



# Drinking Water Project Needs Assessment (PNA) Form

Water Quality Control Division

**General Information**

Facility Name: Denver Water Original ID: \_\_\_\_\_

Mailing Address 1: \_\_\_\_\_ Mailing Address 2: \_\_\_\_\_ County: \_\_\_\_\_

City: \_\_\_\_\_ State: CO Zip Code: \_\_\_\_\_

Property Address 1: 1600 W. 12th Ave. Property Address 2: \_\_\_\_\_ County: Denver

City: Denver State: CO Zip Code: 80204-3412

Latitude : \_\_\_\_\_ Longitude : \_\_\_\_\_

Name of Project: Lead Reduction Program

Type of Project (Check all that apply)

Treatment       Distribution / Transmission       Water Supply       Water Storage

Please enter the following information for your organization if you have it.

**1. Applicant Information:**

First Name: Usha Middle Name: \_\_\_\_\_ Last Name: Sharma

Phone Number: 303-628-6410

Mailing Address1: 1600 West 12th Avenue Mailing Address2: \_\_\_\_\_

City: Denver State: CO Zip Code: 80204

E-mail: usha.sharma@denverwater.org

**Consulting Engineer Information:**

First Name: Dan Middle Name: \_\_\_\_\_ Last Name: Fourness

Phone Number: 303-723-5098

Mailing Address1: 165 S Union Blvd Ste 200 Mailing Address2: \_\_\_\_\_

City: lakewood State: CO Zip Code: 80228

E-mail: Daniel.Fourness@mottmac.com

**Self-Certification:**

Yes     No    Does the system intend to self-certify all or a portion of the project?

If yes, please identify the portions of the project that the system will self-certify.

- Distribution system piping       Pump station (without integral treatment)       Valves, hydrants, and/or meters

Provide additional explanation, if necessary:

## 2. Executive Summary

In 2012, water quality sample results from homes with known lead service lines and plumbing exceeded the lead action level, as defined by the EPA's Lead and Copper Rule (LCR). As a result, Denver Water completed an optimal corrosion control treatment study and recommended the use of pH control for its Optimum Corrosion Control Treatment (OCCT). However, in 2018, the Colorado Department of Public Health and Environment required that Denver Water implement orthophosphate as OCCT. Soon after, Denver Water sought a variance from the EPA to implement the holistic and innovative Lead Reduction Program (LRP) as an alternative due to concerns that orthophosphate treatment would not permanently solve the ultimate public health issue of tackling lead at its source by simply removing lead service lines and would have negative impacts on the environment, wastewater treatment agencies and water treatment operations. Numerous and diverse stakeholders were involved in the creation of the variance request from the LCR. The EPA approved the request in 2019 with a 3-year initial term. In 2020, Denver Water launched the LRP. 2022 marks the third year of the LRP thus Denver Water is in the process of requesting the full renewal of the LRP for the remaining program years (12 additional years through 2034). The combined Denver Water service area includes the City and County of Denver (City) and service areas of the approximately 60 treated water distributors in the Denver metropolitan area. The total cost estimate for the program is approximately \$673.5 million. If additional funding were to be obtained, Denver Water would be able to increase the number of LSL replacements each year, complete the program sooner than the 2034 projected time frame, and reduce the burden of program costs on Denver Water's ratepayers.

## 3. System Structure and Operation

### 3.1 Legal Ownership of System (TMF: Managerial-1)

First Name: City and County of Denver acting by and through its Board of Water Commissioners

Mailing Address1: 1600 West 12th Avenue      Mailing Address2: \_\_\_\_\_

City: Denver      State: CO      Zip Code: 80204

Phone Number: 303-628-6410      Fax: \_\_\_\_\_

### 3.2 Organizational Chart

Include an Organizational Chart as Attachment 2.

### 3.3 Plans (TMF: Managerial-2)

Monitoring Plan - Include a copy of the Monitoring Plan as Attachment 3.

Cross Connection Control Plan - Include a copy of the Cross Connection Control Plan as Attachment 4.

Water Conservation Plan (if system sells over 2,000 acre feet of water annually) - Include a copy of the Water Conservation Plan as Attachment 5.

Not Applicable

### 3.4 Current Operator in Responsible (ORC) Charge (TMF: Technical-14)

First Name: na      Middle Name: \_\_\_\_\_      Last Name: na

Certification Number: na      Certification Expiration Date: 06/07/2022

Operator Certification Level (check one)       Staff Operator       Contract Operator

Treatment  Class D  Class C  Class B  Class A  
 Distribution  Class 4  Class 3  Class 2  Class 1  
 Combined Treatment/Distribution  Class S  Class T

**3.5 Operator Certification (TMF: Technical-15)**

Yes  No Do the system operators have adequate operator certification levels for the proposed project as defined by Regulation 100 Water and Wastewater Facility Operators Certification Requirements?

Explain the impact of the proposed project on the required operator in responsible charge (ORC) certification level and other predicted staffing changes.

The project does not impact certification levels or staffing requirements.

**3.6 Record Keeping (TMF: Managerial-3)**

Describe the system's record retention policy that meets the requirements of the Colorado Primary Drinking Water Regulations (Regulation 11) including: record type, retention period, and record location.

Permanent retention held for: utility infrastructure locations, construction management records of enduring value and corrosion treatment monitoring. All other lead reduction program records held for 2 years after the end of the program (2035).

**3.7 Annual Budget (TMF: Financial-1)**

Yes  No Does the system prepare an annual budget?  
 Yes  No Does the system prepare and maintain a Capital Improvement Plan?

Please provide a narrative of the process for annual budgeting and financial planning.

Staff compiles organizational budgets and analyzes all revenue and expenditure projections for alignment with organizational goals and objectives as well as adherence to budget guidelines. The draft budget is reviewed by organizational leadership to ensure it aligns with the organizational strategies and priorities. Each November, the draft budget for the upcoming calendar year is presented to the Denver Board of Water Commissioners in the annual budget workshop to gather feedback. The final version of the draft budget is formally presented to the Board in December for adoption.

**3.8 Financial Status (TMF: Financial-2)**

Describe the current financial status and multi-year financial planning for the system including O&M costs, existing debt, required reserve accounts, rate structure, other capital improvement programs, and the system's reserve policies.

Denver Water utilizes a multi-year financial plan to determine revenue adjustments needed to meet annual revenue requirements for each year of the plan. Operating expense budgets capture the day-to-day, ongoing expenses incurred to run the business. Budget targets for operating expenses are developed annually by reviewing prior year expenditures, determining which expenditures are no longer needed and adding new expenditures for the upcoming year. Project budgets are funded by debt, system development charges and/or cash reserves. Budget targets for capital projects are based on the prioritized list of projects found within the long-term capital forecast. Please see pages 22-23 of the Official Statement for Water Revenue Bonds Series 2021A (Attachment 8) for our Capital Improvement Plan.

20-year cash flow projection  
 Include a copy of the 20-year cash flow projection as Attachment 8.

**3.9 Audits (TMF: Financial-5)**

Has the system submitted audits to the Department of Local Affairs or has the received State exemption of the statutory audit requirement?

- Yes - Provide a copy of the most recent audited financial statement or exemption from State as Attachment 9.  No

**3.10 Insurance (TMF: Financial-6)**

Does the system maintain general liability insurance?

- Yes - Provide a copy of the most recent audited financial statement or exemption from State as Attachment 9.  No

see attachment

**4. Project Purpose and Need**

Discuss the issue or concern that the proposed project will address. Specific issues are outlined below. All issues must be discussed in each sub section below even if they are not the project driver.

**4.1 Health and Compliance**

Summarize the system's compliance status that necessitates the proposed project.

In 2012, water quality sample results from homes with known lead service lines and plumbing exceeded the lead action level. Denver Water completed an optimal corrosion control treatment study and recommended the use of pH control for its OCCT. However, in 2018, CDPHE required that Denver Water implement orthophosphate as OCCT. Soon after, Denver Water sought a variance from the EPA to implement the holistic and innovative LRP as an alternative due to concerns that orthophosphate treatment would not permanently solve the ultimate public health issue of tackling lead at its source and would create negative impacts on the environment, wastewater treatment agencies and water treatment operations. In 2019, Denver Water received approval from EPA through a variance from the LCR to implement the LRP as OCCT. A key component to this program is replacing customer-owned LSLs to reduce exposure to lead in drinking water. The Variance Order and associated Lead Reduction Program Plan detail all regulatory compliance requirements. Denver Water is currently in compliance with the requirements of both the EPA LCR as well as the Variance Order for OCCT.

**4.2 Existing facility limitations**

Summarize existing water system facility(ies) limitations that necessitate the proposed project.

In Denver Water's service area, 20-25% of households receive water via lead service lines. An estimated 70% of households with LSLs are in low-income and/or minority neighborhoods. Given the disproportionate rate at which low-income and minority residents experience the risk of lead exposure from all/other sources, this program prioritizes vulnerable populations and historically disadvantaged neighborhoods for LSL replacement. The expedited program means that current and future generations will be protected from lead exposure in drinking water more quickly. Federal funding will shorten this timeline through increased rates of replacement.

**4.3 Operations and Maintenance Issues**

Summarize operational and maintenance (O&M) issues with the existing water facilities.

This project involves replacing customer-owned LSLs and does not impact Denver Water facilities. However, LSL replacement work affects Denver Water infrastructure such as water mains. Service line replacement requires either new taps or use of existing taps on water mains. The material, size or condition of the water main can dictate the type of replacement work performed. For instance, LSL replacements on PVC water mains with an existing direct tap requires isolation of the main and the installation of a saddle on the replacement tap. This type of work takes longer for crews to complete and creates longer water outages for customers but ensures the integrity of the pipe stays intact.

## **5. Existing Facilities Analysis**

### **5.1 Existing Source Water– Section required for treatment and supply projects**

- Not applicable (for distribution and storage projects, only)

#### **5.1.2 Water Rights (TMF: Technical-3)**

Placeholder for content related to 5.1.2 Water Rights (TMF: Technical-3).

### **5.2 Existing treatment– Required for treatment and supply projects only**

- Not applicable (for distribution and finished water storage projects, only)

#### **5.2.1 Overall treatment description (TMF: Technical-5)**

Provide a current treatment description including: treatment processes used, major design parameters (e.g., process capacities, detention times, unit loading rates, disinfection log inactivation).

Denver Water's treatment plants use conventional process design consisting of coagulation/sedimentation, filtration and disinfection processes. Denver Water's treated water meets or exceeds all the standards set by the state of Colorado and the federal Safe Drinking Water Act. Denver Water currently has three treatment plants with a capacity of 600 million gallons per day (MGD):

Marston: (200 MGD) treats water from the South Platte and Dillon Reservoir, occasionally supplemented with water from Bear Creek and Chatfield Reservoir.

Moffat: (120 MGD) Treats water from South Boulder Creek and the Fraser River delivered through the Moffat Tunnel.

Foothills: (280 MGD) treats the same South Platte and Dillon Reservoir water as Marston.

Denver Water is in the process of constructing a new treatment plant, which is scheduled to come online in 2024.

Corrosion control: pH is maintained using sodium hydroxide and alkalinity with calcium carbonate at Denver Water's treatment plants to reduce corrosion in the distribution system and the plumbing in homes and businesses.

#### **5.2.2 Existing Process Flow Diagram (TMF: Technical-8)**

Include an existing treatment facility process flow diagram as Attachment 13.

#### **5.2.3 Current Compliance Status (TMF: Technical-1)**

Discuss the system's current compliance status with Regulation 11, as well as violations and significant deficiencies documented during sanitary surveys.

Denver Water is in compliance with Regulation 11. Sanitary survey violations and significant deficiencies are as follows for the latest survey completed in 2019:

Significant Deficiencies

F310 - Storage Condition: The condition of storage structure may allow potential sources of contamination to enter the tank. Marston WTP (SDWIS ID: 001) This deficiency has been corrected and closed.

F310 – Storage Condition: The condition of the storage structure may allow potential sources of contamination to enter the tank – Green Mountain Storage and Pumpstation (SDWIS ID: 010) This deficiency has been corrected and closed.

Violations

F330 – Storage Tank Inspection Plan (T3): Supplier has not developed or maintained a finished water storage tank inspection plan. This violation has been corrected and closed.

R529 – Monitoring, Recordkeeping and Data Verification (T3): Supplier was not properly monitoring and or recording turbidity values. This violation has been corrected and closed.

5.2.4 Appropriateness of Treatment Technologies (TMF: Technical-6)  
Discuss if the existing treatment process(es) are appropriate to meet Regulation 11 considering existing source water quality and potential sources of contamination.

The conventional water treatment processes utilized by Denver Water treatment facilities are sufficient to fully comply with the applicable standards of Regulation 11. Potential contamination within watersheds can be overcome through various treatment adaptations and/or shifting load from one facility/watershed to another.

Denver Water oversees the implementation and maintenance of the corrosion control treatment (CCT) with pH/alkalinity adjustment and optimization strategy, monitoring of pH and alkalinity in the distribution system, testing of water at customer taps and from customers' filters for the presence of lead and copper contamination. Since Denver Water implemented CCT in March 2020, the cumulative 90th percentile lead concentration has decreased. Low lead levels were achieved by raising pH from 7.8 standard units (S.U.) to 8.8 S.U. and maintaining tight pH control at the treatment plants and in the distribution system. On July 9, 2021 CDPHE set final water quality parameters for corrosion control treatment to an entry point range of 8.6-9.0 for pH and minimum alkalinity of 20 mg/L as CaCO<sub>3</sub> (calcium carbonate). Denver Water continues to monitor and provide reporting throughout the treatment and distribution system, demonstrating they are within the parameters set by CDPHE.

Maintaining a pH/alkalinity adjustment above 8.8 S.U. across the system has achieved a better-than-expected 60-65% decrease in 90th percentile lead levels as compared to the second sampling period in 2019, with LCR sampling results showing lead concentrations ranging from 4.1-4.5 µg/L as the 90th percentile concentration.

5.2.5 Capacity of Treatment Technologies (TMF: Technical-7)  
Is the capacity of the existing water treatment system appropriate to meet water demands through the next 20 years?

Yes       No

Please explain:

This project does not modify water treatment capacity. For more information on Denver Water's construction of the Northwater Treatment Plant, see page 23 of the OS, Attachment 8.

5.2.6 Operational Controls (TMF: Technical-10)  
Describe if the existing treatment process(es) has appropriate operational controls.

n/a

5.2.7 Residuals Management (TMF: Technical-9)  
If the treatment process produces waste residuals, please discuss the water system's residuals management strategy.

n/a

List documentation for all existing discharge permits and/or residuals for the water treatment plant including residuals for disposal or beneficial use (e.g., NPDES discharge permits, EPA UIC Permit, HMWMD radioactive materials license, HMWMD Solid Waste licenses).

Include a copy of discharge permits and/or residual documentation as Attachment 14  Not Applicable

### **5.3 Distribution - Required for distribution and storage projects only**

Not applicable (for supply and treatment projects, only)

#### **5.3.1 Overall Distribution System Description (TMF: Technical-11 and -12)**

Discuss the existing finished water distribution system including: gravity vs. pumped pressurization, facility age, material type, condition of materials, amount of AC pipe, number of pressure zones, pump stations, and storage tanks.

Denver Water's combined service area is approximately 335 square miles. To provide water across the service area, there are three treatment plants (Marston, Moffat, and Foothills) which currently have a combined treatment capacity of 650 million gallons per day. This system includes 23 pump stations (18 potable water pump stations, 2 recycled water, and 3 raw water), 15 raw water reservoirs, 33 treated water reservoirs, 149 pressure zones, and 150 pressure regulated stations. Pressure within the distribution system is maintained through a combination of direct pumping and elevated storage tanks. 40% of the distribution system is pre-1960s. Pipe materials include cast iron (CI), 11% asbestos cement (AC), 22% ductile iron (DI), 26% polyvinyl chloride (PVC). The average age of system pipes is approximately 37 years. The average age of transmission conduits is approximately 48 years. In general, customer-owned service lines connect to a Denver Water distribution main.

Discuss the estimated distribution system losses (i.e., the percent of water lost in the distribution system and not delivered/billed to customers).

Non-revenue water system losses vary between 3% and 5% annually.

#### **5.3.2 Pressure (TMF: Technical-13)**

Discuss if the existing distribution system is designed to maintain a minimum pressure of 20 psi at all ground level points in the distribution system under all conditions of flow as required in the CDPHE Design Criteria for Potable Water Systems (Design Criteria). The Design Criteria also recommends a normal working pressure in the distribution system of approximately 60 psi, and not less than 35 psi. Discuss how the distribution system meets the required and recommended distribution system pressures.

Replacement of LSLs will not affect pressure in the distribution system.

Include a map illustrating any locations where a minimum pressure of 20 psi cannot be provided under all conditions of flow as Attachment 15.

Not Applicable

#### **5.3.3 Meters (TMF: Financial-4)**

Discuss if the existing distribution system includes water meters.

Denver Water's distribution system is fully metered at individual structures and uses an Automatic Meter Reading (AMR) system to ensure accurate consumption readings. The meter and appurtenances are changed out during a lead service line replacement to upgrade all service line components and older AMRs.

## 6. Facility Planning Analysis

### 6.1 Planning Area Description

#### 6.1.1 Project Area Map

Provide a map showing a minimum of a 3-mile radius around the project area that includes environmental features (lakes, streams, wetlands, floodplains). Map must include current and proposed service area, existing drinking water facilities (plants, major distribution lines, water sources, storage facilities), existing wastewater outfalls/permitted discharge points, and any new or affected sources with regard to the pertinent watershed. Include the map as Attachment 16.

#### 6.1.2 Urban Growth Boundary

Yes  No Is the project within or near an urban growth boundary?

#### 6.1.3 Local and Regional Issues

Yes  No Were local and regional planning efforts considered?

Please describe.

Yes  No Were local and regional water quality and/or quantity efforts considered?

Please describe.

In 2018, the CDPHE designated orthophosphate be added to drinking water as the OCCT and directed Denver Water to prepare and implement orthophosphate treatment by March 2020. This designation provoked considerable concern from Denver Water and numerous stakeholders due to environmental and public health concerns. Concerns included facility and treatment upgrades for wastewater treatment plants, water quality impacts such as algal blooms and impaired aquatic life in streams, lakes and reservoirs. There were additional public health concerns about the complex and ongoing water chemistry management for orthophosphate and the ongoing concern of lead release at customer taps.

A robust stakeholder process comprised of federal, state and local organizations evaluated possible alternatives to orthophosphate. Alternatives focused on improved water quality for the South Platte watershed, removing impacts to downstream wastewater treatment facilities and increased and more immediately available public health benefits. From this process, the Lead Reduction Program was developed and subsequently, Denver Water proposed this holistic program to the EPA and CDPHE as a variance to the original OCCT designation. The LRP was approved for implementation in 2020.

Yes  No Was consolidation with another water system / treatment facility considered?

If yes, describe the consolidation considerations. If no, please indicate why consolidation was not considered.

### 6.2 Population and Water Demand Projections (TMF: Technical-2)

For a 20 year planning period, forecast the population growth, projected increase in Equivalent Residential Taps (ERT), and projected drinking water demands.

Current ERT - As Calculated in the Prequalification Form: 611745.104586183

Population and Demand Projections - The department generally accepts two methodologies for projecting water flows over the 20 year planning period. Other methodologies are acceptable with a clear explanation and all assumptions and parameters listed:

- Method 1: Population based projections. Recommended for primarily residential systems and/or for systems without water meter data
- Method 2: Equivalent Residential Taps (ERT) Analysis. Recommended for systems with a high multifamily, commercial, industrial, irrigation demands.

Method 1 and 2 templates can be found at the end of this form.  
Attach the population projection as Attachment 17.

Discuss supporting data and reasons for projected future growth during the 20 year planning period.

Note: Projects designed solely to serve future development or population growth are not eligible for State Revolving Fund financing.



Estimates are derived from data provided by Denver Regional Council of Governments as well as the State Demography Office. Denver Water's growth rates are unique to our service area with the average annual growth rate for system population projected at 0.8%.

### **6.3 Source Water Planning**

#### **6.3.1 Overall Water Resource Management Description (TMF: Technical-2)**

For a 20 year planning period, describe the system's water resource management plan.

The project is not designed to alter source water supply. For more information on Denver Water's long range planning see page 19 of the OS.

#### **6.3.2 Water Rights (TMF: Technical-3)**

For the 20 year planning period, discuss how the system will be able to meet the projected population and increased industrial/commercial water demands.

This project has no impacts on water rights or demands. For more information on Denver Water's water rights, please see page 15 of the OS – Attachment 8.

Provide documentation supporting the system's water rights, if not provided in section 5.1.2 above, as Attachment 18.

#### **6.3.3 Source Water Supply Capacity (TMF: Technical-4)**

For the 20 year planning period, discuss if the source water supply infrastructure is capable of delivering adequate source water to meet projected needs.

This project has no impacts on water supply infrastructure. For more information on Denver Water's water rights, please see page 17 of the OS – Attachment 8.

## **7. Assessment of Alternatives**

### **7.1 Alternatives**

For each alternative, please provide:

1. A description of the alternative addressing the issues identified in Section 4: Project Purpose and Need. (TMF: Technical-7)
2. Capital cost estimates and annual operation and maintenance costs.
3. Advantages and Disadvantages of each alternative.

Alternative 1 Title : Existing LSL Replacement  
via the LRP

Alternative 1 Description (2000 character limit):

Under the existing Lead Reduction Program, Denver Water must replace a minimum of 4,477 LSLs a year or 7% of total inventory. The project is expected to be complete by the end of 2034.

Alternative 1 Capital and Operation and Maintenance Costs (2000 character limit):

The expected cost to remove all LSLs within the Denver Water combined service area is \$500M. Total program costs are estimated at \$673.5M.

Alternative 1 Advantages and Disadvantages (2000 character limit):

In 2019, Denver Water received approval from EPA through a variance from LCR to implement the LRP as OCCT. A key component to this program is replacing customer-owned lead service lines to reduce exposure to lead in drinking water. Per the requirements in the variance order, Denver Water is replacing LSLs at an annual rate of 7%. It will take 15 years to complete the program. Federal funding would allow Denver Water to replace LSLs more quickly.

Alternative 2 Title : Accelerated LSL Replacements with Federal Funding (LRP+)

Alternative 2 Description (2000 character limit):

If an additional funding source(s) were made available, Denver Water could replace an additional 3,000-5,000 LSLs a year within the City and County of Denver, prioritizing replacement in areas with vulnerable, at-risk populations and disproportionately impacted communities. Work areas that receive federal funding would be separate from the existing LSL replacement work areas of the LRP.

Alternative 2 Capital and Operation and Maintenance Costs (2000 character limit):

Additional cost estimates of \$60M to replace 4,000-5,000 lines a year, including administrative costs.

Alternative 2 Advantages and Disadvantages (2000 character limit):

There are multiple advantages for Denver Water to receive additional funding to complete LSL replacements. Public health and water quality will be improved at the household level at more properties that under Alternative 1. This means that generally, public health across Denver Water's service area will be improved by more rapidly removing the major source of lead exposure in drinking water. Alternative 2 also allows Denver Water to increase the number of multi-family properties, apartment buildings and other more challenging construction locations it can reach, as the utility can prioritize these important property types more quickly than feasible under Alternative 1. Notably, for every 4,500 additional LSLs replaced through additional funding, one year will be removed from the life of the LRP. Finally, system reliability also will be improved through this alternative because should Denver Water need to utilize different or lower quality water sources for treatment and distribution (due to drought or other operational events), no additional studies for optimal corrosion control would be required, because LSLs would have been removed sooner under this alternative.

Under this alternative, there will be additional construction challenges due to the increased volume of construction activity occurring within the City and County of Denver. This highlights the importance of robust and consistent coordination about project delivery as well as strong communication across all channels to ensure customers, residents and the community at large are aware of the work happening in their neighborhoods.

Alternative 3 Title : na

Alternative 3 Description (2000 character limit):

NA

Alternative 3 Capital and Operation and Maintenance Costs (2000 character limit):

na

Alternative 3 Advantages and Disadvantages (2000 character limit):

na

Provide discussions of additional alternatives as Attachment 19.

## **8. Selected Alternative**

### **8.1 Justification of Selected Alternative (TMF: Technical-6)**

Please demonstrate why the selected alternative best meets system needs based on both monetary and non-monetary considerations. For treatment facility projects, if the EPA-BAT technology is not selected then the report must include a treatment rational.

Alternative 2 (LRP+) would allow Denver Water to replace additional LSLs each year at an increased rate, which improves public health by tackling the major source of lead exposure in drinking water more quickly.

### **8.2 Technical Description and Design Parameters (TMF: Technical-5)**

For the selected alternative, please describe all proposed project components and assumed design parameters.

The LRP includes three types of replacements: (1) Full LSL replacement of a single service line. (2) Replacement of an existing partial LSL that results in a non-LSL from the main to the first fitting inside the dwelling. (3) Replacement of a galvanized service line downstream of an existing or previously existing lead service line. Additional funding will allow Denver Water to further accelerate replacement of lead service lines.

### **8.3 Proposed Process Flow Diagram**

Include a proposed treatment facility process flow diagram or map of the distribution system, as applicable as Attachment 20.

### **8.4 Appropriateness of Treatment Technologies (TMF: Technical-6)**

Discuss appropriateness of the proposed treatment process(es) to meet Regulation 11 considering anticipated source water quality and potential sources of contamination.

Accelerated LSL removal is one of the major elements of the LRP, which was approved by EPA on Dec. 19, 2019.

**8.5 Environmental Impacts**

Describe direct and indirect impacts on floodplains, wetlands, wildlife habitat, historical and archaeological properties, etc., including any projected permits and certifications.

Replacement work requires replacing a LSL with a copper pipe through an existing hole in the property's foundation or drilling a small (1"-2" diameter) hole to install a service line at a new location. These replacement techniques may occur in homes or buildings with a National Historic Preservation Act (NHPA) historic property designation. This work is completed only with the property owner's signed consent. In addition, there may be historic district designations in neighborhoods throughout the LRP area. Direct impacts that may occur to historic properties are anticipated to temporary and are not anticipated to change the structural integrity or historic context of the structure. The NHPA also considers indirect impacts that may result from an undertaking and are defined as those impacts that occur later in time or farther removed in distance. Neither of these conditions are reasonably foreseeable as a result of the LSL replacement, therefore no indirect impacts are anticipated. In a meeting on May 10, 2022, between CDPHE, the State Historic Preservation Office (SHPO), and Denver Water, the process for NHPA Section 106 consultation compliance was discussed. CDPHE and SHPO agreed to work toward a Programmatic Agreement for the lead service line replacement project to define the types of impacts anticipated as a result of the undertaking, and identify creative ways to avoid, minimize and mitigate the impacts.

**8.6 Land Requirements**

Identify all necessary sites and easements, permits and certifications, and specify if the properties are currently owned, to be acquired, or leased by the applicant.

Work will require temporary street occupancy, stormwater, plumbing, utility plan review, and tree removal permits. Work areas are not located on Denver Water property and occur in the public right of way and private property.

**8.7 Construction Requirements**

Discuss construction concerns such as subsurface rock, high water table, limited access, or other conditions that may affect cost of construction or operation of a facility.

Because this project takes place on developed land, construction concerns differ from that of a new-build project. Construction concerns can include encountering groundwater, asbestos, trees, retaining walls and various interior property hazards.

**8.8 Operational Aspects**

Discuss the operator staffing requirements, operator certification level requirements (including distribution), the expected basic operating configuration and process control complexities, and the operational controls and equipment that allows operational personnel to respond to routine and unanticipated treatment challenges, such as flow rate, chemical feed dosing, and process monitoring.

na

**8.9 Costs (TMF: Financial-2 and -3)**

Summarize the capital costs associated with the selected alternative. The 20 year cash flow projection included in Attachment 7 must reflect the capital and operation and maintenance costs associated with the selected alternative. (No more than 2,000 Characters)



Provide documentation of a public meeting held or describe when and where the meeting will be held. The meeting must be noticed for 30 days. Provide the public notice, proof of publication, sign in sheet, and agenda as Attachment 23 or provide to your project manager in the Grants and Loans Unit after the meeting has taken place.

Include the public meeting documentation as Attachment 23.

Or, will be provided to the Grants and Loans Unit project manager after the meeting takes place.

### 9. Projecting Water Flows Method 1: Population based projections

#### Assumptions/Data

Current System Population	1430000	People
Current Service Area Population (If providing water to neighboring community)	1287000	People
Population Growth Rates	0.8	% increase/year
Average Daily per Capita Flow Rate	179	Gallons per capita day
Maximum Daily per Capita Flow Rate	370	Gallons per capita day
Peak Hour Factor	631	Gallons per capita day

#### Information Source

System population is the service area population plus the estimated population served within fixed limit contract areas. Population is calculated from estimates provided by the Colorado state demographer and the Denver Regional Council of Governments (DRCOG). Population estimates are fit to the service area using GIS applications.

Service area population is estimated using the above method. Denver Water's service area is the total area within the City and distributors in neighboring communities.

Colorado State Demographer and DRCOG

Current daily per capita use is 125 gallons. Future per capita is expected to decline to 117 gallons by 2040 with increased customer efficiency.

Current maximum daily per capita use is 265 gallons.

Current peak hour factor is approximately 1.7x the maximum daily use.

Year	System Population	Service Area Population (if different)	Average Daily Flow	Maximum Daily Flow	Peak Hour Flow
+0	0	0	179	370	631
+5	1501490	1360359	184	376	642
+10	1571421	1423717	188	384	656
+15	1615443	1463601	191	392	669
+20	1659464	1503484	193	400	683

**10. Projecting Water Flow Method 2: Equivalent Residential Taps (ERT)**

Current Equivalent Residential Taps (ERT)		
A	Number of active residential taps:	0
B	Total annual consumption (gallons per year) - Residential	0
C	Estimated equivalent residential tap water usage Annual flow per ERT = B / A	0
D	Total annual consumption (gallons per year) - Commercial / Industrial / Irrigation	0
E	Estimated Commercial / Industrial / Irrigation flow in ERT # of commercial / industrial / irrigation ERT = D / C	0
F	Total ERTs = A + E	0

Population and Flow Assumptions / Data

Information Source

Current System Population	_____	People	_____
Current Service Area Population (If providing water to neighboring community)	_____	People	_____
Population Growth Rates	_____	% increase/year	_____
Average daily flow per ERT	_____	Gallons per capita day	_____
Maximum daily flow per ERT	_____	Gallons per capita day	_____
Peak Hour Factor	_____	Gallons per capita day	_____

Year	System Population	Service Area Population (if different)	Residential Taps (ERTs)	Multifamily Residential Taps (ERTs)	Commercial/ Industrial Taps (ERTs)	Irrigation Taps (ERTs)	Total Taps (ERTs)	Average Daily Flow	Maximum Daily Flow	Peak Hour Flow
+0										
+5										
+10										
+15										
+20										