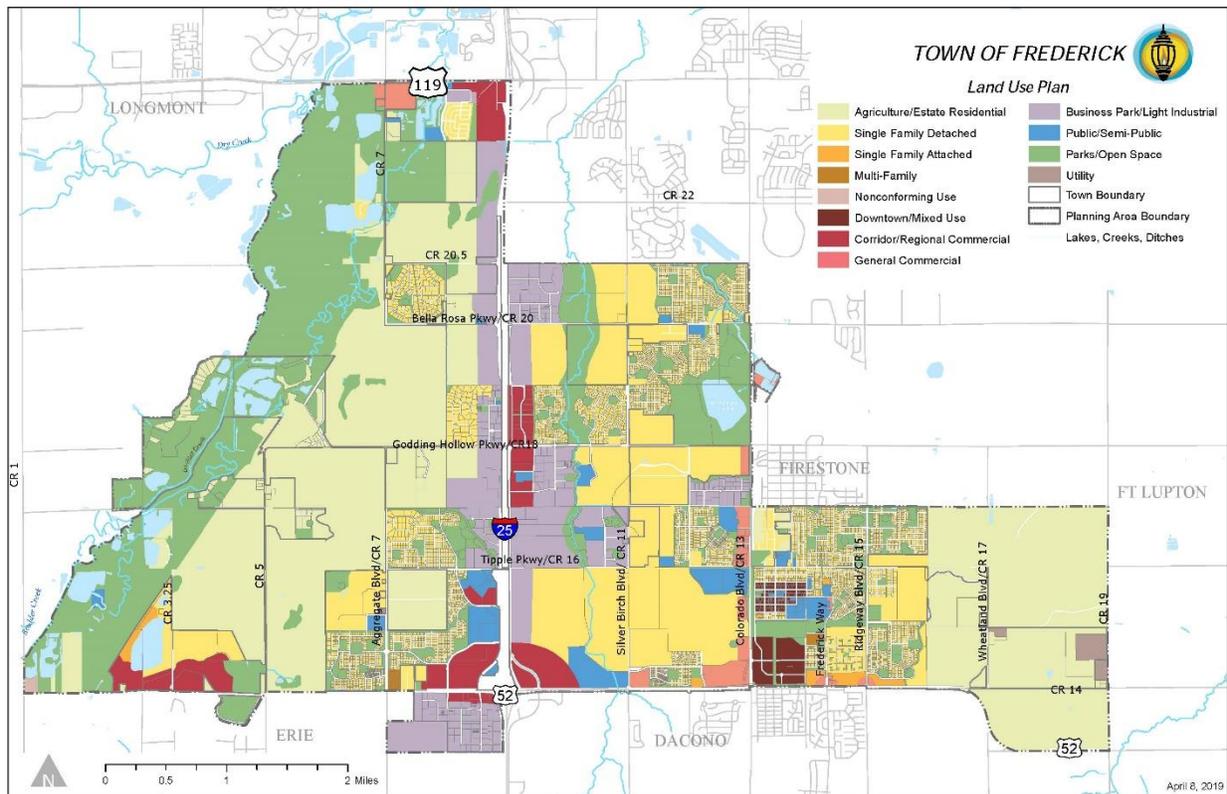


Figure 2: Town of Frederick Land Use Plan.

<sup>2</sup> The 2022 Water Efficiency Plan was adopted on March 22, 2022.

## 2. POTABLE SUPPLY AND DEMAND CONDITIONS

The purpose of this section is to summarize the Town’s projected potable demands over the 50-year planning period compared against the Town’s existing and planned new supplies to identify the range of projected shortages.

### 2.1 CURRENT CONDITIONS

The Town currently provides potable water service to a total of approximately 4,100 customer connections within its potable service area on the east side of I-25. The potable service area population was approximately 12,000 in 2020, and the total Town population has been growing at an average rate of 6.15% over the last 10 years (Simmons, 2021). Potable water demand has been increasing similarly (Figure 3).

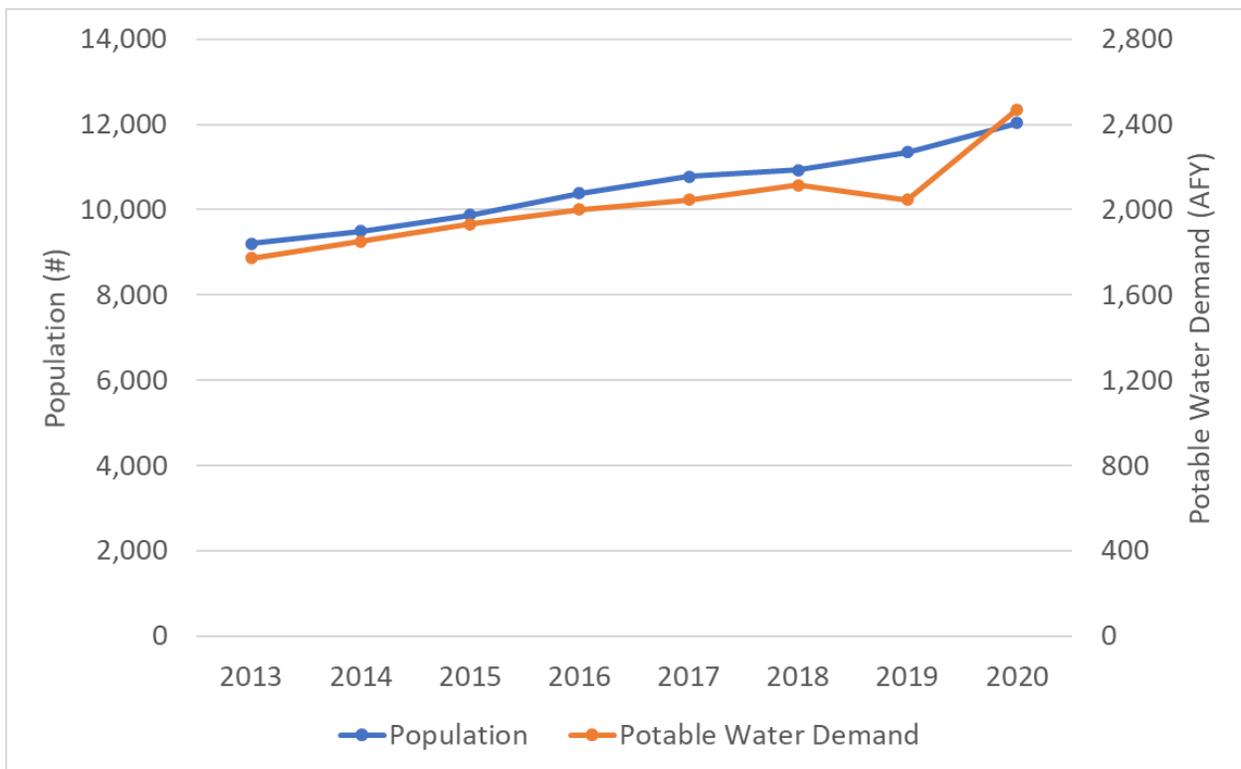


Figure 3: Historical Population for Potable Service Area and Potable Demand, 2013-2020.

The Town’s existing potable water supply consists entirely of Colorado-Big Thompson (C-BT) project water,<sup>3</sup> which is treated and delivered to the Town by Central Weld County Water District (Central Weld). Central Weld treats the Town’s C-BT water at the Carter Lake Filter Plant, which is approximately 20 miles northwest of the Town (Figure 4), and then delivers water to the Town’s master meters. Under the Town’s potable water service agreement with Central Weld, Frederick must provide Central Weld with water in an amount equal to 120% of the volume delivered through the Town’s master meters, which is intended to account for system, treatment, delivery, and metering losses (Frederick-Central Weld, 1998). In order to account for the contractual requirements with

<sup>3</sup> The Town’s Windy Gap supplies also may be used to meet potable demand; however, the Town only began taking delivery of those supplies in 2021 and has not yet used them to meet potable demands.

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Central Weld and additional losses between the master meters and the Town’s customer meters, potable demand requirements were calculated to be 25% greater than the metered water use to account for “Surcharge/Loss.” A schematic of the Town’s current potable water system is provided on **Figure 5**.

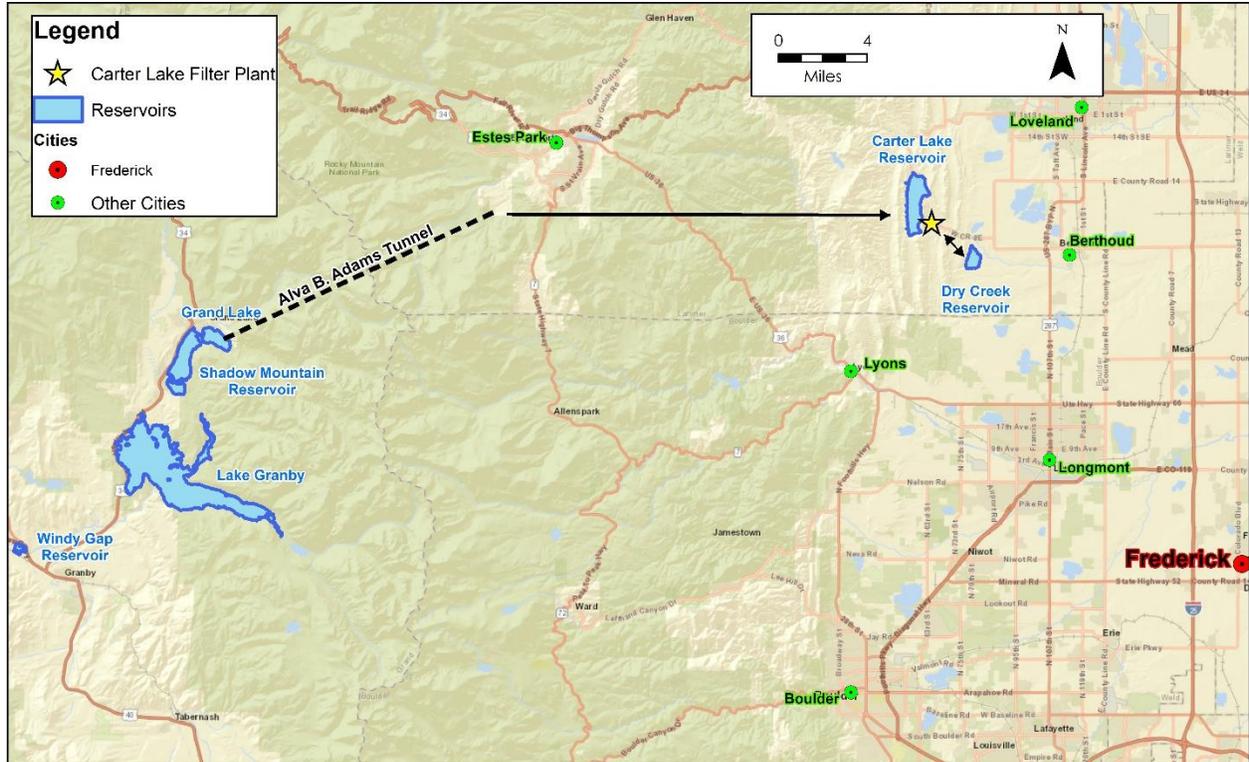


Figure 4: Current Potable Supply Vicinity Map.

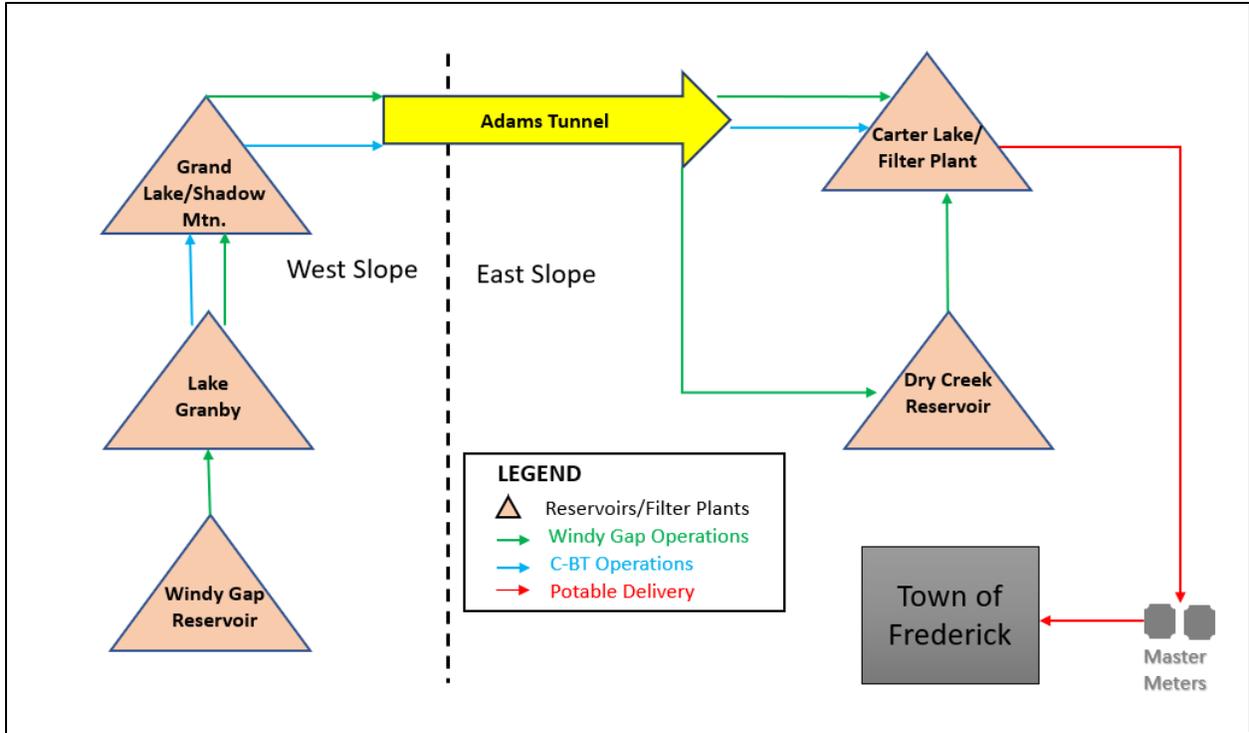


Figure 5: Current Potable Supply Schematic.

The C-BT Project is operated and administered by Northern Colorado Water Conservancy District (Northern Water). Northern Water determines the annual “quota” of water available to C-BT units, which has historically ranged from 0.5 to 1.0 acre-feet per year (AFY) per unit with an average of 0.74 AFY/unit from 1957 – 2020 (Northern Water, 2020). The Town currently owns 4,373 C-BT units, indicating that the total annual supply can range from approximately 2,190 to approximately 4,370 AFY depending on the annual quota and would average approximately 3,240 AFY based on historical conditions.

The Town’s current C-BT supplies are sufficient to meet current demands at a C-BT quota of 0.6 AFY/unit or higher; however, shortages are possible with a quota of 0.5 AFY/unit that would require the Town to implement demand management measures (e.g., watering restrictions). In addition to the Town’s current demands, there are pending development projects for which the Town has committed to provide water service using its current supply portfolio. The potable demand for these “pending commitments” is approximately 680 AFY, which exacerbates the potential for shortages under current supply conditions when that demand is added to the current demand (**Figure 6**). A key objective of the 10-Year Plan was to develop a clear path toward satisfying the Town’s existing service commitments and developing adequate supplies to support new commercial customers.

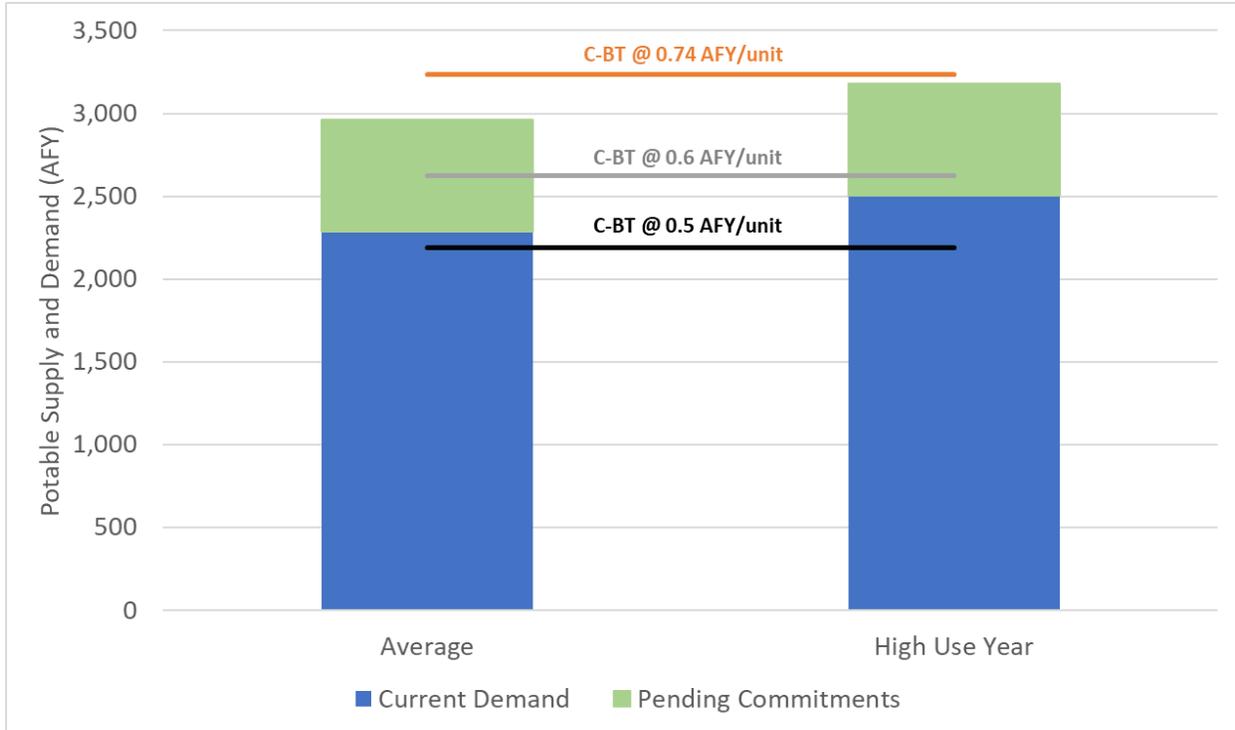


Figure 6: Frederick's Current Potable Supply and Demand Conditions.

## 2.2 POTABLE DEMAND PROJECTIONS

Baseline potable water use factors were developed for each of the Town's metered customer categories to be used for projecting the Town's future water demands. Residential (single-family plus multi-family) baseline water use factors were calculated on a per capita basis, expressed as gallons per capita per day (gpcd), while non-residential baseline water use factors were calculated based on the annual water use per account (AFY/account). These baseline water use factors, as further categorized as indoor and outdoor water use, represent current water use conditions.

A scenario-based planning approach was employed to project a range of future potable demands. This approach acknowledges that the future is uncertain and provides a range of reasonable future conditions to support the Town's long-term planning. Scenario-based methods are becoming more commonly applied to water planning and were recently relied upon in preparing statewide water demand forecasts as presented in the Technical Update to the Colorado Water Plan (Technical Update).<sup>4</sup> Potential impacts to future water use from "demand drivers" including climate, technology, conservation, and growth were incorporated into the statewide projections through an adjustment to the baseline water use factors. This approach recognizes that many planning factors may have combined effects on future conditions. The methodologies used for preparing the Town's potable water demand projections were influenced by the methodologies used for the Technical Update, as further described below.

<sup>4</sup> The Technical Update was published in 2019 by the Colorado Water Conservation Board (CWCB) to provide a consistent statewide framework for examining future water supply and demand under different planning scenarios and to provide tools and data for Basin Roundtables to update their Basin Implementation Plans and develop detailed local solutions to supply and demand gaps.

The Town prepared four future water demand planning scenarios by pairing the baseline water use factors with a set of demand drivers specified for each planning scenario, as described below and shown in **Table 1**. The demand drivers for water conservation, efficiency, and climate change impacts influence the magnitude of the projected demand over the 50-year period. Because all scenarios reach “buildout” within the 50-year period,<sup>5</sup> the growth rate drivers only influence the timing of the demand projections. The following provides additional detail and assumptions for each of the demand drivers.

- **Population growth:** Based on information from the Town’s planning department, the maximum population for potable water service at buildout for the Town is currently estimated to be approximately 42,400 people. This maximum population is applied to the residential water use factors for all scenarios. Two different annual growth rates were selected across the scenarios: 2.5% and 4%.<sup>6</sup> For scenarios applying a 2.5% annual growth rate, residential buildout occurs by 2070. For scenarios applying a 4% annual growth rate, residential buildout occurs by 2060.
- **Residential indoor efficiency:** Residential indoor demands have generally been decreasing in recent years throughout the state, mostly influenced by advances in fixture and appliance technologies. The Technical Update relied upon end-use studies of existing homes and water efficiency benchmarks to prepare municipal residential indoor water use projections under five planning scenarios in the year 2050 (CWCB, 2019). These end-use studies indicated that a range of indoor water use of between 30 and 45 gpcd is appropriate to represent future indoor per capita water use depending on the efficiency assumptions for a given planning scenario. The selected residential indoor water use values were applied to all new future population plus a portion of the existing population. That portion of the existing population that is assumed to reduce its indoor water use and meet the indoor efficiency driver is referred to as the “adoption rate driver” and is further described below. The Town’s current/baseline residential indoor water use averages 46 gpcd, which informed the selection of the following future efficiency values for the potable scenarios:
  - 42.4 gpcd – represents a “current efficiency benchmark” for homes equipped with currently-available high efficiency fixtures and appliances that generally meet or exceed EPA WaterSense specifications.
  - 36.4 gpcd – represents “ultra-efficient” water use reflective of future advances in technology.
  - 33.3 gpcd – pairs “ultra-efficient” future water use with reduced household leakage.
- **Adoption rate:** The adoption rate represents the percentage of the existing (2020) population that will achieve the selected residential indoor water use driver for a given scenario. This assumes that the adopting population will reduce their indoor water use over time to meet the future indoor per capita driver due to the use of more efficient indoor technologies. The Town’s planning scenarios assume adoption rates ranging from 40% to 75% of the existing population. This range is comparable to the range of adoption rates used in the Technical Update. For example, if the select scenario’s adoption rate is 55% and the indoor efficiency is 36.4 gpcd, that scenario would assume that all new population would use 36.4 gpcd indoors and 55% of the 2020 population would use 36.4 gpcd indoors by 2070, while the remaining 45% of the 2020 population would continue to use the current indoor residential baseline rate of 46 gpcd.

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<sup>5</sup> “Buildout” is the maximum residential population and non-residential development currently being planned for; however, growth may continue to occur beyond this level due to redevelopment and/or infill.

<sup>6</sup> 2.5% represents the Town’s current planning growth rate and 4% represents a faster growth rate closer to the growth experienced over the last 10 years. These rates were provided by the Town’s Planning Director.

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- **Non-residential growth:** The Town’s planning department provided information about the amount of non-residential developed space that is expected at buildout, which was used to calculate the amount of future non-residential development. Non-residential developed space was projected to increase at a 2.5% annual growth rate under all of the Town’s planning scenarios, reaching the maximum level of development around 2060.
- **Non-residential indoor conservation:** As described in the Technical Update, it is impractical to develop non-residential indoor water usage benchmarks due to variations in customer types, developed space, and water use characteristics for commercial and industrial water customers. However, some amount of reduced indoor water use may be possible through future advances in fixture and appliance technology. Accordingly, the Town’s planning scenarios applied non-residential indoor water use reductions ranging from 0% to 5% from the baseline water use factors. Therefore, depending on the scenario, a certain percentage reduction is applied to the non-residential indoor baseline water use factor (AFY/unit) based on future indoor efficiency assumptions.
- **Outdoor water conservation:** Future outdoor water use may be reduced due to advances in irrigation system technology as well as more rigorous regulations should they be adopted by the Town. The Town’s recent 2022 WEP focuses on developing outdoor water efficiency programs in the shorter-term and future plan updates were assumed to continue advancing this effort. Actual outdoor water savings will be dependent on the outdoor efficiency programs, the regulations adopted by the Town, and the engagement level of customers. To reflect varying levels of water use reductions through efficiency programs, the Town’s planning scenarios applied outdoor water use reductions ranging from 5% to 20%.
- **Climate adjustment factor:** Future changes in climate are assumed to affect future outdoor water use, with warmer and drier conditions increasing evapotranspiration rates, extending growing seasons, and influencing customers to apply more water to outdoor use for longer periods. Climate drivers were prepared by County in support of the Technical Update for “In Between” and “Hot and Dry” conditions in the year 2050. Based on information prepared for the Technical Update for Weld County, the Town selected a climate adjustment factor of 14% that was applied to increase all outdoor water use in one of the scenarios. Climate change studies typically represent the impacts of climate change at a future point in time relative to current conditions rather than as an annual rate of impact. For illustrative purposes, the analysis assumes that the 14% increase is evenly distributed through 2050 when the full adjustment factor is reached, and no further adjustment is applied beyond 2050.

**Table 1: Scenario Demand Drivers for Potable Demand Projections.**

Scenario	Population Growth (%)	Res Indoor (gpcd)	Adoption Rate (%)	Non-Res Growth (%)	Non-Res Indoor Conservation (%)	Outdoor Conservation (%)	Climate Adjustment Factor (%)**
Low Conservation	2.5%	42.4	40%	2.5%	0.0%	-5%	0%
Moderate Conservation	4.0%*	36.4	55%	2.5%	-2.0%	-10%	0%
High Conservation	2.5%	36.4	75%	2.5%	-5.0%	-20%	0%
Highest Conservation with Climate	2.5%	33.3	75%	2.5%	-5.0%	-20%	14%

\* Population growth is assumed to have an annual growth rate of 2.5% through 2034 and 4% from 2035 through buildout.

\*\* Climate adjustment factor is based on information prepared for the Technical Update for Weld County by 2050.

The following summarizes the basis and intent for each of the four future potable water demand scenarios.

1. **Low Conservation Scenario:** This scenario represents the lowest level of conservation and efficiency overall. Residential indoor water use achieves the current efficiency benchmark for efficient homes and assumes the lowest adoption rate with 40% of the existing (2020) population becoming more efficient. Current trends in non-residential indoor water use continue and minimal outdoor water use reduction is achieved.
2. **Moderate Conservation Scenario:** This scenario represents moderate outdoor conservation and assumes faster population growth. This scenario assumes that the Town actively promotes or incentivizes indoor water efficiency to achieve higher indoor water efficiency and a moderate adoption rate with 55% of the existing (2020) population becoming more efficient.
3. **High Conservation Scenario:** This scenario represents the second highest level of conservation and efficiency overall. Residential indoor water use achieves ultra-efficient per capita use and assumes the highest adoption rate with 75% of the existing (2020) population becoming more efficient. This scenario assumes that the Town actively and aggressively incentivizes water use reductions, implements advanced conservation programs, and adopts low water use regulations.
4. **Highest Conservation Scenario with Climate Adjustment:** This scenario represents the highest and most aggressive level of conservation and efficiency paired with the impacts from a warmer and drier future climate. Residential indoor water use achieves ultra-efficient per capita use with reduced indoor leakage and assumes the highest adoption rate with 75% of the existing (2020) population becoming more efficient. The effects of climate increasing outdoor demands offsets a portion of the outdoor water use savings achieved through conservation. Should climate change be experienced as illustrated under this scenario, it is reasonable to assume that the Town will actively seek to further reduce demands.

The projected potable demands range from 6,650 AFY to 7,710 AFY, showing a planning range of approximately 1,060 AFY at buildout (**Figure 7**).

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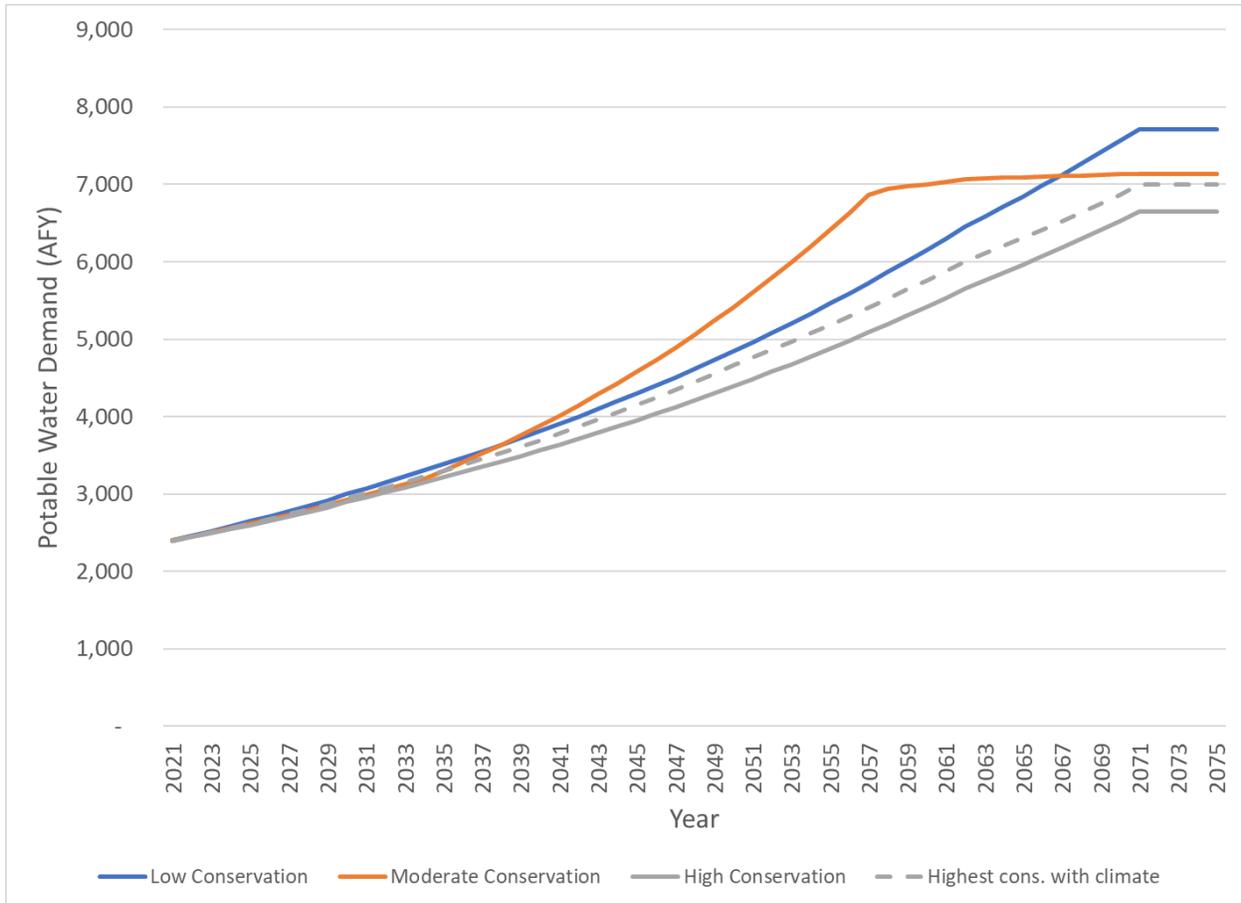


Figure 7: Annual Potable Water Demand Projections, 2021 - 2075.

2.3 EXISTING AND FUTURE PLANNED POTABLE SUPPLIES

The Town’s existing and future planned potable supplies consist of C-BT units, Windy Gap units, NISP participant supplies, and Lower Boulder Ditch shares, as summarized below. How these supplies integrate into the Town’s implementation plans is discussed below in Section 4.

- C-BT:** The Town currently owns 4,373 C-BT units. The Town can acquire additional units while complying with the “ownership limitation” that is imposed by Northern Water for domestic and municipal users. The Town’s current C-BT ownership limitation specified by Northern Water is 4,741 total units, but Town staff estimate that if an updated analysis were requested of Northern Water, the ownership limitation could increase to 4,987 total units.<sup>7</sup> It has been assumed that the Town will likely reach the cap of 4,987 units through future purchases and dedications. The dependable yield from 4,987 C-BT units is estimated to be 2,992 AFY based on an average annual quota of 0.6 AFY per C-BT unit.<sup>8</sup>
- NISP:** Frederick is a participant in NISP, which is being developed and will be implemented by Northern Water, and has subscribed for a dependable annual yield of 2,600 AFY. The Town’s subscribed amount represents 6.5% the total 40,000 AFY of firm supply planned to be developed under NISP. NISP integrates two new reservoirs as part of its planned system: Glade Reservoir near Fort Collins and Galeton Reservoir near Greeley. The NISP delivery

<sup>7</sup> It is possible that the Town’s ownership limitation may be further increased in the future if C-BT units are dedicated by developers under certain circumstances; however, this is challenging to accurately predict.

<sup>8</sup> The Town uses 0.6 AFY per C-BT unit for supply planning purposes.

pipeline will integrate with the C-BT delivery system; therefore, many participants in NISP also own and utilize C-BT supplies (**Figure 8**). NISP supplies are sourced from the Cache la Poudre River watershed whereas C-BT supplies are sourced from the Colorado River watershed, which is beneficial to the Town in the event a supply limitation occurs in one basin but not the other (e.g., supply impacts due to a wildfire). NISP also differs from C-BT in that at least portions of the supply will be reusable, whereas C-BT may be used only once. This provides an opportunity for the Town to extend the total yield from NISP by filing a future Water Court application to reuse the unconsumed portion of deliveries (i.e., the return flows). NISP is unlikely to be available for delivery to the Town until 2030 or later, and there are outstanding permitting and other requirements and contingencies that must be addressed by Northern Water before the certainty of this supply can be confirmed (see Section 4).

- **Windy Gap:** Frederick currently owns 7.0 Windy Gap units that were purchased in 2018. The Town's 7.0 Windy Gap units are not included as part of the Windy Gap Firming Project being implemented by Northern Water; however, the Town has entered into a long-term lease agreement for 2,000 AF of storage space in Dry Creek Reservoir (see **Figure 4** and **Figure 5**) to independently firm its Windy Gap supplies. The dependable yield of the Town's 7.0 Windy Gap units after firming in Dry Creek Reservoir and without reuse is estimated to range from 265 to 315 AFY. A dependable yield of 265 AFY was assumed for the current analysis, but the yield estimate will continue to be refined as the project operates and the Town pursues a plan to reuse the unconsumed portion of Windy Gap deliveries. Our modeling shows that the 2,000 AF of leased Dry Creek Reservoir storage capacity is sufficient to firm up to 8.0 total Windy Gap units; therefore, the 10-Year Plan identified purchasing an additional 1.0 unit as a recommend project if the opportunity arises.
- **Lower Boulder Ditch:** Frederick is the largest shareholder in the Lower Boulder Ditch Company (LBDC) with 18.4% of total Preferred shares and 22.1% of total Common shares. ELEMENT is preparing the technical analyses to support the Water Court application filed in Case No. 21CW3138 to change the use of most of the Town's LBDC shares. The Town may use its LBDC shares to provide a raw water supply as described in Section 3, or may use changed LBDC shares to supply potable demands if a local water treatment plant (WTP) is constructed. Section 3.3 and Table 3 further elaborate on the estimated yield of the changed LBDC shares, and Section 4.1.7 discusses potable use of this supply.

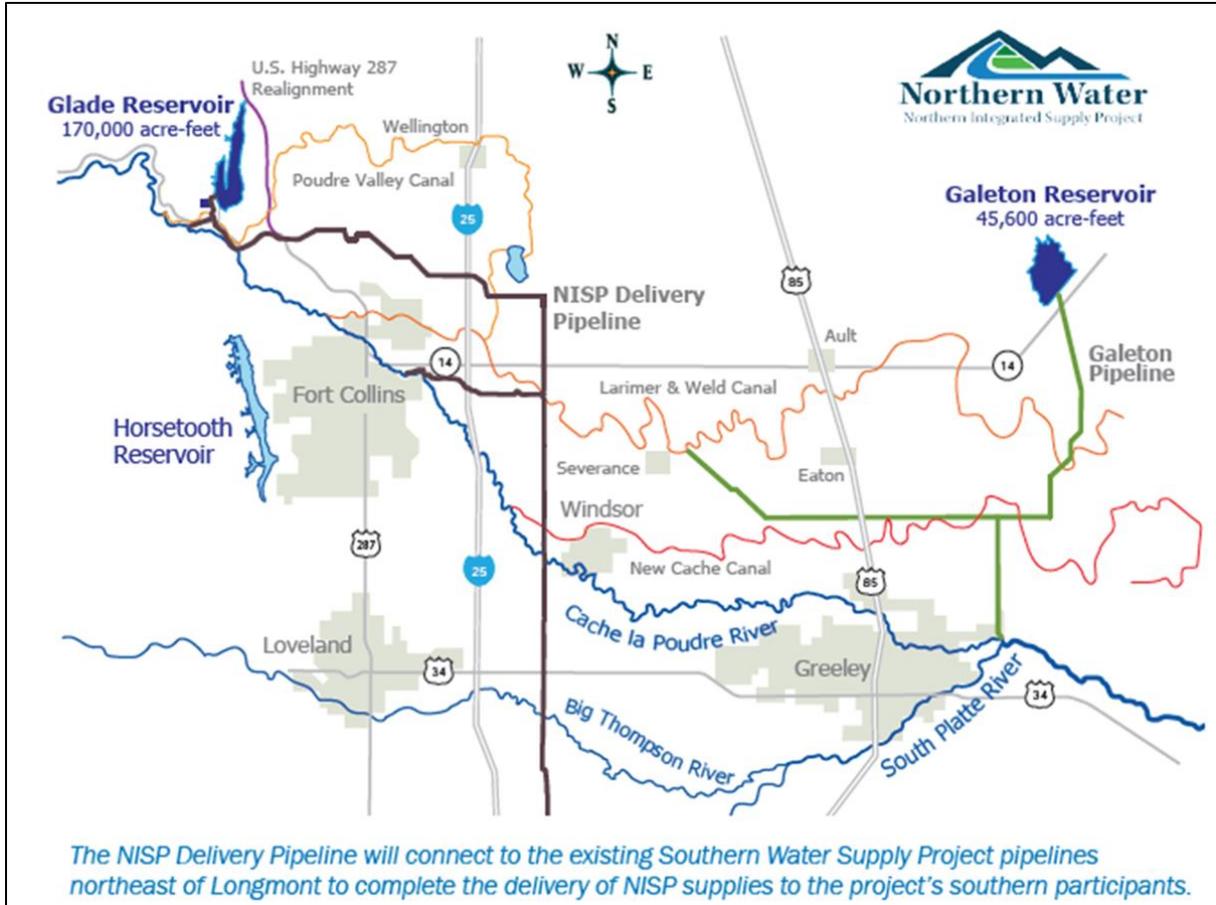


Figure 8: Northern Integrated Supply Project Delivery System.<sup>9</sup>

The Town's potable supplies being developed under the 10-Year Plan are projected to be capable of meeting the Town's potable demands through 2033 or 2036, depending on the demand projection scenario. After those dates, the Town's projected demands have the potential to exceed available supplies if additional projects are not successfully implemented. The Town's path forward to address the projected potable supply shortage is discussed below in Section 4.

### 3. RAW WATER SUPPLY AND DEMAND CONDITIONS

The purpose of this section is to summarize the Town's projected raw demands over the 50-year planning period compared against the Town's existing and planned new supplies being developed to identify projected shortages.

The Town's raw water system is an integral component of its water supply portfolio because it reduces potable supply requirements and the amount of water that needs to be treated to drinking water quality standards. Frederick is in an opportune location to make use of existing irrigation ditches as part of its raw water system, and the Town also has the capability to store and deliver raw water using Milavec Reservoir and its other small ponds. The Town's portfolio of raw water supplies includes Lower Boulder Ditch shares, Coal Ridge Ditch shares, and storage rights. The ditch systems

<sup>9</sup> NISP General Map obtained from: [https://www.northernwater.org/getattachment/81bf61df-0f04-4085-95f2-bc88380b4afe/NISP\\_General\\_Map](https://www.northernwater.org/getattachment/81bf61df-0f04-4085-95f2-bc88380b4afe/NISP_General_Map)

provide a physical means of delivering raw supplies to the Town, and storage aids in distributing supplies to meet raw demands (**Figure 9**).

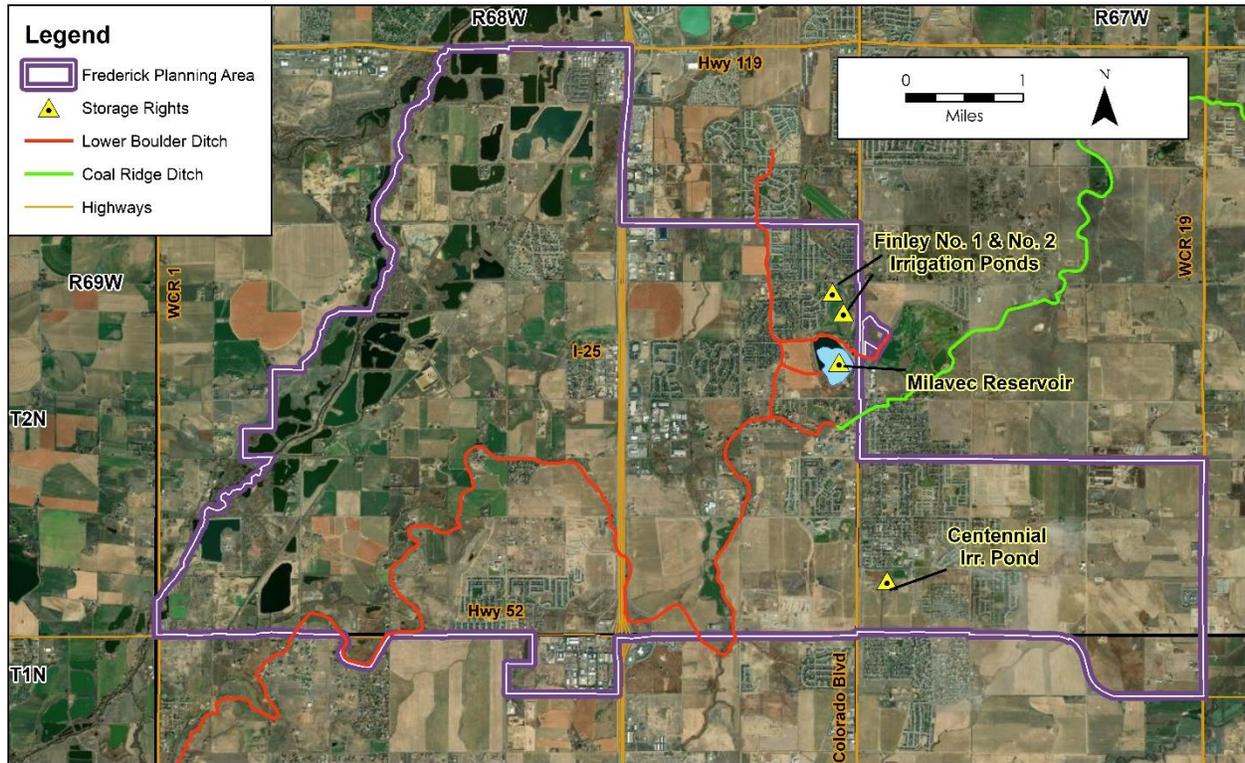


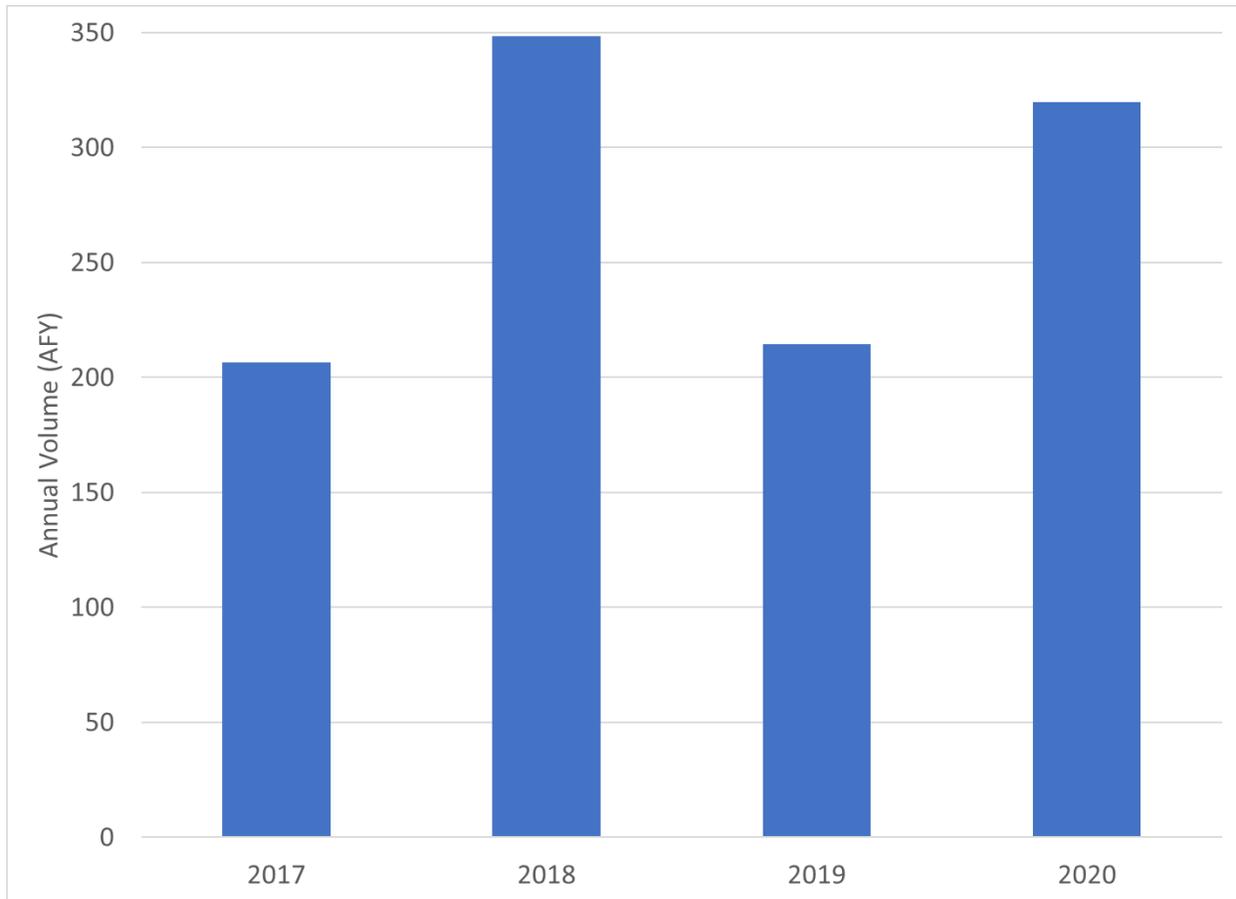
Figure 9. Existing Raw Water Supply Location Map.

### 3.1 CURRENT CONDITIONS

The Town operates a raw water system for irrigation, which is currently supplied with water stored in Milavec Reservoir, Centennial Irrigation Pond, and Finley No. 1 and No. 2 Irrigation Ponds (**Figure 9**). To a limited degree, the Town also delivers raw water directly from the Lower Boulder Ditch, and this type of operation will be expanded in the future as development occurs adjacent to the ditch. Stored supplies are delivered to irrigated lands via gravity and through the Town’s pressurized system. Unpressurized raw water deliveries are conveyed to storage reservoirs located on or near the end-user’s property, from which the users need their own pump stations to distribute the supplies to meet irrigation demands. Pressurized raw water deliveries connect directly to the end user’s irrigation system,<sup>10</sup> and the Town charges additional fees for this level of service.

As of 2020 the Town was serving raw water to 13 metered accounts, which include a combination of accounts with established landscapes and ones that are under development. The metered raw water use by these accounts from 2017 – 2020 averaged approximately 270 AFY, with the highest use of approximately 350 AFY occurring in 2018 (**Figure 10**). As would be expected with irrigation, the vast majority of raw water usage occurs from April through October, with the highest usage in the hottest summer months; however, there is a small amount of winter use by some accounts. Recent raw water usage data were used by the Town to develop a monthly demand curve, which was then used to distribute future annual demands.

<sup>10</sup> Pressurized system customers are required to have on-site storage to meet their peak demands.



*Figure 10: Total Annual Metered Raw Water Use, 2017 - 2020.*

### 3.2 RAW DEMAND PROJECTIONS

A forecast of future raw water demands to be supplied using the Town's portfolio of irrigation water rights was prepared using the methodologies described below. Raw water demands were initially classified by the time period in which the demand is projected to come online.

- **Existing raw water demands:** The recent metered water use described in the previous section was used to characterize existing raw water demands. The locations of use were digitized in GIS based on information provided by the Town.
- **In-development raw water demands:** The Town identified areas that are expected to be developed by 2030 that may be connected to the raw water system. A combination of information from individual development plans and irrigation assumptions from the 2008 Raw Plan was used to assign demand values to these locations.
- **Long-term raw water demands:** The 2008 Raw Plan analyzed the Town's total potential future raw water demands at buildout and prepared a conceptual infrastructure plan for irrigating these areas. Information presented in the 2008 Raw Plan was primarily relied upon in development of this Long-Term Plan to characterize raw water demands at buildout, although some modifications were made based on direction from Town staff to reflect more recent changes in development plans (**Figure 11**). Existing and in-development raw water demands were deducted from the buildout values to determine longer-term raw demands. Properties toward the western extent of the Town's planning area are not anticipated to be connected to the Town's system and were assumed to use independently-owned supplies.

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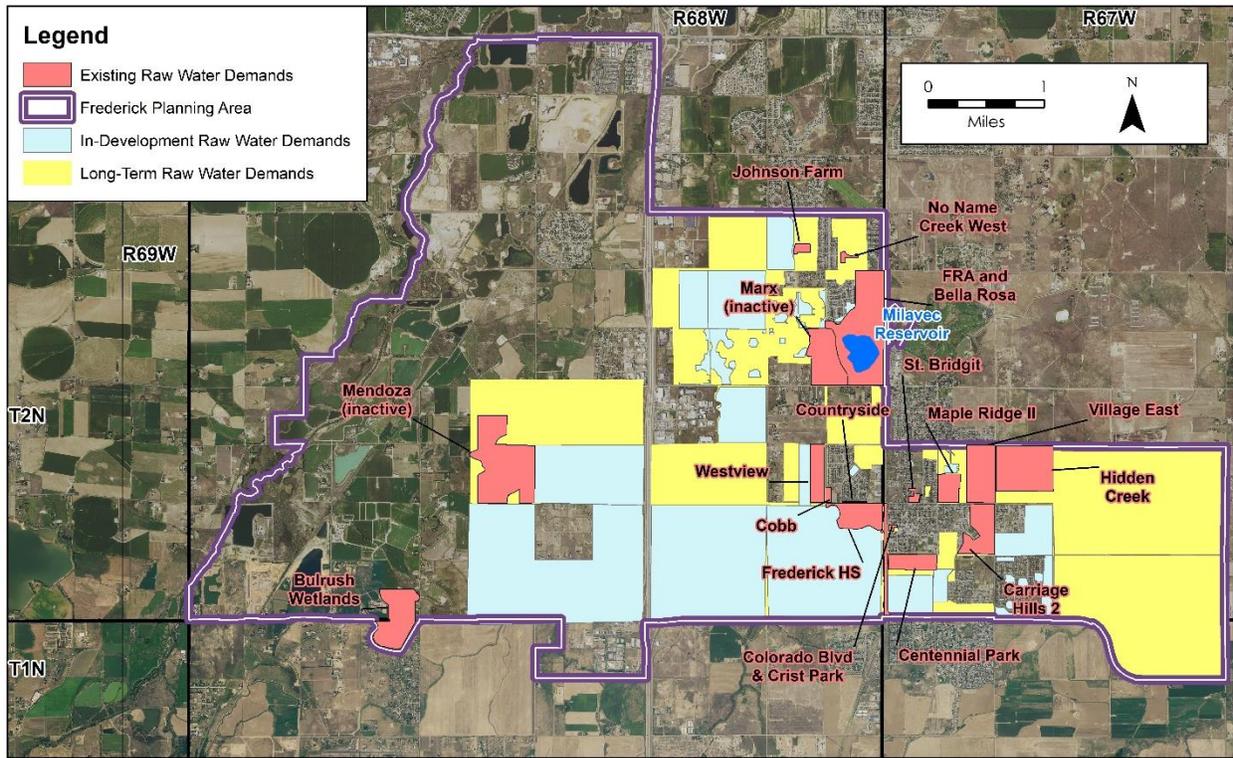


Figure 11: Existing Raw Water Use Areas and Potential Future Development Coverage.

The existing raw water demand for customers with established landscapes is approximately 250 AFY. Raw water demands are projected to be approximately 1,030 AFY by the year 2030 and will be approximately 1,960 AFY at buildout, which is anticipated to occur within the 50-year planning period. These raw demands are in addition to the potable demands discussed above in Section 2.2. The source of supply needed to irrigate a given site is dependent on its location and the following supply considerations, which were used to sub-classify the buildout raw water demands as presented in **Table 2**.

- Unchanged<sup>11</sup> Lower Boulder Ditch Company (LBDC) and Coal Ridge Ditch Company (CRDC) shares may generally be used on lands lying downgradient from the applicable ditch that are not encumbered by a dry-up restriction.
- Changed LBDC shares may be used on lands located upgradient of the ditch and when lands below the ditch are encumbered by a dry-up restriction.<sup>12</sup>
- The Milavec Reservoir senior storage right may be used on lands lying downgradient of the reservoir.
- The Milavec Reservoir junior storage rights and the storage rights for Finley No. 1 Irrigation Pond, Finley No. 2 Irrigation Pond, and Centennial Irrigation Pond may be used anywhere within Frederick's present and future service area.

<sup>11</sup> "Unchanged" refers to irrigation water rights that are diverted and used pursuant to their original decree(s). "Changed" refers to water rights that either have undergone a change of use in Water Court to allow for new types of use and/or new locations of use not allowed under the original decree or the subject of a pending water court change application and Substitute Water Supply Plan request.

<sup>12</sup> When irrigation water rights are changed in Water Court, the lands historically irrigated with those water rights are typically required to be removed from irrigation ("dried up").

*Table 2: Raw Demand Summary.*

Demands Supplied from Ditch (AFY)			Demands Supplied from Milavec (AFY)				TOTAL (AFY)
Unchanged LBDC and CRDC	Changed LBDC	Total	Unchanged LBDC and CRDC*	Milavec Senior Storage Right	Changed LBDC or Junior Storage Rights**	Total	
7	703	710	423	67	763	1,253	1,963

\*Supplies will be temporarily detained in reservoir for less than 72 hours.

\*\*These supplies may be used anywhere within the Town’s service area, and therefore, may be used to meet demands from storage that are classified otherwise.

Of the projected raw demands to be met with unchanged supplies, most will be met using releases from Milavec Reservoir. Of the projected raw demands to be met with changed LBDC shares, approximately half of the demand will be met using supplies stored in Milavec Reservoir, and the other half will be met through direct deliveries from the ditch. In addition to the irrigation demands, the Town currently uses a portion of its Lower Boulder Ditch shares for maintenance of the Bulrush wetlands, and until recently, leased a portion of its shares for agricultural irrigation on the Mendoza and Marx properties.<sup>13</sup>

### 3.3 EXISTING AND FUTURE PLANNED RAW SUPPLIES

Following is a description of the Town’s water rights that may be used to supply raw demands. A summary of supply volumes is provided in **Table 3**; however, it should be noted that the representation of changed LBDC shares reflects the pending Water Court case having been successfully completed and a final decree having been issued as well as the Town having implemented all dry-up requirements and having the capability to satisfy all return flow obligations.

- **Lower Boulder Ditch shares:** Frederick is the largest LBDC shareholder with 36.8234 preferred shares and 43.7174 common shares. The Town filed a Water Court application in August 2021 in Case No. 21CW3138 to change the use of 30.8234 preferred LBDC shares and 40.7174 common LBDC shares. The Town also filed a substitute water supply plan (SWSP) request in November 2021 to allow for temporary use of a portion of the shares for changed purposes starting during the 2022 irrigation season. Shares that are not being changed will continue to be available for irrigation use on lands that are within the historical Lower Boulder Ditch service area downgradient from the ditch and that are not encumbered with dry-up restrictions. Unchanged LBDC shares will be entitled to the same supply that is made available to other LBDC shareholders that take delivery of water for irrigation uses under the ditch. The supply from shares to be changed will be limited to the “historical consumptive use” yield of those shares, as quantified by the Water Court.
- **Coal Ridge Ditch shares:** Frederick owns 8.0 shares in the CRDC that will remain unchanged. Therefore, the supply from these shares will be equal to the amount made available to other CRDC shareholders that take delivery of water for irrigation uses under the ditch.
- **Storage Rights:** Frederick has three storage rights decreed for Milavec Reservoir. The more senior right was decreed in Civil Action No. CA4842 for 768 ac-ft with an appropriation date of February 1, 1892, and a priority (i.e., administration) date of 1907. The more junior rights were decreed in Case No. 17CW3216 for an initial fill of 362 ac-ft and one refill, with an appropriation date of January 16, 2003, and a priority date of 2017. Frederick also has relatively junior storage rights for Finley No. 1 Irrigation Pond, Finley No. 2 Irrigation Pond, and Centennial Irrigation Pond as decreed in Case No. 17CW3216; these rights have a combined volume of 25.6 ac-ft for an initial fill and one refill.

<sup>13</sup> The Town is in the process of evaluating future uses at these properties.

**Table 3: Raw Supply Summary.**

Variable	Unchanged Supplies					Changed Supplies			TOTAL (AFY)
	Lower Boulder Ditch*		Coal Ridge Ditch*	Storage Rights**	Total	Lower Boulder Ditch*		Total	
	Preferred	Common				Preferred	Common		
No. Shares	6.0	3.0	8.0	NA	-	30.8234	40.7174	-	
Avg. Yield (AFY/share)	43.0	8.7	1.5	NA	-	26.9	5.4	-	
Total Avg. Yield (AFY)	258.2	26.0	11.8	636.9	<b>932.8</b>	829.0	220.4	<b>1,049.3</b>	<b>1,982.1</b>

\*Based on diversion records being relied upon in pending change of use Water Court application in Case 21CW3138.

\*\*Based on river call (CDSS, 2021a) and streamflow records from 2002 – 2015 (CDSS, 2021b).

### 3.4 RAW SUPPLY AND DEMAND OPERATIONS

Of the total projected raw demands, approximately 500 AFY can be supplied using unchanged LBDC and CRDC rights and the senior Milavec Reservoir storage right, and approximately 1,460 AFY of demands will require the use of changed LBDC shares or the Town’s junior storage rights. Raw water supplies can be delivered to meet the raw irrigation demands based on the location of use as follows:

1. Demands to be met using unchanged supplies delivered directly from the Lower Boulder Ditch.
2. Demands to be met using changed supplies delivered directly from the Lower Boulder Ditch.
3. Demands to be met using unchanged ditch supplies delivered from storage in Milavec Reservoir within 72 hours.
4. Demands to be met using changed supplies delivered from storage in Milavec Reservoir.
5. Demands to be met using the junior and senior storage rights stored in Milavec Reservoir and the Town’s other irrigation ponds.

**Figure 12** provides a schematic illustrating the operation of the Town’s raw water system, with additional descriptions provided below.

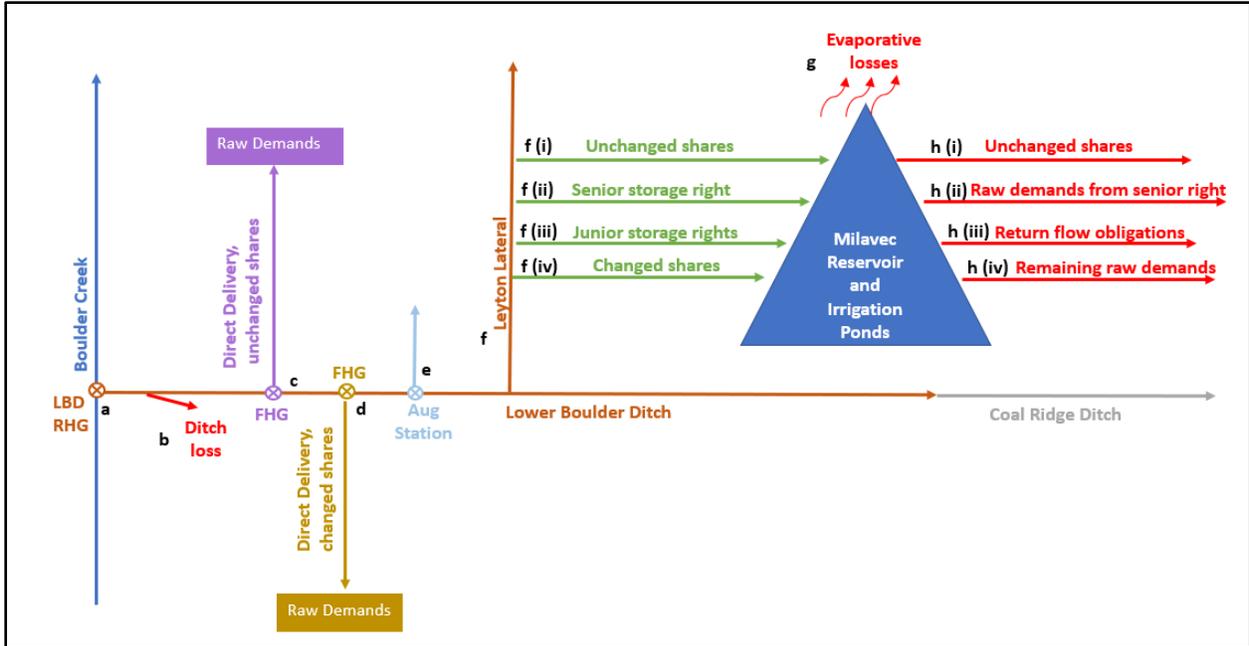


Figure 12: Frederick's Raw Water System Schematic.

The following describes the Town's raw water system operations from the Lower Boulder Ditch river headgate to the location of delivery to meet raw irrigation demands, as depicted in the simplified schematic shown above on **Figure 12**. Each bullet below describes operations at the associated lettered location in the system as shown on **Figure 12**.

- a. All raw supplies attributable to the Town's Lower Boulder Ditch preferred and common shares, Coal Ridge Ditch shares, and storage rights are diverted from Boulder Creek at the river headgate for the Lower Boulder Ditch (labeled as "LBD RHG").
- b. Ditch losses are assessed by the LBDC on all diverted supplies, including Milavec supplies that the Town carries in the ditch based on a carriage agreement with the LBDC. Ditch loss for the Lower Boulder Ditch is assumed to be 8% of the diverted supplies.
- c. A portion of unchanged LBDC supplies is directly delivered to irrigated areas located downgradient of the Lower Boulder Ditch. This is limited to areas of use that were historically within the LBDC service area and are not encumbered by a dry-up restriction.
- d. A portion of changed LBDC supplies is directly delivered to irrigated areas located upgradient of the Lower Boulder Ditch.
- e. A portion of changed LBDC supplies is delivered to augmentation stations to satisfy historical return flow obligations imposed by the Water Court decree or SWSP.
- f. The remaining Lower Boulder Ditch, Coal Ridge Ditch, and storage water right supplies are delivered to storage via the Leyton Lateral.
  - i. Unchanged irrigation ditch supplies are temporarily detained in Milavec Reservoir for up to 72 hours to meet raw water demands associated with lands located downgradient of the applicable ditch.
  - ii. Flows attributable to the Milavec Reservoir senior right are stored in Milavec Reservoir to meet the Town's raw water demands associated with lands located downgradient of the reservoir.
  - iii. Flows attributable to the Milavec Reservoir junior storage rights and junior rights for Finley No. 1 Irrigation Pond, Finley No. 2 Irrigation Pond and Centennial Irrigation Pond are stored to meet the Town's raw water demands.

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- iv. Changed LBDC supplies are stored in Milavec Reservoir to meet raw demands and satisfy historical return flow obligations imposed by the Water Court Decree or SWSP.
- g. Evaporative losses are assessed on the stored supplies in Milavec Reservoir.
- h. Water is released from Milavec Reservoir for the following uses:
  - i. Unchanged supplies are released to meet the remaining unchanged demands that are not met from direct use (i.e., use without prior storage). Unchanged direct-flow supplies cannot be detained for longer than 72 hours.
  - ii. Supplies attributable to the Milavec Reservoir senior storage right are released to meet demands downgradient of the Milavec Reservoir.
  - iii. Releases are made to satisfy any remaining return flow obligations that were imposed by the Water Court Decree or SWSP and that were not met using augmentation station deliveries.
  - iv. Stored supplies are released to meet the Town’s remaining raw demands: first to meet demands that can only use changed supplies, then to meet any unmet unchanged demands.

Raw water operations were modeled at buildout conditions to reflect monthly and annual variability in supply and irrigation demand conditions. During periods when demands exceeded the direct flow supplies and the available stored supplies, certain raw demands were unable to be met. **Table 4** summarizes the average unmet raw demands as well as the unmet LBDC return flow obligations over the 29-year modeling period, and annual results are displayed graphically on **Figure 13**. The modeling results show that the average unmet irrigation demand is approximately 160 AFY and that the average unmet return flow obligation is approximately 40 AFY. However, the Town will be required to replace all return flow obligations first to prevent injury to downstream water rights under the Water Court decree or SWSP, so the unmet irrigation demand will be commensurately higher as a result of reserving supply to replace return flows. Nevertheless, the total supply shortage to meet raw irrigation demands and satisfy return flow obligations remains approximately 200 AFY. Selected projects and potential implementation plans to eliminate the projected raw supply shortages are discussed below in Section 4.

*Table 4: Average Unmet Raw Demands and Return Flow Obligations over the Modeling Period (AFY).*

Unmet Changed Demand	Unmet Unchanged Demand	Unmet Return Flows	Total Unmet Demand and Return Flows
120	38	37	<b>195</b>

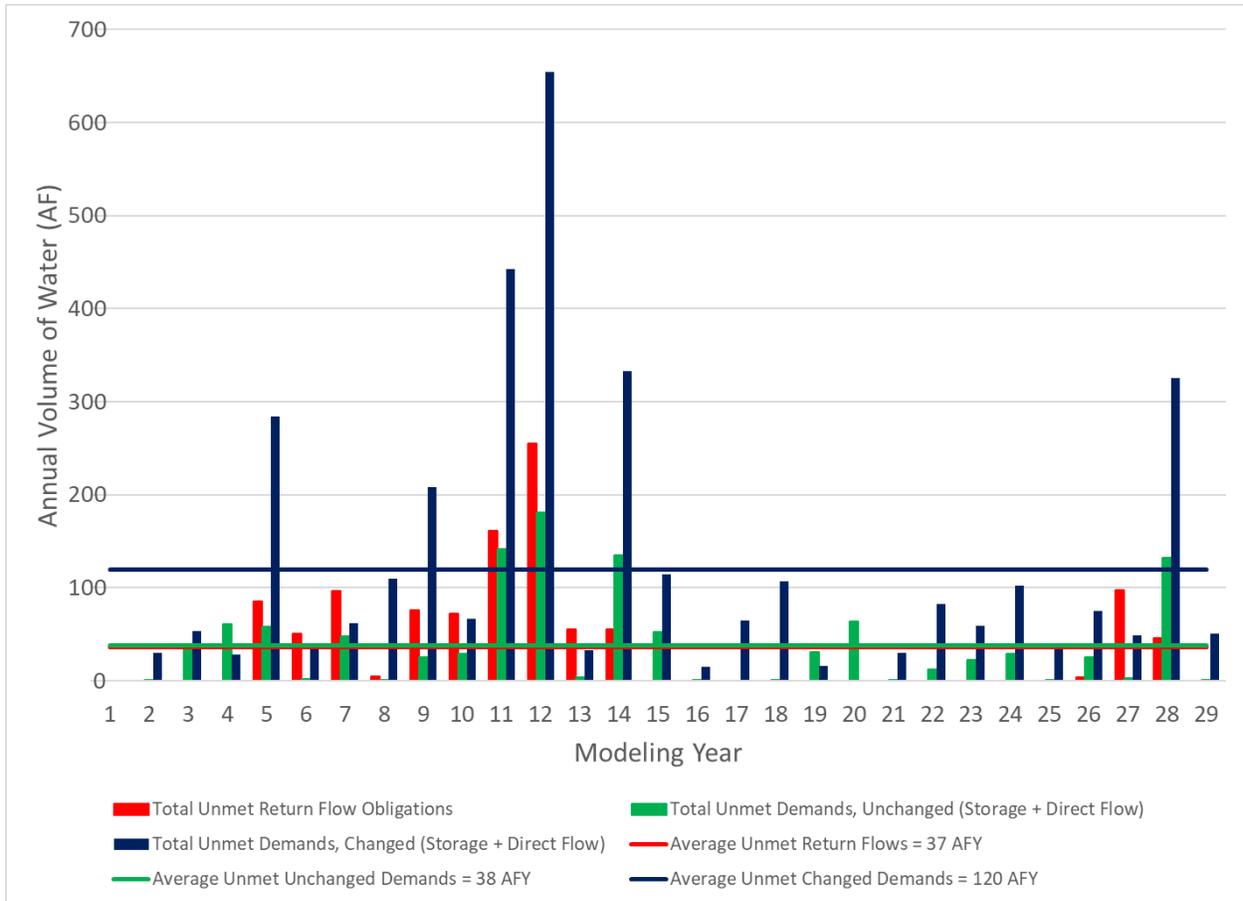


Figure 13: Unmet Raw Water Demands and Return Flow Obligations over the Modeling Period.

Figure 14 shows the monthly modeled storage operations over the 29-year modeling period for a single 1,156 AF storage structure to represent Milavec Reservoir (1,130 AF) and the Town’s irrigation ponds (26 AF). This reflects all inflows and outflows as depicted on Figure 12 and the resultant end-of-month contents and reservoir “spills,” which represent modeled inflows that were unable to be stored because there was no available capacity. Monthly reservoir storage contents were also constrained by a minimum storage of approximately 79 AF to reflect the lowest elevation at which releases can currently be made. The monthly modeling shows that reservoir spills occur in 10 of the 29 modeling years, with a maximum spill volume of 390 AFY. Accordingly, the expansion of Milavec Reservoir was identified as a potential future project as described below in Section 4.1.9.

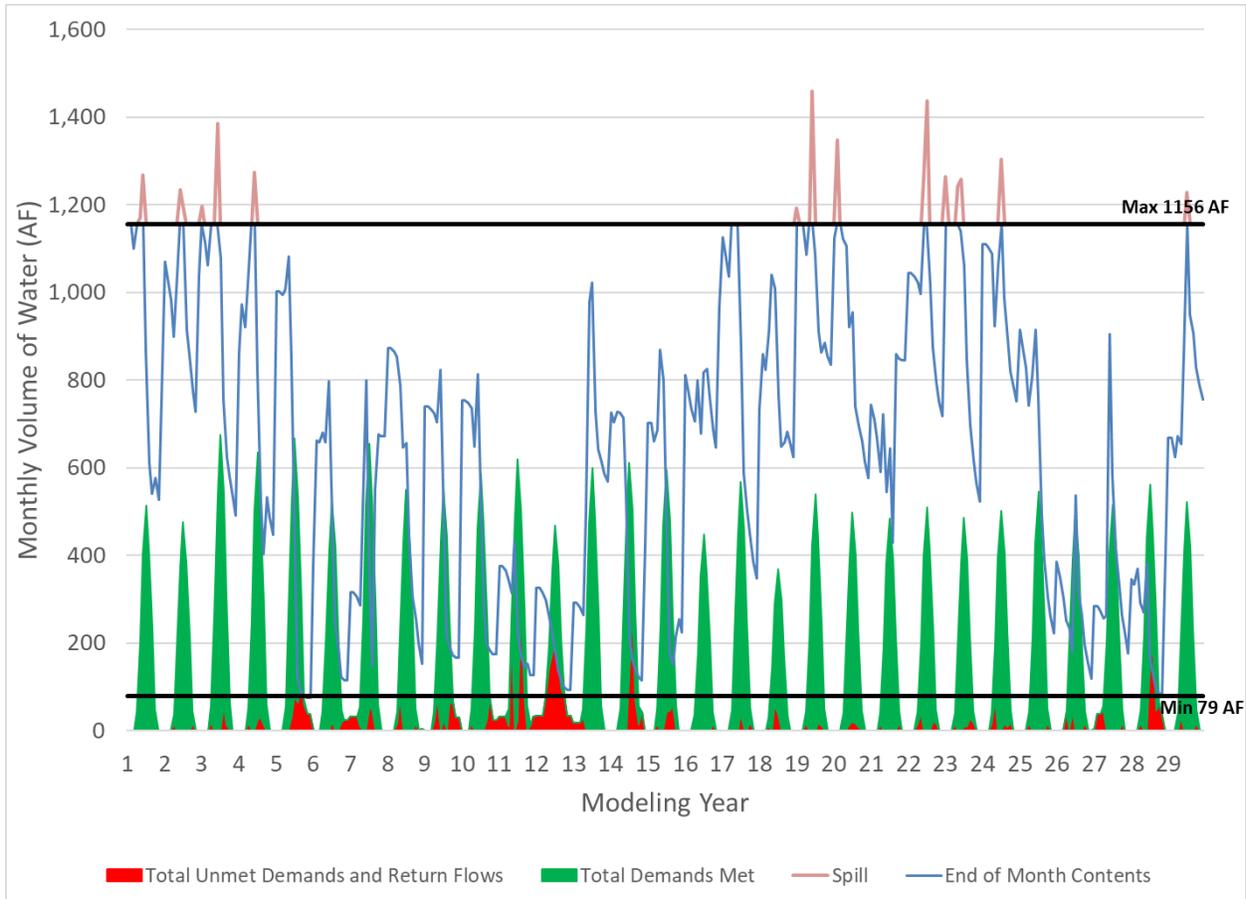


Figure 14: Storage Contents and other Key Variables over the Modeling Period.<sup>14</sup>

The modeling of raw supply and demand operations presented above shows that the Town’s supply portfolio and storage capacity is inadequate to meet all future raw water demands. The Town’s path forward to address the projected raw supply shortage is discussed below in Section 4.

#### 4. THE PATH FORWARD

The 10-Year Plan outlines the Town’s detailed implementation plan to develop adequate supplies to meet projected water demands over the next decade, until NISP is anticipated to be operational. The 10-Year Plan employs a multi-pronged approach using a combination of the following supply and demand reduction projects:

- Acquiring additional C-BT units while remaining under the Town’s ownership limitation imposed by Northern Water.
- Seeking to purchase an additional 1.0 Windy Gap unit, for a total of 8.0 units, to maximize the use of the Town’s leased storage capacity in Dry Creek Reservoir.
- Converting the irrigation supply for 18 properties to use raw instead of potable.

<sup>14</sup> A maximum of 1,156 AF of total storage rights was used to represent the storage operations in the Milavec Reservoir over the 29-year modeling period; the total is from storage rights of the Milavec Reservoir (1,130 AF) and the Town’s irrigation ponds (26 AF).

- Implementing a robust conservation program to reduce water demands, with a focus on outdoor uses. Implementation details are provided in the 2022 WEP.

The shorter planning periods for the 10-Year Plan and 2022 WEP allowed for implementation steps to be outlined on an annual basis to guide the Town’s near-term planning. This Long-Term Plan complements the shorter-term planning efforts and is intended to guide the Town’s actions to be implemented in the coming decades. The Town recognizes that it is imperative to regularly update its water resources planning. Therefore, the Town will prepare an annual assessment of conditions that is presented to the Board of Trustees. Additionally, the Town intends to prepare a comprehensive update to the Long-Term Plan every five years, or as needed in response to significant changes in underlying assumptions.

As discussed above in Section 2 and Section 3, the Town is projected to experience future potable and raw supply shortages even if all projects currently in development, including NISP, are successfully implemented. The following section (Section 4.1) describes the supply and demand reduction projects that have been selected by the Town to address the projected shortages. Section 4.2 outlines two illustrative implementation scenarios to depict how the Town’s water resources planning efforts may unfold if NISP delivers the full subscribed yield of 2,600 AFY versus NISP being unsuccessful and delivering 0 AFY. The Town remains committed to NISP and is optimistic that the project will be successfully implemented; however, it is prudent to consider scenarios under which NISP does not provide the full subscribed delivery volume.

#### **4.1 SELECTED SUPPLY AND DEMAND REDUCTION PROJECTS**

The Town will pursue a collection of supply and demand reduction projects to develop a dependable water portfolio to meet projected demands over the 50-year planning period. The following sections provide an overview of selected projects and recommendations for implementation as well as the estimated yield and planning-level costs<sup>15</sup> where available. The first four projects are being implemented under the 10-Year Plan but are also discussed herein because they are key components of the Long-Term Plan.

##### **4.1.1 C-BT ACQUISITIONS**

As discussed above in Section 2.3, the Town currently owns 4,373 C-BT units but can acquire additional units while remaining in compliance with the “ownership limitation” that is imposed by Northern Water. The Town intends to actively pursue the acquisition of additional C-BT units to eventually reach its ownership limitation, which is estimated to be 4,987 units. If the Town were to acquire 614 C-BT units to reach the estimated ownership limitation, then the potable supply would be increased by approximately 370 AFY assuming a quota of 0.6 AFY/unit. C-BT units have recently been offered for sale to the Town for \$65,000/unit (approximately \$108,000/AFY) and are projected to be approximately \$80,300/unit (approximately \$134,000/AFY) in 2030 with inflation.<sup>16</sup> The timing at which C-BT supplies are purchased is controllable by the Town subject to units being available for purchase and adequate funding being available. For reference, if 614 C-BT units were purchased in 2022, then the estimated acquisition cost would be approximately \$41 million.

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<sup>15</sup> Cost information is based on conceptual projects and will need to be updated if the project advances beyond conceptual level, as engineering, permitting, and construction-related information becomes available. Cost information reflects only acquisition and/or initial project implementation costs. Operation, maintenance, and replacement costs will need to be evaluated if a project advances beyond conceptual level.

<sup>16</sup> Inflation was estimated based on average Consumers Price Index (CPI) for Denver-Aurora-Lakewood from 2012 – 2020, which averaged 2.38% per year.

It is possible that the Town's ownership limitation may be further increased in the future if C-BT units are dedicated by developers under certain circumstances; however, this is challenging to accurately predict. Accordingly, the implementation scenarios presented below in Section 4.2 assume that the Town's C-BT portfolio will be capped at 4,987 units, and this assumption may be modified in future updates to the Long-Term Plan. The dependable yield from 4,987 C-BT units would be 2,992 AFY based on the annual quota of 0.6 AFY per C-BT unit that is used by the Town for planning purposes.

#### 4.1.2 WINDY GAP/DRY CREEK RESERVOIR

As discussed above in Section 2.3, Frederick currently owns 7.0 Windy Gap units, and the 10-Year Plan identified the acquisition of an additional 1.0 unit as a recommended project if the opportunity arises. A total of 8.0 Windy Gap units is projected to maximize the dependable yield that can be developed using the Town's leased storage capacity in Dry Creek Reservoir. The Town has initiated efforts to procure an additional unit and is optimistic that the project will be successfully implemented within the next decade; therefore, the implementation scenarios presented below in Section 4.2 assume that the Town's future potable portfolio will include 8.0 Windy Gap units. The dependable yield from 8.0 Windy Gap units coupled with storage in Dry Creek Reservoir, and in the absence of a reuse program, is currently estimated to be approximately 300 AFY by the year 2026; the yield estimate will continue to be refined after the project has been operational for a longer period of time.<sup>17</sup>

The total purchase price for the 7.0 Windy Gap units currently owned by the Town was \$16 million (approximately \$2.3 million per unit). The 10-Year Plan assumed that the Town would purchase an additional unit in 2026 for \$3 million, which is a 30% increase from what was paid in 2018. The lease agreement for Dry Creek Reservoir requires annual lease payments of \$300,000 in the first year, \$600,000 in the second year, and \$900,000 from the third year onwards; the lease payments after the first year are subject to inflation adjustments using the Consumers Price Index, and potential adjustments for comparable storage lease agreements are also possible starting in 2026. The current lease agreement is for 20 years through 2040; however, for planning purposes, it was assumed that the Town would have long-term storage capacity that may be lawfully used to store its Windy Gap supplies. The Town intends to evaluate long-term storage options for its Windy Gap supplies in the coming years.

#### 4.1.3 POTABLE TO RAW CONVERSIONS

There are 18 metered accounts, which are predominantly parks (**Figure 15**), that currently use potable C-BT supplies for landscape irrigation purposes and were identified under the 10-Year Plan for future connection to the Town's raw water system. Converting these properties to use raw water will reduce the Town's current potable demands and thereby increase its potable supply available for other uses. Upon full conversion, the potable demand reduction will be approximately 100 AFY. As described in the 10-Year Plan, all of these accounts are planned to be connected to the raw water system within the next 10 years. Accordingly, all demand projection scenarios presented in Section 2.2 reflect the impacts from this demand reduction project.

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<sup>17</sup> The Town began taking delivery of Windy Gap supplies in 2021 and has started firming operations using Dry Creek Reservoir.

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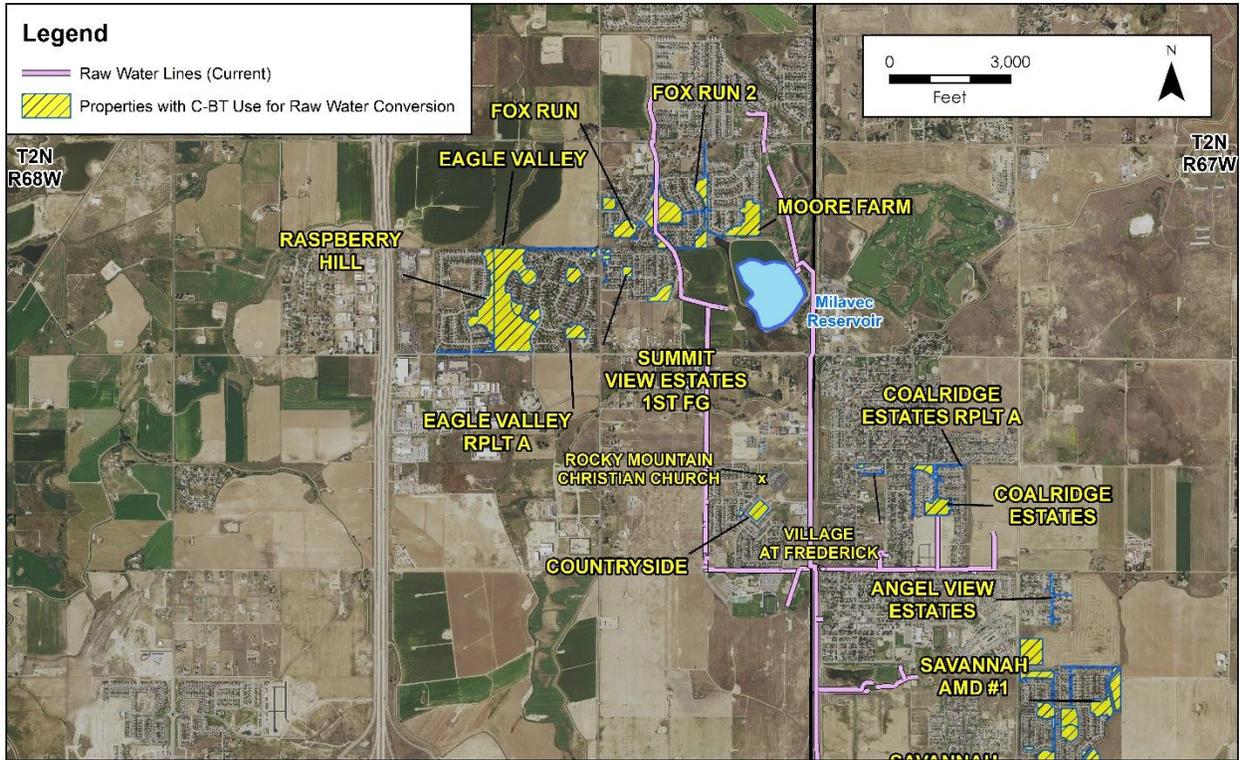


Figure 15: Properties to be Converted from Potable to Raw Irrigation Supply.

Infrastructure costs to implement the potable conversion project are still being evaluated by Town staff. For comparison against other projects under consideration, a planning-level cost of \$4.3 million for infrastructure was used based on information in the 2008 Raw Plan.<sup>18</sup> This planning-level analysis indicates that the cost to implement the potable conversion project is approximately \$94,000/AFY of demand reduction. The Town intends to prepare an update to its raw water master plan in 2022 or 2023 to identify infrastructure requirements and implementation costs.

4.1.4 WATER CONSERVATION

The potable demand projections presented above in Section 2.2 show that a robust water conservation program has the potential to significantly reduce potable demands, thus reducing the potential supply shortages. The Town is committed to reducing demands through conservation efforts. To this end, the Town is adding a dedicated Conservation Specialist staff position in 2022 to implement the 2022 WEP and future WEP updates that are required by statute at least every seven years.

The 2022 WEP details the activities to be implemented by the Town to reduce potable demands by approximately 125 AFY by 2030.<sup>19</sup> Examples of the types of activities selected under the 2022 WEP include:

- Improved utility water loss control.
- Landscape water budgets and water rates tied to each customer’s budget.

<sup>18</sup> Based on information in the 2008 Raw Water Infrastructure Master Plan to construct Systems B, E, and F, adjusted by inflation for this report.

<sup>19</sup> Does not include potable demand reduction from the potable-to-raw conversion project because that is tracked separately in this Long-Term Plan.

- Rebates for smart irrigation controllers.
- Targeted rebates for the replacement of older indoor fixtures and appliances.
- Turf replacement incentive program (aka “cash for grass”).
- Water-efficient landscape ordinances for new construction, redevelopment, and municipal facilities.
- Public information and outreach.

The potable demand projections presented in Section 2.2 show that conservation activities over the next 50 years could potentially reduce demands by a maximum of approximately 1,000 AFY under the most progressive conservation scenario. The preliminary annual budget for implementing conservation programs is estimated at \$200,000 per year in 2022 and \$450,000 per year in subsequent years through 2070 with adjustments for inflation. These planning estimates are based on a review of six recent WEPs published by Colorado Front Range utilities and include a combination of program and infrastructure costs.<sup>20</sup> The planning estimate includes the addition of a full-time equivalent staff person responsible for implementing the selected activities and advancing the Town’s conservation program over time. A dedicated staff member is critical for the success of a robust conservation program.

The total planning-level cost for conservation programs over the 50-year planning period is approximately \$42 million. This indicates that the cost to implement this project is approximately \$42,000/AFY with the maximum potential demand reduction; however, the costs would be ongoing beyond the 50-year planning horizon.

#### 4.1.5 PLAN FOR SATISFYING LBDC RETURN FLOW OBLIGATIONS

In order to use the LBDC shares being changed in the pending Water Court application for new (i.e., municipal) uses, the Town will need the capability to reliably replace return flow obligations associated with the historical use of the shares for irrigation. Return flows historically accrued to Boulder Creek, Coal Creek, Godding Hollow, and an unnamed tributary to Godding Hollow. The Town intends to satisfy obligations to Godding Hollow and the unnamed tributary by using an existing “augmentation station” structure located on the Lower Boulder Ditch that can make deliveries to Godding Hollow and by making releases from Milavec Reservoir.

The Town has started evaluating alternatives to satisfy obligations to Boulder Creek and Coal Creek, and these efforts will be continued in 2022 and 2023. Potential solutions include negotiating agreements to use existing structures owned by other parties or constructing new facilities that may include an augmentation station and/or storage.

#### 4.1.6 NISP

NISP is a critical component of the Town’s water resources planning efforts due to the large volume of dependable potable supply (2,600 AFY) that would potentially be delivered to the Town. A key driver in formulating the 10-Year Plan was to develop the implementation plan for having adequate supplies until NISP is anticipated to be operational. As noted earlier, the Town remains committed to NISP and is optimistic that the project will be successfully implemented; however, there remains a degree of uncertainty about the reliability of this supply until the project becomes operational. NISP has obtained the necessary 1041 Permit from Larimer County and Clean Water Action Section 401 Permit from the State of Colorado but is still awaiting issuance of the Clean Water Action Section 404

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<sup>20</sup> Implementation of certain types of water loss control projects could far exceed these costs and are not accounted for in this plan.

Permit and Record of Decision from the U.S. Army Corps of Engineers (USACE). These outstanding USACE permit approvals were anticipated to be issued in 2020 or 2021 but have not been received as of the date of this plan, and it is possible that lawsuits may cause additional delays after the USACE permits are issued. Northern Water is proceeding with the construction of project elements that do not require additional permits, the preparation of design plans, and work with NISP participants to develop implementation procedures. These efforts are being undertaken in anticipation of the project being permitted to proceed. However, given the uncertainty at this time, the Town is considering implementation scenarios where NISP does not deliver the full subscribed yield of 2,600 AFY as described below in Section 4.2.

Information prepared by Northern Water in 2020 indicates that the estimated total project cost for NISP would be approximately \$1.6 billion. The Town's participation in the project currently represents a 6.5% interest; therefore, the Town's obligation will be approximately \$104 million based on the 2020 estimate. With a dependable yield of 2,600 AFY, this would equate to a cost of approximately \$40,000/AFY. It is anticipated that the Town's NISP supplies will be treated and delivered by Central Weld pursuant to a separate agreement; however, costs for this arrangement are unknown at this time.

The Town will closely monitor the progress of NISP because it is a pivotal component of the Town's potable planning efforts. The Town will also consider expanded participation in NISP if the opportunity presents itself at a later date, as an alternative for addressing projected future supply shortages; however, the Town has no short-term plans to increase its subscribed volume beyond 2,600 AFY.

#### 4.1.7 LOCAL WATER TREATMENT PLANT

The Town's potable supplies are presently treated at the Carter Lake Filter Plant and delivered to the Town by Central Weld. The Town's current agreements with Central Weld allow for the treatment of C-BT and Windy Gap supplies, and as noted above, NISP supplies are also anticipated to be treated and delivered by Central Weld. The Town would need to develop additional treatment capacity to make use of its Boulder Creek supplies (Lower Boulder Ditch shares being changed in the pending Water Court application and junior storage rights decreed in Case No. 17CW3216) for potable purposes.

Prior to 1988, the Town operated a water treatment plant located adjacent to Milavec Reservoir; however, the feasibility of treating Boulder Creek supplies to meet existing and anticipated drinking water quality standards needs to be investigated. As further described below in Section 4.2, the timeframe for needing a local treatment plant to meet potable demands is largely dependent on whether NISP is successful. Local treatment may be necessary in approximately 2034 if NISP is unsuccessful, but if NISP is successful, then local treatment may not be necessary until after 2053.

In 2023, the Town will advance investigations regarding the feasibility of treating Boulder Creek supplies stored in Milavec Reservoir to meet drinking water quality standards. The investigation will evaluate potential treatment technologies, costs, and time requirements to permit and construct the facility, as well as monitoring and evaluating current quality data for water stored in the reservoir. The Town will use this information to inform decisions about how to proceed as updated information becomes available regarding the likelihood and anticipated schedule for NISP deliveries.

#### 4.1.8 REUSE

A portion of the Town's existing and planned future water supplies have the potential to be legally reused, which means that the Town may recapture and exercise control over municipal return flows (primarily wastewater effluent and lawn irrigation return flows), and then may place those recaptured return flows to use, including to meet the Town's raw water/irrigation demands. Reusable supplies include Windy Gap, at least a portion of NISP supplies, the Town's LBDC shares being changed in the pending Water Court application, and the Town's junior storage water rights. Conversely, C-BT units, unchanged ditch company water rights, and the senior Milavec Reservoir storage water right may legally be used only once. In order for the Town to legally reuse the unconsumed portion of (i.e., the return flows from use of) its Windy Gap, NISP, changed LBDC, and junior storage water right deliveries, a separate Water Court application would need to be filed. The following describes the estimated supply that may be available from reuse to evaluate the potential timing for implementation of the reusable supplies.

Only a portion of potable water deliveries to the Town's customers are fully consumed. Indoor water uses are largely unconsumed, with as much as 90% or more of the delivered water returning to the stream system through sewer drains. A portion of potable water deliveries to supply outdoor uses (i.e., irrigation) is also not consumed, running off irrigated areas and into storm sewer systems or accruing to the underlying aquifer; these are commonly referred to as lawn irrigation return flows ("LIRFs"). The evaluation of reuse potential completed as part of this planning effort has been limited to that portion of the water supply that would potentially be available from unconsumed indoor water deliveries from reusable sources that would be treated and then discharged to the stream at the Saint Vrain Sanitation District (SVSD) wastewater treatment facility (WWTF). Reuse potential would be higher with the inclusion of LIRFs, but the evaluation of whether to seek credit for LIRFs will not be completed until the Town has decided to file the Water Court application to reuse wastewater effluent.

The potable demand projections described in Section 2.2 were used to predict the future volume of the Town's wastewater that may be discharged from the SVSD WWTF. Wastewater outflows are projected to average approximately 1,970 AFY in the year 2070; however, not all effluent will be attributable to reusable sources of supply because the Town will continue to use C-BT units to meet a portion of its potable demands. The analysis is further influenced by the monthly timing of when reusable supplies are delivered to meet potable demands as described in the following two scenarios. In the winter when there is little outdoor use, most of the potable water deliveries will ultimately be discharged at the SVSD WWTF. In the summer, a lower percentage of the potable water deliveries will be discharged at the SVSD WWTF because of outdoor consumption. As a result, the quantities of reusable outflows vary depending on the monthly proportion of demands to be met with C-BT supplies and available reusable supplies.

The volume of reusable supply discharged at the SVSD WWTF will depend on the sources used to supply potable demands as well as the monthly pattern of deliveries. If Windy Gap, NISP, junior storage, and LBDC supplies are used to meet potable demands in addition to C-BT supplies, then the future volume of reusable supply discharged at the SVSD WWTF is projected to range from approximately 850 AFY to 1,500 AFY depending on the delivery schedule. The higher end of the range assumes that reusable deliveries to meet potable demands will preferentially be made during the non-irrigation season. If Windy Gap and NISP are used to supply potable demands in addition to C-BT supplies, but LBDC supplies and junior storage supplies are not (i.e., no local water treatment plant), then the volume of reusable supply discharged at the SVSD WWTF is projected to range from approximately 540 AFY to 1,180 AFY depending on the delivery schedule.

The values presented above represent the potential volume of reusable supply to be discharged at the SVSD WWTF, which is located approximately five miles north of the Town. There are two main strategies being considered by the Town to make subsequent use of reusable supplies after they are discharged at the SVSD WWTF. First, the Town may operate an “exchange” where water is diverted at an upstream location (e.g., the Lower Boulder Ditch headgate) in an amount equal to the “substitute” reusable supply being delivered downstream after the water is discharged at the SVSD WWTF outfall on Saint Vrain Creek. The ability to operate an exchange will depend on river administrative conditions (i.e., flow availability and call conditions, or “exchange potential”) and the available capacity to divert into the upstream structure.<sup>21</sup> A Water Court application or ad hoc administrative approvals would also be required to allow for the operation of exchanges. Alternatively, the Town could pump the reusable supplies from a location near the SVSD WWTF outfall to the Town. This alternative would not require a separate Water Court application (other than the application to quantify the reusable supplies); however, infrastructure and permitting requirements would be more complex.

Regardless of whether the reusable supplies are exchanged or pumped to the Town, there is likely a need for additional storage capacity to retime the supplies for subsequent irrigation use. Options being considered to develop additional storage capacity include the construction of a new reservoir either near the SVSD WWTF or closer to the Town, or the expansion of Milavec Reservoir as discussed in the following section.

The information presented above indicates that reuse has the potential to provide a significant supply for meeting raw water demands; however, additional investigations are needed to evaluate the feasibility of various components and select the preferred alternative. Accordingly, the Town intends to commission a feasibility study related to reuse in 2023 or 2024. The investigation will evaluate project costs, legal needs, and time requirements to permit and construct any necessary infrastructure. The Town will use this information to inform decisions about how to proceed as updated information becomes available regarding the likelihood and anticipated schedule for NISP deliveries, as reuse supplies will be needed sooner if NISP is unsuccessful and Lower Boulder Ditch supplies or junior storage supplies are used to meet potable demands.

#### 4.1.9 EXPANSION OF MILAVEC RESERVOIR

The Town’s raw water supplies and demands over a 29-year modeling period, including storage operations in Milavec Reservoir, were discussed above in Section 3.4. The results show that the existing capacity of Milavec Reservoir would be unable to store all available inflows in approximately one-third of the years over the modeling period. The modeled inflow volume that was unable to be stored (aka “spill volume”) averaged approximately 70 AFY. Sensitivity analyses were prepared to evaluate the potential benefits of expanding Milavec Reservoir to store the Town’s existing Boulder Creek supplies using the same supply and demand assumptions outlined in Section 3.4, but with variable capacity increases for Milavec Reservoir. The results show that increasing the storage capacity of Milavec Reservoir would decrease the frequency and volume of spills; however, the resultant decrease in unmet raw water demands would be limited. Increasing the capacity of Milavec Reservoir by 100 AF would reduce the unmet demand from approximately 200 AFY to 190 AFY, or by approximately 10 AFY; a capacity increase of 500 AF would reduce the unmet demand from approximately 200 AFY to 170 AFY, or by approximately 30 AFY. Given these results, the Town does not intend to pursue the expansion of Milavec Reservoir solely for the purpose of storing its changed

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<sup>21</sup> The Town would also need an agreement with the owner(s) of any upstream structure to divert water by exchange.

LBDC shares and storage rights; however, the expansion of this structure will be evaluated as part of the reuse feasibility study to retine supplies that are discharged at the SVSD WWTF.

#### 4.1.10 ACQUIRE ADDITIONAL NATIVE WATER SUPPLIES

The Town may benefit from the acquisition of additional “native” water supplies that may be diverted from Boulder Creek and conveyed to the Town. The Town’s Municipal Code defines the term “native water” as “water historically applied to beneficial use within or near the Town’s planning area and that can be used by and is acceptable to the Town.” Under Colorado water law, native water refers to surface and underground water naturally occurring in a watershed, which is distinguished from imported and transbasin water that is sourced from locations unconnected with the receiving system such as C-BT. The Town’s existing portfolio of native water rights includes its LBDC shares, CRDC shares, and storage water rights.

The analyses prepared in support of the Long-Term Plan show that the Town has a need for additional potable and raw supplies to address projected future supply gaps. The acquisition of additional native water supplies may be a component of the Town’s implementation plan for addressing these shortages; however, due to present considerations, the Town intends to update its policies to only consider the dedication of native supplies that have been previously changed in Water Court to allow for municipal uses within the Town’s current and future boundaries and can be physically delivered to the Town. This policy is being implemented because the supply and demand analyses indicate that the Town has little need for additional unchanged native supplies, and the Town’s water attorneys have identified legal concerns about the viability of being able to successfully change the use of additional LBDC shares with terms and conditions that would be acceptable to the Town. This policy will be reevaluated as part of future updates to the Long-Term Plan.

#### 4.1.11 REGIONAL PROJECTS & PARTNERSHIPS

Many other Front Range water providers are facing similar future supply shortages, which prompted the formation of the South Platte Regional Opportunities Water Group (SPROWG) in 2015 to explore regional cooperative strategies to meet water supply gaps. SPROWG commissioned a feasibility study to evaluate a holistic approach to meet diverse water needs in the South Platte River basin using multiple storage facilities at various locations between Denver and the state line, infrastructure to transport the water to users, and water treatment strategies (SPROWG, 2020). The study concluded that the SPROWG concept is technically and financially feasible, and that additional studies were warranted. The feasibility study specifically calls for collaborating with and inviting new partners to participate; therefore, the Town will be initiating efforts in 2022 to be included in SPROWG’s future planning efforts.

The Town will also evaluate opportunities to develop interconnections with nearby water providers that may have surplus raw or potable supplies that are capable of being delivered to the Town. These evaluations will be completed as opportunities arise, and will require an assessment of legal constraints, physical connection options, storage requirements, and water quality compatibility.

While there is no dependable yield associated with regional projects and partnerships at this time, the Town recognizes that collaboration with regional partners may offer future benefits.

## 4.2 ILLUSTRATIVE IMPLEMENTATION SCENARIOS

The projects to be implemented under the Long-Term Plan are interrelated, and the actual yield from a given project influences other components of the plan. For this reason, the Town will prepare an

annual assessment of supply and demand conditions that is presented to the Board of Trustees. The Town also intends to do a comprehensive update to the Long-Term Plan every five years, or as needed in response to significant changes in underlying assumptions. The following sections provide two illustrative implementation scenarios to depict how the Town's water resources planning efforts may unfold if NISP delivers the full subscribed yield of 2,600 AFY versus NISP being unsuccessful and delivering 0 AFY. These illustrations were selected to bookend NISP assumptions; however, it is possible that NISP will deliver a dependable yield somewhere in between these representations, which may be evaluated as part of future plan updates as the development of NISP progresses.

Both illustrative implementation scenarios have the following common project assumptions, which reflect the measures being implemented pursuant to the 10-Year Plan and 2022 WEP.

- **C-BT** supply is assumed to reach the Town's ownership limitation of 4,987 units by the year 2034. The dependable yield from 4,987 C-BT units is estimated to be 2,990 AFY based on an average annual quota of 0.6 AFY per C-BT unit.
- **Windy Gap** dependable yield from 8.0 units is assumed to be 300 AFY by the year 2026. Note this assumes the Town is able to purchase the additional 1.0 Windy Gap unit.
- **Potable to Raw Conversion** project will be completed within the next 10 years to reduce the potable demand by 100 AFY.
- **Water Conservation and Efficiency** measures will be implemented as outlined in the 2022 WEP and continued over the 50-year planning period.
- **Demands** for the first decade have been projected to be similar to the 10-Year Plan and 2022 WEP and continued to increase over the 50-year planning period.

Timelines illustrating both implementation scenarios are provided as **Attachment A**.

#### 4.2.1 NISP AT 2,600 AFY

The following sections describe the illustrative implementation scenarios for potable and raw conditions if NISP successfully delivers a dependable yield of 2,600 AFY.

##### 4.2.1.1 POTABLE CONDITIONS

###### No Local WTP

If NISP can deliver a dependable yield of 2,600 AFY to the Town by 2034, then the combined potable supplies from C-BT, Windy Gap, and NISP are projected to be adequate to meet the Town's potable demands through 2053 or 2064 depending on the demand projection scenario as discussed above in Section 2.2. The potable supply shortage after those dates is projected to range from 750 AFY to 1,810 AFY (**Figure 16**).

###### Local WTP is Constructed

If a local water treatment plant (WTP) is determined to be feasible, then one alternative for reducing the remaining potable supply shortage is to use the Town's changed LBDC shares and junior Milavec storage rights to meet a portion of the potable demands. Adding the treated changed LBDC and Milavec supplies to the potable supply portfolio of C-BT, Windy Gap, and NISP would potentially be adequate to meet the projected potable demands at buildout in three of the four scenarios; however, a shortage would remain under the low conservation demand scenario (**Figure 16**).<sup>22</sup> The addition

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<sup>22</sup> The actual yield of changed LBDC and junior Milavec supplies for meeting potable demands will depend on storage operations and the schedule of deliveries.

of the changed LBDC shares and the junior Milavec rights to the potable supply portfolio has the potential to delay the onset of the potable supply shortage until approximately 2070, and the potable supply shortage after that date is estimated to be approximately 260 AFY (Figure 16). In order to use the changed LBDC shares and the junior Milavec rights for meeting potable demands, the local water treatment plant may need to be operational before 2053 when other potable supplies may no longer be adequate to meet the Town’s demands. As discussed below, using the changed LBDC and junior Milavec supplies to meet potable demands would exacerbate the raw supply shortage because these supplies would no longer be available for meeting raw demands. This highlights the interrelationship between projects and the need for regular planning updates.

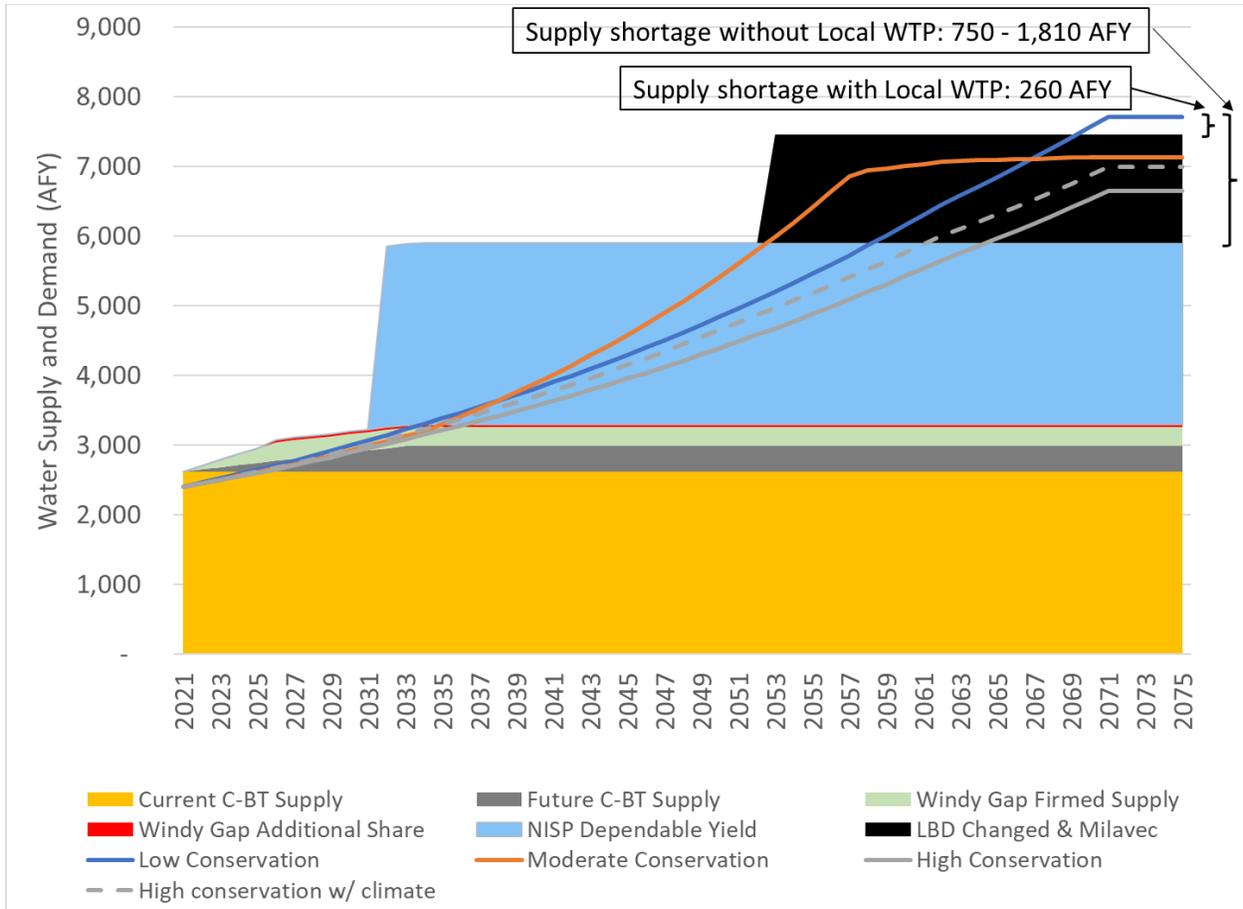


Figure 16: Example Potable Supply and Demand Conditions with NISP Yield of 2,600 AFY.

4.2.1.2 RAW CONDITIONS

No Local WTP

The analyses presented above in Section 3.4 evaluated the Town’s capability to meet future raw water demands if all of the Town’s changed LBDC shares and Milavec rights are used as a raw supply as opposed to a potable supply. The results showed that there would be a raw water supply gap of approximately 200 AFY; however, the Town’s raw water supplies, including the LBDC and Milavec supplies, are estimated to be adequate to meet the Town’s raw water demands until approximately 2043. Potential options for addressing a future shortage of this magnitude include acquiring additional native water supplies or developing reuse supplies as discussed above in Section 4.1.8. Depending on the delivery schedule under which Windy Gap and NISP are used to meet potable

demands, the volume of reusable supply discharged at the SVSD WWTF is projected to range from 540 AFY to 1,180 AFY. While conveyance and storage losses need to be evaluated as part of the planned reuse feasibility study along with its cost effectiveness, reuse would potentially provide the necessary volume to supply raw demands above what can be met using the Town's LBDC shares, CRDC shares, and storage water rights.

#### Local WTP is Constructed

If the Town's changed LBDC shares and junior Milavec supplies are used to meet potable demands as opposed to supplying raw demands, then the raw supply shortage at buildout is estimated to be approximately 1,700 AFY. This is an increase of approximately 1,500 AFY in raw supply shortage as compared to when the changed LBDC and junior Milavec supplies are not used to meet the Town's potable demands.

In this scenario with the changed LBDC shares and the junior Milavec rights being used as a potable supply, the volume of reusable supply discharged at the SVSD WWTF is projected to range from approximately 850 AFY to 1,500 AFY depending on the delivery schedule for using Windy Gap, NISP, LBDC shares, and junior Milavec rights to meet potable demands. Accordingly, the supply from reuse alone may not be adequate to eliminate the Town's future raw supply shortage. The timing of the raw water supply shortage is projected to occur around 2043, as under the prior scenario, because if NISP is successful then the LBDC shares and junior Milavec rights can be used for supplying raw demands until 2053 or later, until the local WTP is constructed to supply potable demands. Therefore, under this scenario, the Town would need reuse to be operational, or to have acquired additional native water supplies, to address raw water supply shortages that are projected to occur around 2043.

#### 4.2.2 NISP AT 0 AFY

The following sections describe the illustrative implementation scenarios for potable and raw conditions if the dependable yield of NISP is 0 AFY.

##### 4.2.2.1 POTABLE CONDITIONS

#### No Local WTP

If there are no dependable potable deliveries to the Town from NISP, then the combined potable supplies from C-BT and Windy Gap are projected to be adequate to meet the Town's potable demands through 2034 or 2036 depending on the demand projection scenario as discussed above in Section 2.2. The potable supply shortage after those dates is estimated to range from 3,350 AFY to 4,410 AFY (**Figure 17**).

#### Local WTP is Constructed

If the local water treatment plant (WTP) is determined to be feasible, then one alternative for reducing the remaining potable supply shortage is to use the Town's changed LBDC shares and junior Milavec rights to meet a portion of the potable demands. Adding the changed LBDC shares and junior Milavec rights to the potable supply portfolio of C-BT and Windy Gap would potentially delay the onset of the potable supply shortage until 2047 or 2055 depending on the demand projection scenario.<sup>23</sup> The potable supply shortage after those dates is estimated to range from approximately 1,800 AFY to 2,860 AFY (**Figure 17**). In order to use the changed LBDC shares and junior Milavec

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<sup>23</sup> The actual yield of changed LBDC and junior Milavec supplies for meeting potable demands will depend on storage operations and the schedule of deliveries.

rights for meeting potable demands, the local water treatment plant may need to be operational before 2034 when other potable supplies may no longer be adequate to meet the Town’s demands. This scenario is a key driver behind the decision to prepare the feasibility study related to the local water treatment plant within the next couple of years. As discussed previously, using the changed LBDC shares and junior Milavec supplies to meet potable demands would exacerbate the raw supply shortage because these supplies would no longer be available for meeting raw demands. This highlights the interrelationship between projects and the need for regular planning updates.

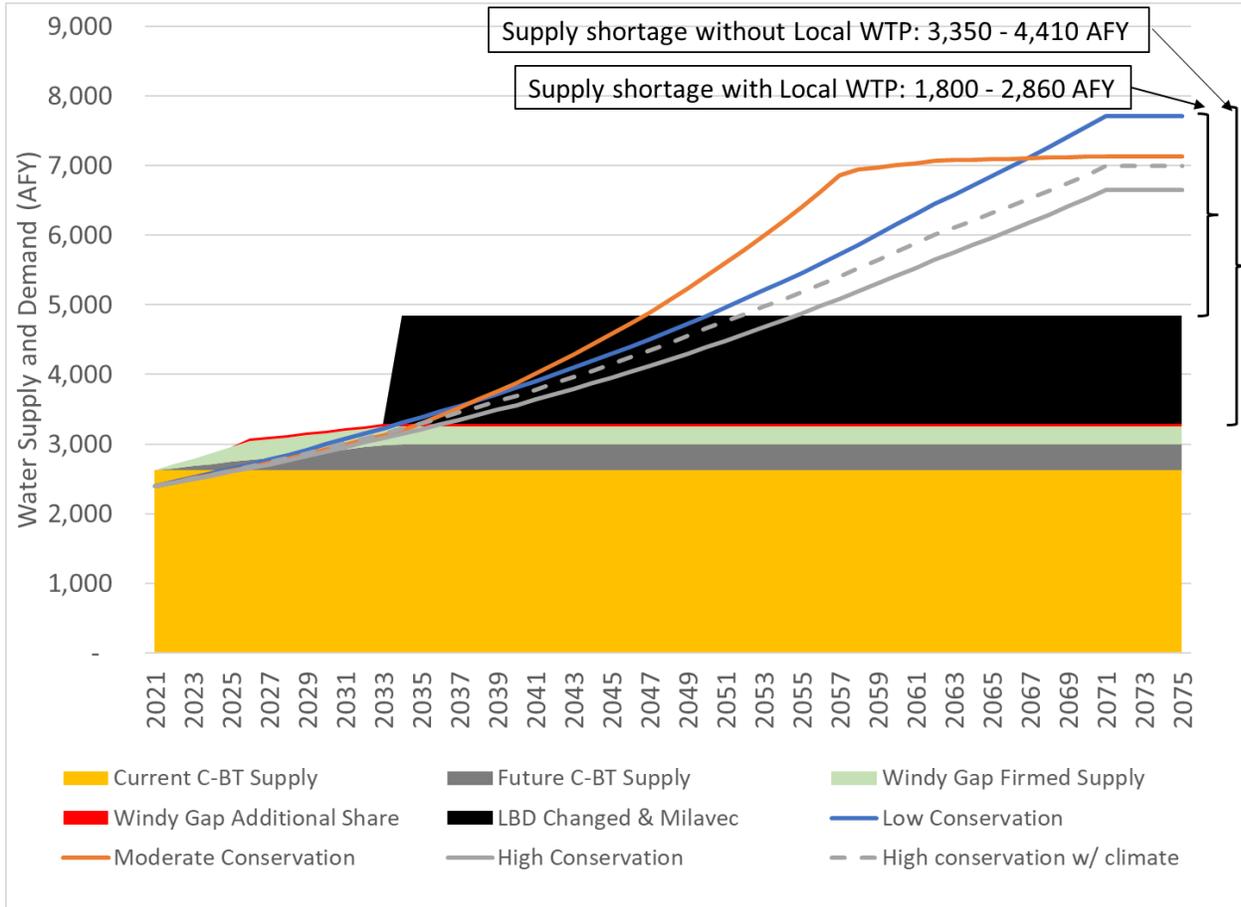


Figure 17: Example Potable Supply and Demand Conditions with NISP Yield of 0 AFY.

4.2.2.2 RAW CONDITIONS

No Local WTP

The Town’s raw water supplies, including the changed LBDC and junior Milavec supplies, are estimated to be adequate to meet the Town’s raw water demands until approximately 2043, at which point there is a need for additional raw supplies to meet the future raw water supply gap of approximately 200 AFY. Depending on the delivery schedule under which Windy Gap is used to meet potable demands, the volume of reusable supply discharged at the SVSD WWTF is projected to range from approximately 90 AFY to 210 AFY. Given that the projected volume of the reusable flows is relatively low and will be further reduced by conveyance losses, reuse alone is not expected to provide the necessary volume to supply raw demands above what can be met using the Town’s LBDC shares, CRDC shares, and storage water rights. The cost effectiveness of developing reuse at this scale

will be evaluated as part of the planned feasibility study and compared against other raw water supply options such as the acquisition of additional native supplies.

#### *Local WTP is Constructed*

As previously discussed, if the Town's changed LBDC and junior Milavec supplies are used to meet potable demands as opposed to supplying raw demands, then the raw supply shortage at buildout is estimated to be approximately 1,700 AFY. This is an increase of approximately 1,500 AFY in raw supply shortage as compared to when the changed LBDC and junior Milavec supplies are not used to meet the Town's potable demands. The raw water shortage is projected occur in the year that LBDC shares start being used to meet potable demands (e.g., 2034).

In this scenario with the changed LBDC shares and junior Milavec rights being used as a potable supply starting as early as 2034, the volume of reusable supply discharged at the SVSD WWTF is projected to range from 400 AFY to 930 AFY depending on the delivery schedule for using Windy Gap, changed LBDC shares, and junior Milavec supplies to meet potable demands. The total raw water demand in 2034 is projected to be approximately 1,000 AFY; therefore, reuse and the Town's other native supplies may not be adequate to meet all raw water demands. This indicates that the Town must delay entering into new raw water service commitments relying on the use of its changed LBDC shares and junior Milavec rights until more information is known about the reliability of NISP and decisions have been made related to implementing reuse. Otherwise, there is risk that the Town's raw commitments may exceed its raw supplies if the changed LBDC shares and junior Milavec rights are determined to be necessary for supplying potable demands at a later date.

### **4.3 ACTION ITEMS**

The illustrative implementation scenarios presented above highlight the interrelationship between projects and the need for regular planning updates. While the Town's exact path forward to develop a dependable water supply portfolio has elements of uncertainty, this Long-Term Plan and future updates will be instrumental in guiding the Town's decision making. Following is a summary of how Town staff and the Board of Trustees intend to focus their near-term efforts. A tabulation of action items and estimated implementation dates is provided as **Attachment B**.

1. The Town will purchase additional C-BT units over the next 10 years with the goal of reaching the ownership limitation that is imposed by Northern Water. The Town will also accept C-BT units to satisfy water dedication requirements as allowed under the Town's Municipal Code. These efforts are intended to maximize the Town's potable supply from C-BT units.
2. The Town will pursue opportunities to purchase an additional 1.0 Windy Gap unit to maximize the use of its leased storage space in Dry Creek Reservoir. The Town will also evaluate long-term storage options for its Windy Gap supplies in the coming years.
3. The Town will begin converting the 18 metered accounts identified under the 10-Year Plan that currently use potable supplies for irrigation over to the Town's raw water system. The conversions will commence in 2022 or 2023 and will continue over the next 10 years as adequate raw water supplies become available. The Town intends to prepare an update to its raw water master plan in 2022 or 2023 to identify related infrastructure requirements and implementation costs. This project will reduce the Town's current potable demands and thereby increase the potable supply available for other uses.
4. The Town will implement a robust water conservation program to reduce potable demands and thereby reduce its potable supply requirements. The near-term implementation measures are described in the 2022 WEP, which will be updated at least every seven years as required by statute.

5. The Town is actively pursuing opportunities to satisfy its return flow obligations related to the future use of its Lower Boulder Ditch shares for changed purposes. The initial efforts focus on using excess capacity in existing augmentation stations and storage structures; however, the construction of new facilities will be evaluated as needed. The capability to reliably replace return flow obligations is necessary for the Town to use Lower Boulder Ditch supplies to meet raw and/or potable demands.
6. The Town will closely monitor NISP progress to understand potential impacts on anticipated delivery volumes and the schedule for implementation. NISP is a critical component of the Town's potable supply and reuse planning due to the large volume of dependable potable supply (2,600 AFY) that would potentially be delivered to the Town. The Town remains committed to NISP and is optimistic that the project will be successfully implemented; however, the Town is planning for scenarios with reduced NISP deliveries given the present uncertainty of the project. If NISP deliveries are reduced and/or delayed, the Town will have a more urgent need for other potable supplies beyond what is projected to be delivered from C-BT and Windy Gap.
7. The Town will prepare a feasibility study in 2023 related to the potable treatment of Boulder Creek supplies stored in Milavec Reservoir to meet drinking water quality standards. If potable treatment is determined to be feasible, then the timeframe for needing a local water treatment plant to meet potable demands is largely dependent on whether NISP is successful. If NISP is successful, then local treatment may not be necessary until after 2053. If NISP is not successful, then local treatment may be necessary around 2034.
8. The Town will prepare a feasibility study related to reuse infrastructure and storage options, including the expansion of Milavec Reservoir, in 2023 or 2024. The Town will use this information to inform decisions about how to proceed as updated information becomes available. This will primarily focus on the likelihood and anticipated schedule for NISP deliveries because reuse supplies will be needed sooner if NISP is unsuccessful and Lower Boulder Ditch or junior storage supplies are used to meet potable demands.
9. The Town will initiate efforts in 2022 to be included in SPROWG's future planning. As opportunities arise, the Town will also evaluate potential interconnections with nearby water providers that may have surplus raw or potable supplies that can be delivered to the Town.
10. The Town will prepare an annual assessment of supply and demand conditions to be presented to the Board of Trustees. Progress towards reducing demands as a result of WEP efforts will also be evaluated as part of the annual assessments. The Town will prepare a comprehensive update to the Long-Term Plan every five years or as needed to address significant changes in underlying assumptions.

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## TOWN OF FREDERICK LONG-TERM WATER RESOURCES PLAN

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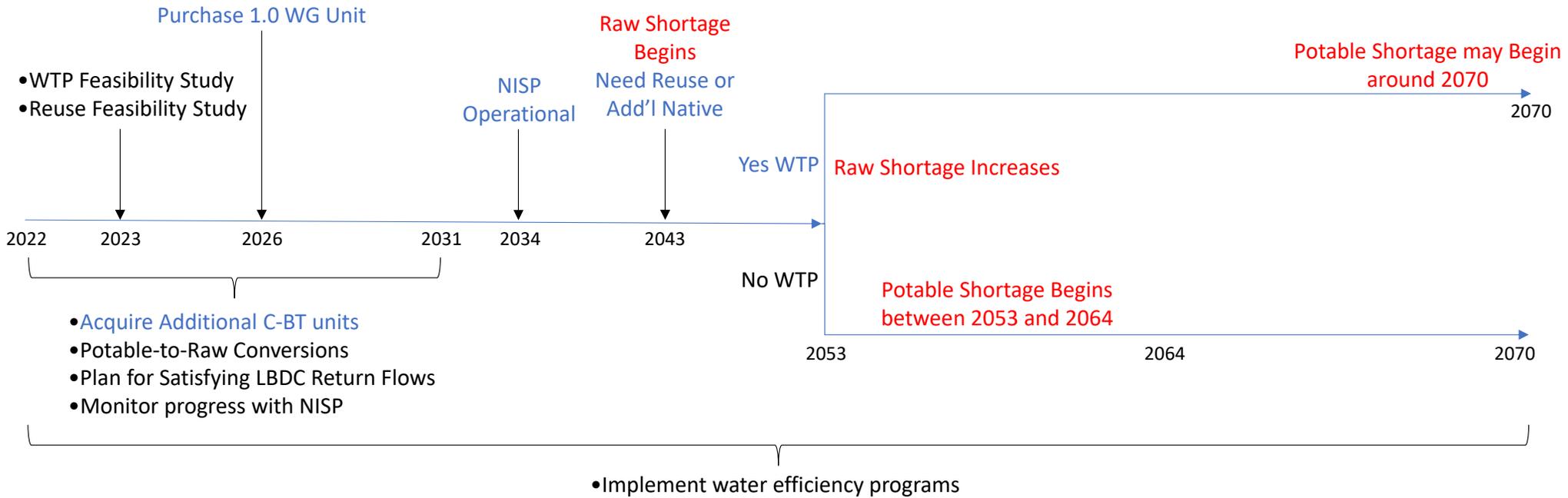
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# **ATTACHMENT A**

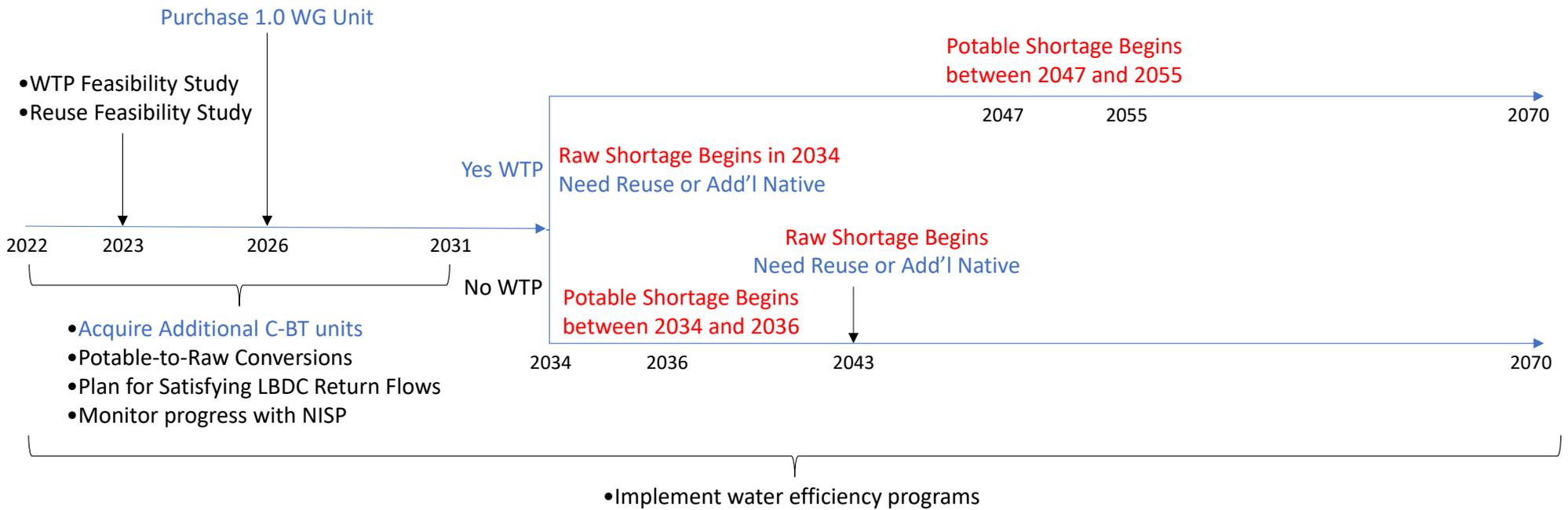
## **Illustrative Implementation Timelines**

## Timeline for Illustrative Implementation Scenario with NISP @ 2,600 AFY



*\*timeline not to scale*

## Timeline for Illustrative Implementation Scenario with NISP @ 0 AFY



*\*timeline not to scale*

## **ATTACHMENT B**

Summary of Nearer-term Action Items Identified in the  
Long-Term Water Resources Plan

**Summary of Nearer-Term Action Items Identified in Long-Term Water Resources Plan.**

Project	Year(s)	Notes
C-BT Acquisitions	2022 - 2034	Purchase units to reach ownership limitation.
Windy Gap	2022 - 2026	Purchase additional 1.0 unit.
	2027 - 2035	Evaluate long-term storage options.
Raw Water	2022 - 2031	Convert 18 accounts to use raw instead of potable.
	2022 - 2023	Update raw water master plan.
Conservation/Efficiency	2022	Hire Conservation Specialist staff member.
	2022, ongoing	Implement programs outlined in 2022 Water Efficiency Plan.
	2029	Update Water Efficiency Plan no less frequently than every 7 years, as required by statute.
LBDC Return Flows	2022 - 2023	Negotiations to use existing structures.
	2023 - 2027	Develop new augmentation station and/or storage facilities, if needed
NISP	2022 - 2030	Monitor progress and anticipated schedule for deliveries.
	2025 - 2030	Collaborate with Central Weld to develop additional treatment capacity
	2025 - 2030	Evaluate expanded participation in NISP based on findings of local WTP and reuse feasibility studies
Local WTP	2023	Prepare feasibility study.
	TBD	Implementation schedule will be influenced by NISP progress and WTP feasibility study.
Reuse	2023 - 2024	Prepare feasibility study.
	TBD	Implementation schedule will be influenced by NISP progress and plans for the local WTP.
Milavec Res. Expansion	2023 - 2024	Evaluate as part of Reuse feasibility study.
Additional Native Water	2026	Update policies based on potential for changing add'l LBDC shares and plans for NISP, local WTP, and Reuse.
Regional Opportunities	2022, ongoing	Participate in SPROWG planning and evaluate other opportunities as they arise.
Water Resources Planning	annually	Annual status update to Board of Trustees.
Document Updates	2027, 2032	Update Long-Term Water Resources Plan every 5 years, if not warranted earlier.
Municipal Code Revisions	2022, ongoing	Update water dedication policies.

