Water Treatment Plant Expansion Preliminary Engineering Report

RFP for Coronavirus State and Local Fiscal Recovery Funds

Town of Weaverville

Selena D Coffey
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Application Form

Question Group

Buncombe County requests proposals for projects to help the community recover from and respond to COVID-19 and its negative economic impacts.

Buncombe County has been awarded $50,733,290 in Coronavirus State and Local Fiscal Recovery Funds (Recovery Funding), as part of the American Rescue Plan Act. To date, Buncombe County has awarded projects totaling $23,093,499, leaving a balance of $27,639,791 available to award.
Visit http://www.buncombecounty.org/recoveryfundinghttp://www.buncombecounty.org/recoveryfundingwww.buncombecounty.org/recoveryfundinghttp://www.buncombecounty.org/recoveryfundinghttp://www.buncombecounty.org/recoveryfundinghttp://www.buncombecounty.org/recoveryfundinghttp://www.buncombecounty.org/recoveryfunding for details.

This infusion of federal resources is intended to help turn the tide on the pandemic, address its economic fallout, and lay the foundation for a strong and equitable recovery.

Buncombe County is committed to investing these funds in projects that:

- Align to county strategic plan and community priorities
- Support equitable outcomes for most impacted populations
- Leverage and align with other governmental funding sources
- Make best use of this one-time infusion of resources
- Have a lasting impact

Proposals shall be submitted in accordance with the terms and conditions of this RFP and any addenda issued hereto.

Click here for the full terms and conditions of the RFP

Organization Type*

Public

Nonprofit documentation

If nonprofit, attach IRS Determination Letter or other proof of nonprofit status.

IRS Letter - 4076C - Tax Exempt Status for Town of Weaverville.pdf

Name of Project.*

Water Treatment Plant Expansion Preliminary Engineering Report

New/Updated Proposal*

Is this a new project proposal or an updated version of a proposal submitted during the earlier (July 2021) Recovery Funding RFP?

New project proposal

Amount of Funds Requested*

$1,018,740.00

Category*

Please select one:

- Affordable Housing
- Aging/Older Adults
- Business Support/Economic Development
- Environmental/Climate
- Homelessness
- K-12 Education
- Infrastructure and/or Broadband
- Mental Health/Substance Use
- NC Pre-K Expansion
- Workforce

Infrastructure and/or Broadband

Brief Project Description*

Provide a short summary of your proposed project.

The Town of Weaverville operates a 1.5 MGD (millions gallons per day) water treatment plant and distribution system. Population growth in north Buncombe County is resulting in increased water demands, revealing the need for increased capacity of the water treatment plant. The current plant was constructed in 1996 and is approaching water production values that trigger mandated actions to begin the planning, design, and construction process to increase capacity. The Town is positioned to be a regional provider due to its ability to withdraw 4.0 MGD from the Ivy River. The proposed project will expand the rated capacity of the existing water treatment plant to 3.0 MGD. Weaverville requests funding assistance for the project's preliminary engineering report as the report is integral in determining the service needs and challenges in providing safe, potable, and affordable water to the residents of north Buncombe County.

Project Plan*

Explain how the project will be structured and implemented, including timeframe.

The Water Treatment Plant Preliminary Engineering Report (PER) was completed in October 2021 (PER attached with this proposal). The PER identifies water service demand projections, addresses existing capacity, and analyzes four alternatives to address increasing water demands in North Buncombe County: 1) intake and Water Treatment Plant expansion, 2) new groundwater wells and Water Treatment Plant expansion, 3) new groundwater wells with onsite treatment, and 4) purchase of water from the City of Asheville. The PER is included with this submission and provides further explanation.

While the Water Treatment Plant expansion project's PER was completed in October 2021, Weaverville's Town Council is currently making efforts to determine the best way in which to proceed to address the growing water needs within Town limits, but also in North Buncombe County. Weaverville's Mayor and Town Manager are currently actively engaged in conversations with neighboring jurisdictions and Buncombe County government to assess the viability of a regional approach to water distribution.

Should the Water Treatment Plan expansion project proceed, it is estimated to take approximately 50 months from start to finish to complete the expansion. Once approved, as per the PER milestones, the following timeline should be followed: RFQ process (3 months), planned USDA funding application and approval (7 months), design (20 months), permitting (30 months), bid & award (32 months), construction (50 months).

Statement of Need*

Describe the need that this project will address. Include data to demonstrate the need, and cite the source of the data.

Buncombe County has identified the need for and prioritized the support of affordable housing in its strategic goals. Affordable housing requires safe and affordable water.

Excerpts from Preliminary Engineering Report attached:

As of 2020, the population for Weaverville was 4,567 based on the 2020 US Census. Weaverville has seen significant population growth over the past 30 years averaging about 25% growth per decade. As Asheville has been revitalized, people have been moving to the surrounding suburbs, including Weaverville. Asheville's growth rate has been decreasing, possibly because the City is approaching buildout in the existing service area. Weaverville still has abundant developable land for future growth. Like Asheville, Buncombe County's growth rate is slowing (18% from 2000 to 2010 to 9.6% from 2010-2019) likely because people are moving within the County boundaries into communities like Weaverville. This is because the cost of property and rent in Asheville is high and the life in many smaller communities is desirable.

Historically, Weaverville's growth has not trended directly with Buncombe County or City of Asheville growth. An average of the historical projection (25% increase per decade) may be more accurate but may also overshoot realistic numbers as a rate of growth that high will not continue unchecked. Therefore, Buncombe County population projections were used as surrogates for the Town of Weaverville. Using the NC county projections, the future populations for Weaverville can be estimated assuming the Town population will vary proportionately to the Buncombe County population projections. Using data provided by the NC OSBM, it becomes abundantly clear that the population of the Town is expected to continue to increase, which is the main motivation for this water treatment plant expansion project.

Link to COVID-19*

Identify a health or economic harm resulting from or exacerbated by the public health emergency, describe the nature and extent of that harm, and explain how the use of this funding would address such harm.

"Access to safe water is a fundamental human need and, therefore, a basic human right." (Excerpt from message of Secretary-General Kofi Annan on World Water Day, https://www.un.org/press/en/2001/sgsm7738.doc.htm)

At no time in our nation's history has the need for access to safe water been more evident than during the COVID-19 public health emergency. Access to safe water has been necessary for protecting the public's health during the pandemic and for preventing further spread of the virus. It has been essential that residences, schools, and workplaces maintain appropriate hygiene protocols during the pandemic. These protocols have required access to safe water during the pandemic and will continue to be necessary during recovery.

In summary, it has been critical during pandemic recovery that water remain affordable for all. As such, local government must continue to safeguard access to water for low income households as affordable water is directly linked to affordable housing.

Population Served*

Define the population to be served by this project, including volume and demographic characteristics of those served.

The Town of Weaverville's current Water Treatment Plant serves residents within the incorporated Town limits, as well as those outside of Town limits. The water system serves those of any demographic characteristic and volume as necessary.

Excerpted from Preliminary Engineering Report attached:
As of 2020, the population for Weaverville was 4,567 based on the 2020 US Census. Weaverville has seen significant population growth over the past 30 years averaging about 25% growth per decade. As Asheville has been revitalized, people have been moving to the surrounding suburbs, including Weaverville. Asheville's growth rate has been decreasing, possibly because the City is approaching buildout in the existing service area. Weaverville and north Buncombe County have abundant developable land for future growth and it is expected that this growth will continue at a rapid pace.

Results*

Describe the proposed impact of the project. List at least 3 performance measures that will be tracked and reported. If possible, include baselines and goals for each performance measure.

This project has the potential to impact residents of north Buncombe County who want public water. The current Water Treatment Plant was constructed in 1996 and produces 1.5 MGD (millions gallons per day) of water currently. The Water Treatment Plant has served the Town and residents of north Buncombe County well since its construction. However, increased water demands are approaching levels that require mandated actions to begin the planning, design, and construction process to increase capacity of this facility. The population of the service area continues to increase steadily, enforcing the need for additional water treatment capacity. Thus, the primary reason for this project is to expand treatment capacity to meet the potable water needs of the growing population of Weaverville and the surrounding north Buncombe County.

Potential performance measures may include, but not limited to the following:

Performance Measure #1: Town Council approves alternative to improve water system (See alternatives in PER).
Goal: Town Council approves alternative and approves project within 6 months (Fall 2022)

Performance Measure #2: Town finalizes funding plan.

Goal: Initiation of USDA loan process if expansion is chosen.

Performance Measure #3: Town develops timeline for implementation of approved project.
Goal: Town begins implementation, which may include the following if a Water Treatment Plant expansion is approved: RFQ process (3 months), planned USDA funding application and approval (7 months), design (20 months), permitting (30 months), bid & award (32 months), construction (50 months).

Evaluation*

Describe the data collection, analysis, and quality assurance measures you will use to assure ongoing, effective tracking of contract requirements and outcomes.

Regular evaluation will help to assess the qualitative and quantitative impact of grant funds if awarded. Data collection involving water usage and number of water customers and evaluation of the Town's water system will also provide a basis for future water system decisions and demonstrate the Town's accountability to the public and its water system customers. The Town will comply with data collection, analysis and quality assurance measures as required by Buncombe County for the use of any approved grant funds for the proposed project.

Equity Impact*

How will this effort help build toward a just, equitable, and sustainable COVID-19 recovery? How are the root causes and/or disproportionate impacts of inequities addressed?

Greater access to public water will provide more availability for affordable housing. The COVID-19 pandemic disproportionately impacted low income households, many of which lost access to housing. Increasing availabity of public water to affordable housing projects should provide low income households better access to reliable, safe drinking water.

Access to safe and affordable water should be equitable to all and should be the Town's goal in making decisions regarding a water system expansion. Creating an equitable and sustainable water system means providing all people with access to safe and affordable water. Achieving this equity will require collaboration and investment by all involved, including the Town, partnering jurisdictions, and potentially, the County.

The Town's evaluation of and intentional deliberations regarding the community's water needs is, in itself, the most fundamental example of sustainability, as it looks to the future of equitable water service delivery in the area. The Town's desire to work with neighboring jurisdications and exploring the potential for a regional approach to water distribution speaks to the Town's commitment to its citizens, as well as those outside of incorporated Town limits in north Buncombe County and beyond. With the potential for expansion of the Town's Water Treatment Plant, the Town will endeavor to maintain affordable water rates for those inside Town limits as well as those outside incorporated limits. Maintaining an affordable water rate structure will likely require ongoing analysis and implementation of new rate structures as necessary.

Project Partners*

Identify any subcontractors you intend to use for the proposed scope of work. For each subcontractor listed, indicate:
1.) What products and/or services are to be supplied by that subcontractor and;
2.) What percentage of the overall scope of work that subcontractor will perform.

Also, list non-funded key partners critical to project.

Project partners will be determined based on those municipalities that choose to partner with the Town in the delivery of water services.

Capacity*

Describe the background, experience, and capabilities of your organization or department as it relates to capacity for delivering the proposed project and managing federal funds.

Town Manager Selena Coffey:
- 23 years local government administration experience, including serving as Manager, Asst. Manager, Budget & Management Director, Budget Analyst
- Direct experience in capital project management
- Bachelor of Science, 1993
- Master of Public Affairs, 1995
- UNC-CH Municipal & County Administration Certificate, 2006

Town Finance Director Tonya Dozier:
- 6 years as Town Finance Director
- Certified Public Accountant (CPA), since 1997
- 15 years in accounting and tax preparation
- Bachelors of Science in Accounting, 1996
- Masters in Accountancy, 1997
- 6 years experience in accounting for and reporting on state and federal grants

Town Engineer & Public Works Director Dale Pennell:
- 4 years experience in current role as Public Works Director
- Served as Town's Project Manager for a $1,900,000 USDA water line project and $2,900,000 community center.
- Previous experience includes over 30 years as Project Engineer for multiple projects for municipal and state clients.
- Professional Engineer in NC, 2000)
- Registered Land Surveyor in NC, 1983

Weaverville Water Treatment Plant Director Trent Duncan:
- 20+ years in municipal water treatment and distribution with 5 years as Water Resources Superintendent and 7 years as Operator in Responsible Charge for Water and Wastewater
- Class A Surface Treatment Certification, 2010
- Class A Distribution Certification, 2012
- UNC School of Government Municipal and County Administration, 2018

Town Attorney Jennifer Jackson:
- 25+ years in Local Government Law, 6 years with Town of Weaverville as Town Attorney
- Juris Doctorate,1993
- UNC School of Government and NC League of Municipality local government (1997- current)
- Have provided assistance and support on grant projects (CDBG, FEMA, DEQ, LOSRC); Financing projects (160A-20 installment financing and USDA revenue bonds); Construction projects (architect/engineer selection, bidding/contractor selection, contract negotiation and administration)

Budget*

Provide a detailed project budget including all proposed project revenues and expenditures, including explanations and methodology. For all revenue sources, list the funder and denote whether funds are confirmed or pending. For

project expenses, denote all capital vs. operating costs, and reflect which specific expenses are proposed to be funded with one-time Buncombe County Recovery Funds.

Download a copy of the budget form HERE. Complete the form, and upload it using the button below.

Recovery-Funds-budget-Town-of-Weaverville.xlsx

Special Considerations*

Provide any other information that might assist the County in its selection.

2021-10-22 - Weaverville PER Draft - without Appendix.pdf
Of note, any level of funding assistance available would be beneficial for this project.

A copy of the Water Treatment Plant Expansion Preliminary Engineering Report and Withers-Ravenel Engineering Agreement are attached. There was not enough space allowed to attach the appendices to the PER, therefore this can be provided upon request. Pages 10-12 within the Engineering Agreement provide a detailed outline of the budget and funding requested for this project proposal. Please feel free to contact the Town should the County require additional information and/or documentation.

File Attachment Summary

Applicant File Uploads

- IRS Letter - 4076C - Tax Exempt Status for Town of Weaverville.pdf
- Recovery-Funds-budget-Town-of-Weaverville.xlsx
- 2021-10-22 - Weaverville PER Draft - without Appendix.pdf

IRS Department of the Treasury
Internal Revenue Service

ATLANTA GA 39901-0001

In reply refer to:
Feb. 22, 2021 LTR 4076C 0
56-6001368 000000 00
00042315
BODC: TE

TOWN OF WEAVERVILLE

30 S MAIN ST
WEAVERVILLE NC 28787-8463

010185

Taxpayer identification number: 56-6001368
Person to contact: CUSTOMER SERVICE
Toll-free telephone number: 877-829-5500

Dear Taxpayer:

We received your request dated Feb. 10, 2021, asking about your federal tax status. Our records don't specify your federal tax status. The following information about the tax treatment of state and local governments and affiliated organizations may help you.

GOVERNMENTAL UNITS

Governmental units, such as states and their political subdivisions, generally are not subject to federal income tax. Political subdivisions of a state are entities with the authority to exercise one or more of the sovereign powers of the state: taxation, police powers, or eminent domain. They typically include counties or municipalities and their agencies or departments. Charitable contributions to governmental units may be tax-deductible under Internal Revenue Code (IRC) Section 170(c)(1) if made for an exclusively public purpose. Generally, grantors and contributors may rely on the status of governmental units based on state or local law in determining the deductibility of their contributions.

AFFILIATED ORGANIZATIONS

* INSTRUMENTALITIES

In general, an instrumentality is an entity separate from, but affiliated with, a state or local government, and lacking any sovereign powers. Instrumentalities generally are subject to federal income tax. However, they may be recognized as tax-exempt under IRC Section 501(a) as organizations described in IRC Section 501(c), including IRC Section 501(c)(3). In addition, the income of a state or local government instrumentality may be excluded from gross income if it meets the requirements of IRC Section 115(1).

* ENTITIES MEETING THE REQUIREMENTS OF IRC SECTION 115(1)

An entity that is not a governmental unit but that performs an essential governmental function may qualify for an income exclusion under IRC Section 115(1). If the entity's income (1) is derived from a

TOWN OF WEAVERVILLE

30 S MAIN ST
WEAVERVILLE NC 28787-8463

public utility or the exercise of an essential governmental function, and (2) accrues to a state, a political subdivision of a state, or the District of Columbia, it may be excluded from gross income. Charitable contributions to these entities may not be tax deductible to the donors.

RULING LETTERS

To receive a ruling on its status as a political subdivision or instrumentality of a government, or on whether its income is excluded from gross income under IRC Section 115(1), a governmental unit or affiliated organization may request a letter ruling by following the procedures in Revenue Procedure (Rev. Proc.) 2019-1 or its annual successor. There is a fee associated with obtaining a letter ruling.

TAX-EXEMPT CHARITABLE ORGANIZATIONS

An organization affiliated with a state, county, or municipal government may qualify for exemption from federal income tax under IRC Section 501(c)(3), if (1) it is not an integral part of the government, and (2) it does not have governmental powers inconsistent with exemption (such as the power to tax or to exercise enforcement or regulatory powers). Note that an affiliated organization may meet the requirements of both IRC Sections 501(c)(3) and 115(1) under certain circumstances. See Rev. Proc. 2003-12, 2003-1 C.B. 316, for more information.

Most entities must file a Form 1023, Application for Recognition of Exemption Under Section 501(c)(3) of the Internal Revenue Code, or Form 1023-EZ, Streamlined Application for Recognition of Exemption Under Section 501(c)(3) of the Internal Revenue Code, to be recognized as exempt from federal income tax under IRC Section 501(c)(3), and to ensure that any charitable contributions they receive are tax-deductible to contributors under IRC Section 170(c)(2).

ADDITIONAL INFORMATION

This letter does not determine that you have a particular tax status. If you're unsure of your status, you can:

- Visit www.irs.gov/government-entities/federal-state-local-governments for government entity information.
- Visit www.stayexempt.irs.gov, an IRS site created especially for 501(c)(3) organizations.
- Read Publication 4220, Applying for 501(c)(3) Tax-Exempt Status.
- Seek a private letter ruling, following the procedures in Rev. Proc. 2019-1, 2019-1 I.R.B. 1 (updated annually).

Coronavirus State and Local Fiscal Recovery Funds
Proposed Project Budget

Organization Name:	**Town of Weaverville**
Project Name:	**Water Treatment Plant Expansion Preliminary Engineering**
Amount Requested:	**$1,018,740**

Proposed Project Revenue Funder	Amount	Confirmed or Pending?	Notes
Proposed Buncombe COVID Recovery Funds	$1,018,740		
List other sources here			
List other sources here			
List other sources here			
List other sources here			
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List other sources here			
List other sources here			
List other sources here			
List other sources here			
Total	$ 1,018,740.00		

Proposed Project Expenses	Proposed Recovery Funds	Other Funds	Total	Capital or Operating Expense?	Notes
Phase I: Study and Report	$132,500		$ 132,500.00	Capital	
Phase II: Preliminary Design Phase	$206,000		$ 206,000.00		
Phase III: Final Design Phase	$218,000		$ 218,000.00		
Phase IV: Bidding and Negotiating	$61,000		$ 61,000.00		
Phase V: Construction Contract Administration	$112,500		$ 112,500.00		
Phase VI: Post Construction	$62,500		$ 62,500.00		
Construction Observation (20 hrs/week, 1,560 hrs total	$218,400		$ 218,400.00		
Mileage	$7,840		$ 7,840.00		
List expenses here			$ -		
List expenses here			$ -		
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List expenses here			$ -		
List expenses here			$ -		
List expenses here			$ -		
List expenses here			$ -		
Total			$ 1,018,740.00		

PRELIMINARY ENGINEERING REPORT

Town of Weaverville – Water System Expansion

Prepared For:

Town of Weaverville
30 South Main Street
Weaverville, NC 28787

Prepared By:

WithersRavenel
137 S Wilmington St, Suite 200
Raleigh, NC 27601
919.469.3340
License No. C-0832

October 2021

WR No. 08201117.00

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2. Existing WTP Process Flow Diagram
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6. Alternative 3 WTP Expansion Map
7. Alternative 4 Proposed WTP Process Flow Diagram
8. Alternative 4 WTP Expansion Map

Appendix B – Town Financials

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2. Weaverville 2019 Audit
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1. 2020 Weaverville Local Water Supply Plan
2. Correspondence on Ivy Creek Withdrawal
3. Correspondence on 2020 US Census updates

EXECUTIVE SUMMARY

Existing Conditions and Reasons for the Project

The Town of Weaverville owns and operates a 1.5 MGD water treatment plant (WTP) that was constructed in 1996. The WTP pulls water out of the Ivy River and a total of 4 MGD can be allocated for use at the intake.The WTP has served the Town well, but increased water demands from the Town are approaching levels that require mandated actions to begin the planning, design, and construction process to increase capacity of this facility. The population of the Town continues to increase steadily, which enforces the need for additional water treatment capacity. In addition, the Town has begun discussions with surrounding communities to provide them with potable water through an existing interconnection within the distribution system. Thus, the primary reason for this project is to expand treatment capacity to meet the potable water needs of the growing population of Weaverville and the surrounding communities.

Results of Alternatives Analysis

This Preliminary Engineering Report (PER) evaluated five (5) alternatives to expand the drinking water supply to the Town of Weaverville. The five alternatives examined were:

- **Alternative 1** – No Action
- **Alternative 2** – Intake and Water Treatment Plant Expansion
- **Alternative 3** – New Groundwater Wells and WTP Expansion
- **Alternative 4** – New Groundwater Wells with Treatment at Existing Site
- **Alternative 5** – Purchase Water from the City of Asheville

Considering both monetary and non-monetary factors, the recommendation of this PER is for the Town of Weaverville to expand their drinking water capacity is Alternative 2 – Intake and Water Treatment Plant Expansion.

Proposed Project Description

The proposed project consists of expanding the existing Weaverville WTP from 1.5 MGD to 3.0 MGD to meet the present and future water needs of the Town. The existing treatment process will be 'mirrored' on east side of the site to double the treatment capacity of the plant. This expansion was the intent of the original engineer that designed the WTP, making process integration and construction simpler than other alternatives.

The total capital cost for the project is expected to be approximately $13.6 million, which is intended to be funded through the United States Department of Agriculture (USDA) Rural Development program.

Summary of Environmental Impacts

The proposed alternative will utilize the existing WTP site for construction, which will significantly reduce negative environmental impacts to the surrounding area. Typical environmental impacts would be expected during construction including increased noise, air emissions from heavy equipment, use of fossil fuels, and runoff from the site. These impacts will be mitigated to the extent practical during construction. A separate Environmental Assessment (EA) accompanies this PER.

Project Funding and User Fee Increases

The capital cost of $13.6M is intended to be funded by USDA-RD through a low-interest loan or grant. Based on this capital cost and annual O&M costs, water customer bills will need to increase to help the Town pay for the WTP Expansion. Increases to user fees would be increased gradually over four years to ease the burden on Town water customers; water fees would increase approximately 5% per year over a period of four (4) years to fund the proposed project.

1. PROJECT PLANNING

1.1. LOCATION

The Town of Weaverville is located in Buncombe County, North Carolina. The Town owns and operates a Water Treatment Plant (WTP) and water distribution system that serves residents both inside and outside of Town limits. The WTP is located at 50 Sams Road in Weaverville, NC, which is approximately 4.5 miles north of the downtown area.

Weaverville is located in the Blue Ridge Mountains of North Carolina and just north of the City of Asheville. Interstate 26 skirts by the Town on the west side. The topography of Weaverville and the surrounding area is mountainous, with many streams and small rivers that feed into the French Broad River, which flows through the center of Buncombe County. The Weaverville WTP, located off Sam's Road and Old Burnsville Road at Lat. 35.780125, Lon. -82.554212, pulls raw water from Ivy River (in some places referred to as Ivy Creek), which is located about 1,300 ft North of the WTP. The intake is below the confluence of Ivy Creek with Little Ivy Creek which is approximately 6,000 ft upstream. A map of Buncombe County and a topographic map of Weaverville can be found in **Appendix C, Items 1 and 3**.

1.2. ENVIRONMENTAL RESOURCES PRESENT

The proposed expansion to the existing WTP will predominantly take place on previously disturbed land. The only addition that is expected to disturb additional land outside the zone of the original WTP will be a new backwash drain line running alongside Sams Road to discharge into the Ivy River (permitted by NPDES). Although a small amount of new land will be disturbed, the drain line upgrade will provide a more direct discharge route to the Ivy River.

The section of the Ivy River where the WTP pulls raw water as well as where the WTP itself is located is in a class WS-II critical area. The intake is located in the Ivy River at a point with a watershed area of 112 square miles. Class WS-II means that raw water can be used as sources of water supply for drinking, culinary, or food processing purposes, as well as protected for class C purposes. Class C purposes include uses such as secondary recreation, fishing, wildlife, fish consumption, aquatic life including propagation, survival and maintenance of biological integrity, and agriculture. The area of the Ivy River that flows towards the intake is in the class WS-II protected. Both areas are considered environmentally sensitive and are protected to high standards as a result.

A small amount of Weaverville is in a high-risk flood zone. The WTP itself is not located in a flood zone according to NC Flood Risk Information System (NC FRIS). However, the intake pump station is located just next to the Ivy River and in the 100-year flood zone, but the intake pump motors and electrical infrastructure are above the 100-year flood elevation. A map depicting the floodplains in the WTP site and intake pump station from NC FRIS is shown in **Appendix C, Item 4.**

Because this project proposes to expand the treatment capacity of the WTP, an Environmental Assessment (EA) is being completed in unison with this PER. The EA will provide a comprehensive overview of the additional environmental resources present in the vicinity of the project site as well as the potential impacts as a result of this project.

1.3. POPULATION TRENDS

As of 2020, the population for Weaverville was 4,567 based on the 2020 US Census[1]. The population trends of Buncombe County and Asheville are shown in **Table 1-1a and Table 1-1b** for reference. **Table 1-1c** shows the historical population trend of Weaverville based on data obtained from the 1990, 2000, and 2010 US Census[2] and 2019 Estimates[3]. Weaverville has seen significant population growth over the past 30 years averaging about 25% growth per decade. As Asheville has been revitalized, people have been

[1] Provided by Town Attorney, Appendix D, Item 3
[2] http://censusviewer.com/cities/NC
[3] https://www.census.gov/quickfacts/fact/table/US/PST045219

moving to the surrounding suburbs, including Weaverville. Asheville's growth rate has been decreasing, possibly because the Town is approaching buildout in the existing service area. Weaverville still has abundant developable land for future growth. Like Asheville, Buncombe County's growth rate is slowing (18% from 2000 to 2010 to 9.6% from 2010-2019) likely because people are moving within the County boundaries into communities surrounding Asheville like Weaverville. This is because the cost of property and rent in Asheville is high, and the life in many smaller communities is desirable.

Table 1-1a

Buncombe County Historical Population Trends

Year	1990	2000	2010	2020
Population	174,778	206,365	238,318	269,452
Percent Increase	-	18.1%	15.5%	13.1%

Table 1-1b

City of Asheville Historical Population Trends

Year	1990	2000	2010	2020
Population	61,607	72,606	83,420	94,589
Percent Increase	-	18%	15%	13.4%

Table 1-1c

Weaverville Historical Population Trends

Year	1990	2000	2010	2020
Population	2,107	2,968	3,120	4,567
Percent Increase	-	41%	5.1%	46.4%

Census population projections by the NC Office of State Budget and Management (NC OSBM) are only given for cities and towns which have populations greater than 5,000 people. Weaverville is under that threshold; therefore, the projected growth of the County, nearby cities, or historical growth patterns can be used to estimate growth. Historically, Weaverville's growth has not trended directly with Buncombe County or City of Asheville growth. An average of the historical projection (25% increase per decade) may be more accurate but may also overshoot realistic numbers as a rate of growth that high will not continue unchecked. Therefore, Buncombe County population projections were used as surrogates for the Town of Weaverville.

Using the NC county projections, the future populations for Weaverville can be estimated assuming the Town population will vary proportionately to the Buncombe County population projections. The Buncombe County population projections are shown in **Table 1-2a** from data provided by the NC OSBM. The projections for the Town populations based on this county data are shown in **Table 1-2b**. The population of the Town is expected to continue to increase, which is the main motivation for the proposed WTP expansion.

Table 1-2a Buncombe County Future Population Trends				
Year	2020	2030	2040	2050
Projected Population	264,408	283,363	303,393	323,423
Projected Percent Growth	-	7%	7%	6.6%

Table 1-2b Weaverville Future Population Trends				
Year	2020	2030	2040	2050
Projected Population	4,062	4,346	4,651	4,958
Projected Percent Growth	-	7%	7%	6.6%

Table 1-3 gives the service area's Median Household Income (MHI) based on correspondence with the Town. The MHI for the state of North Carolina as of 2019 is slightly lower at $54,602. The poverty rate in the Town is less than 10%.

Table 1-3 Service Area MHI	
	MHI
Town of Weaverville	$66,179

*according to the Town of Weaverville Webpage

Table 1-4 shows the area demographics for the Town of Weaverville based on data from the 2010 Census as the full 2020 is not available yet. The predominant demographic is White, which composes 98% of the population. Most of the population is not Hispanic or Latino.

Table 1-4 Service Area Demographics	
Service Area: Town of Weaverville	
Asian alone	26
Black or African American	22
American Indian and Alaskan Native	15
Native Hawaiian or Pacific Islander	0
White	3,863
Multiple Races Selected	14
Other Race	0
Ethnicity (Hispanic or Latino)	19
Not Hispanic or Latino	3,921

1.4. COMMUNITY ENGAGEMENT

The Town of Weaverville has an engaged community that participates in monthly meetings, and the Town publishes a proposed budget annually. The WTP Expansion plan and budget will be covered in a Town Council Meeting prior to submitting this PER and application for USDA funding. The scope of the project, the expected USDA funding, and the need for this project will be discussed and documented in a meeting summary that will be included in an appendix of this PER.

2. EXISTING FACILITIES

2.1. LOCATION

The Town of Weaverville owns and operates the Lawrence T. Sprinkle, Jr. Water Treatment Plant (WTP) located at 50 Sams Road, Weaverville, NC in Buncombe County. The WTP was constructed in 1996 (25 years old) and draws water from Ivy Creek (Ivy River) in the French Broad River Basin. The capacity of the WTP is 1.5 MGD and designed to be expanded to 3.0 MGD onsite.

The Town's water distribution system is comprised of approximately 68 miles of 2 to 20-inch pipe. There are six (6) pressure zones, seven (7) reservoirs, and four (4) pump stations (excluding the high service pumps at the WTP) in the distribution system. The reservoirs provide 3.7 MG of finished water storage and are listed with corresponding overflow elevations in **Table 2.1**. Distribution pump stations are listed in **Table 2.2**. The Town has two emergency interconnections, one with the Town of Mars Hill, and the other with the City of Asheville.

See the Weaverville Water System Map in **Appendix C, Item 2** and existing WTP process flow diagram in **Appendix A, Item 2** for reference.

Table 2.1. Weaverville Distribution System Reservoirs

Name	Capacity	Pressure Zone	Overflow Elevation (ft)
Hamburg	1 MG	1	2,407
Ridge	1 MG	1	2,407
Dubose Hill	1 MG	1	2,407
Ox Creek	0.35 MG	2	2,661
Course View	0.1 MG	3	2,629
Highbluff	0.15 MG	5	2,739
Perrion	0.1 MG	6	2,782

Table 2.2. Weaverville Distribution System Pumping Stations

Name	Capacity	Horsepower (hp)	TDH (ft)	Pressure Zone
Hamburg	(2) 175 gpm	40	554	Pulls from 1, pushes to 2
Reems Creek	(2) 238 gpm	15	152	Pulls from 2, pushes to 5
Perrion	(2) 195 gpm	40	400	Pulls from 1, pushes to 6
Perrion Hydro Fire Pump	(2) 100 gpm (1) 850 gpm	10 30	200 150	Pulls from 6, pushes to 4

2.2. HISTORY

The current WTP was constructed in 1996 and came online in 1998 at 1.5 MGD. The site was laid out to accommodate a Phase 1 expansion to 3.0 MGD when needed. Prior to the construction of the plant, the Town pulled water from the Eller Cove Reservoir close to the existing Ox Creek Watershed. Raw water was dosed with chlorine and sent to the distribution system. Current Town staff believe withdrawing from Eller Cove Reservoir and class B surface water treatment began in the 1950-60's.

2.3. CONDITION OF EXISTING FACILITIES

2.3.1. INTAKE PUMP STATION

The intake pump station is located next to Ivy Creek, below the WTP. Ivy Creek has an estimated 7Q10 stream flow at the raw water intake site of 8.70 MGD. Water from Ivy Creek enters the wet well through two intake screens that reduce the amount of debris entering the wet well. Two (2) Floway vertical turbine pumps are utilized to move raw water to the WTP; space and a piping flange connection for a third pump has been provided. There is one submersible grit pump located in the wet well in a sump that discharges back to Ivy Creek. The screens tend to collect a lot of debris on the exterior and the operators use a portable air scour unit to clean them off. A permanent air scour unit should be provided to automatically clean of the screens. Pumps are well maintained and in good condition.

Intake Pumps
Type: Vertical Turbine
Number: 2 (wet well space, piping, and electrical for 3rd already provided)
Capacity: 1,042 gpm
Horsepower: 100
Speed: 1770 rpm
TDH: 277 ft
Diameter of Raw Water line: 18-inch
Electrical: 480 VAC, 3 phase, 75 A

Figure 2-1 Vertical turbine pumps

2.3.2. CHEMICAL ADDITION VAULT

The chemical injection vault is located next to the flash mix chamber on the WTP site. Raw water passes through the vault on its way to the ClariCone and is routed back through the vault before entering flash mix. Water is dosed with alum before the ClariCone and alum, and caustic before entering flash mix. Orthophosphate is added before the clear well.

Figure 2-2. Chemical Injection Vault showing pipe from intake pump station (bottom) and 18 inch pipe from Claricone (top).

Figure 2-3. Motorized butterfly valve on 18-inch pipe from intake pump station.

2.3.3. UPFLOW CLARIFICATION TANK (CLARICONE)

After water leaves the chemical injection vault, it then enters the upflow clarification tank (Claricone). The Claricone is designed to handle 1.5 MGD however plant staff have indicated it realistically can only handle about 90% (1.35 MGD) of the rated flow. The top of the Claricone is located ~270 ft above the normal water level of the creek. The operators have the ability to bypass the Claricone if needed. Design loading rate of the Claricone is 1 gpm/sq ft. The Claricone tank shows no signs of deterioration. All exterior piping is insulated. The small building housing sludge piping has deteriorated and is in need of replacement (Figure 2-5).

Figure 2-4. Existing Claricone

Figure 2-5. Influent and effluent piping at base of Claricone.

2.3.4. FLASH MIX VAULT AND FLASH MIXER

Water from the Claricone enters the flash mix from the bottom of the tank. A 7.5 hp mixer is mounted on the top of the tank and anti-rotation baffles are provided on the walls of each tank. Calculated mixing provided by the mixer is G=428 1/s and residence time 1.1 minutes at 1.5 MGD.

Figure 2-6. Flash mix tank exterior.

2.3.5. FLOCCULATION

There are four (4) flocculator chambers and each chamber is approximately 6,200 gallons. Each chamber has one paddle mixer with a 1 hp motor mounted on top and one 8-inch drain leading to the sludge basin. Residence time in each flocculator is 5.5 min for a total of 22 minutes for the entire flocculator. Mixing applied in each flocculator chamber is approximately 70 1/s.

Figure 2-7. Top of flocculators looking west towards flash mix

Figure 2-8. Flocculator motor

2.3.6. SEDIMENTATION BASINS

After leaving the flocculator, water goes through openings covered by slide gates, into a splitter box, and flows over a weir into the (2) 108,000 gallon horizontal flow sedimentation tank. A stilling wall is provided to straighten out the flow at the beginning of the tank. Each tank has a 12-inch disk valve to drain the tank to the sludge basin. Overflow is provided by two 12-inch valves that also drain to the sludge basin. Total residence time in the sed basins is 3.4 hours. Some deterioration of the interior concrete walls was noted in the basins, and it is recommended to coat the concrete to prevent further damage.

Figure 2-9. Northside Sedimentation Basin

Figure 2-10. Walkway between sedimentation basins

2.3.7. MEDIA FILTERS

There are two (2) media filters after the sedimentation basins. Media in the filter is composed of multiple layers, including 24-inch anthracite, 12-inch sand, and 12-inch gravel. Influent flow is control by 18-inch butterfly valves with electric actuators. Loading rate for the filters is 7.2 gpm/sq. ft. A surface wash unit is used to clean the top of the filters. It is recommended to switch to an air scour wash to improve cleaning. Air scour has the ability to clean all layers of the media, to the full depth of the filter beds. Backwash and surface wash pumps are located near the entrance to the WTP, next to the clearwell. Chlorine is added post-filtration. Caustic can be dosed to adjust pH before going to the clearwell.

Figure 2-11 Surface wash (front) and backwash (back) pumps for media filters

Backwash Pumps

Number: 1
Horsepower: 100 hp
Speed: 1780 rpm
Diameter of Backwash line: 18-inch

Surface Wash Pumps

Number: 1
Capacity: 143 gpm
Horsepower: 30 hp
Speed: 3535 rpm
TDH: 329 ft
Diameter of Raw Water line: 6-inch

Figure 2-12 Top of media filter

Figure 2-13 Media filter pipe gallery

2.3.8. CLEARWELL

After the filters, finished water flows through an 18-inch pipe to a 0.25 MG clearwell for holding before distribution. Two (2) vertical turbine high service pumps mounted on the top of the clearwell deliver water to the distribution system by a 20-inch force main. Baffle walls are installed in the clearwell to prevent short circuiting. Due to the location, the clearwell is difficult to access. Only pedestrian access is possible which makes maintenance of the clearwell and pumps difficult. There are otherwise no issues with the tank, and it has experienced normal wear from exposure to the elements.

Figure 2-14 Finished water pumps

Figure 2-15 Top of clearwell facing north

Finished Water Pumps
Type: Vertical Turbine
Number: 2
Capacity: 1,050 gpm
Horsepower: 150
Speed: 1,770 rpm
TDH: 435 ft
Diameter of Finished Water line: 20-inch
Electrical: 480 VAC, 3 phase, 150 A

2.3.9. SLUDGE BASIN

A 215,000 gallon sludge basin provides sludge settling and holding volume. Water is decanted from the tank by an 8-inch decant line and the level is controlled by manually adjusting the height of the inlet. Two 15 hp submersible mixers are mounted in the tank. A sludge pump transfers sludge from the basin to a truck loading station. Once a year, a contractor pumps out the collected sludge, dewaters it, and hauls off the solids.

Figure 2-16 Sludge Basin

2.3.10. CHEMICALS

All plant chemicals are stored on the bottom floor of the building and bulk tanks are located just outside. Bulk tanks are single wall, polyurethane insulated tanks with spill containment. An eye wash and shower are provided adjacent to the alum and caustic transfer pumps.

Transfer Pumps: Iwaki Mag-Drive Pump, 10 gpm, 47 TDH, 2 hp
Chemical Metering Pumps: Peristaltic ProSeries M-2

Alum (Delpac 2020). Alum is stored in a 5,000 gallon bulk tank that sits outside the building south of the existing sed basins. Alum is dosed at two locations: before entering the Claricone and before flash mix. There is one (1) 250-gallon day tank and chemical metering pump. A chemical transfer pump moves alum from the bulk tank to the day tank.

Caustic (sodium hydroxide). A 5,000 gallon bulk tank and one (1) 250 gallon day tank provides storage. A chemical transfer pump moves caustic from the bulk tank to the day tank. Caustic is used to adjust the pH of water to optimize alum activity and is dosed before entering the Claricone.

Chlorine gas. One-ton cylinders are stored in the chlorine room. Typically, two tanks are on hand at any given time. There are 3 chlorinators and 2 weight scales provided. Chlorine is dosed after leaving the media filters. A third chlorinator is provided as a spare.

Orthophosphate. Orthophosphate is stored in a 55-gallon barrel next to the polymer tank. It is used as a corrosion inhibitor and dosed in the 18-inch line before the clearwell.

Calcium thiosulphate. Calcium thiosulphate is used to dechlorinate sludge supernatant before being discharged under the NPDES permit. A small building is located next to the sludge basin for ease of dosing. One 5 gpd pump is used for dosing.

Figure 2-17 Alum (right) and caustic (left) bulk tanks

Figure 2-18 Chlorine gas tanks

Figure 2-19 Alum and caustic day tanks

2.3.11. BUILDING

The existing building at the WTP is a two-story building. The bottom floor houses the chemical feed area, electrical and mechanical rooms, chlorine room, and filter pipe gallery. The top floor houses the office, laboratory, filter console room, break room, and restroom/locker room. The laboratory is where daily process sampling is conducted. A generator is provided for the building but none of the process equipment (pumps, mixers, etc.) is supported by the generator.

Figure 2-20. WTP building, picture facing north.

2.3.12. SCADA

The Town utilizes Carolina Technical Services (CTS) to provide VTSCADA for the WTP and distribution system. SCADA is primarily read only providing tank levels, pump on/off and flow, valve open/close, turbidity, chlorine residuals, and pH readings. Processes that can be controlled in SCADA include filter backwash, filter surface wash, and generator on/off. A backup server is located onsite.

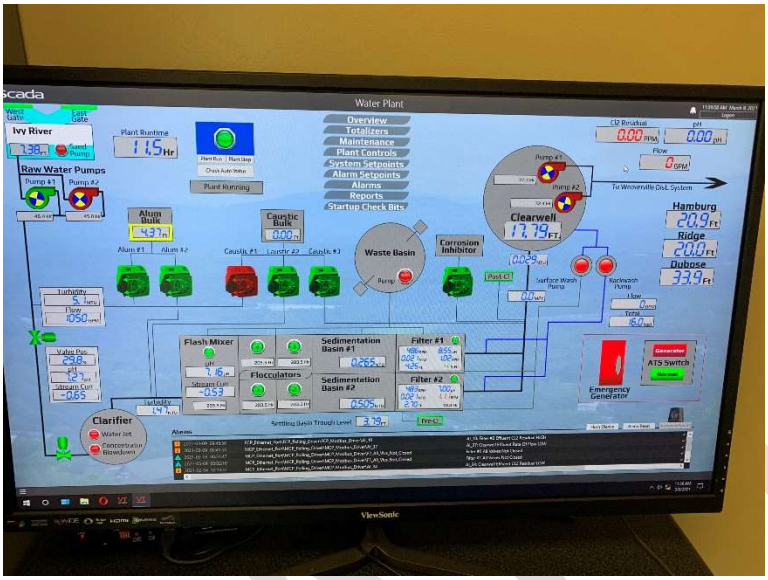


Figure 2-21 Screen of SCADA computer

2.3.13. NPDES DISCHARGE

The WTP discharges media filter backwash to a drainage ditch just below the entrance to the plant. The max monthly average discharge is 0.0256 MGD and the NPDES permit does not limit the total discharge. Total suspended solids, pH, total residual chlorine, and total copper have limits in the permit while hardness and chronic WET testing mush be monitored and reported. Calcium thiosulfate is added to discharge water for dechlorination.

Once discharged into a roadway ditch adjacent to the WTP, discharge flows along the existing road that eventually leads to the Ivy River upstream of the intake. It is suggested that the WTP extend the discharge piping to discharge closer to the river at the culvert at the intake pump station.

Figure 2-22. NPDES Discharge pipe into drainage ditch

2.4. FINANCIAL STATUS OF EXISTING FACILITIES

The 2021-2022 water rates are shown in **Table 2.3**.

Table 2.3. Current rate schedule

	In-Town (per 1,000-gal)	Out-of-Town (per 1,000 gal)
First 3,000 gallons	$9.22	$18.44
Next 22,000 gallons	$10.17	$20.34
Next 175,000 gallons	$11.04	$22.08
Next 300,000 gallons	$11.94	$23.88
All over 500,000 Gallons	$12.81	$25.62

A minimum monthly charge is determined by meter size as shown below in **Table 2.4**.

Table 2.4. Minimum Monthly Water Charges			
Meter Size	Minimum Monthly Usage	In-Town	Out-of-Town
5/8"	2,000 gallons	$17.74	$35.48
3/4"	4,000 gallons	$36.39	$72.78
1"	6,000 gallons	$55.95	$111.90
1-1/2"	11,200 gallons	$106.81	$213.62
2"	18,200 gallons	$175.27	$350.54
3"	36,200 gallons	$363.23	$726.47
4"	58,500 gallons	$600.06	$1,200.12
6"	112,000 gallons	$1,168.23	$2,336.46
8"	180,000 gallons	$1,890.39	$3,780.78
10"	258,000 gallons	$2,718.75	$5,437.50

Table 2.5 shows the total existing users and average monthly usage per customer type for 2020 based on the Local Water Supply Plan (**Appendix D, Item 1**). In 2020, the average daily usage was only 0.46 MGD. This is less than previous years and trends lower than demand in early 2021. **Table 2.6** provides a summary of previous years as well as monthly averages for 2021 to show the current demands. It is believed the lower demand in 2020 is due to the COVID-19 pandemic. During the pandemic many people worked from home and used less water as they did not need to clean up to go to work.

Table 2.5. Drinking Water System Metered Connections Committed Average Usage (from 2020 Local Water Supply Plan)				
	Total Existing Users	New Users Committed to Project*	Average Monthly Usage /User (gallons)	Total Average Monthly Usage (gallons)
Residential	2,796	-	3,348	9,360,000
Typical Commercial	193	-	10,104	1,950,000
Typical Industrial	9	-	100,000	900,000
Typical Institutional	9	-	40,000	360,000
Large Commercial/Industrial/Institutional				
Backwash, line cleaning, flushing	1	-	41,900	1,257,000
			Total Average Gals/Month=	12,670,000
			Total Average MGD=	0.46

Table 2.6. Summary of Historical Water Production	
Time Period	Average Daily Production (MGD)
2018 – Annual Avg.[4]	0.80
2019 – Annual Avg.[4]	0.66
2020 – Annual Avg.[4]	0.60
2021 – January[5]	0.82
2021 – February[5]	0.81
2021 – March[5]	0.78
2021 – April[5]	0.83
2021 – May[5]	0.88
2021 - June[5]	0.82

The Town's existing annual operating budget for the Water Fund based on the calendar year 2021-2022 budget ordinance is shown in **Table 2.7**. The Town has two (2) loans: one is a consolidated loan of water line projects and the other is recent USDA project to provide a secondary connection from the WTP to Town. The first debt service payment for the latter project was June 1, 2021. **Table 2.8** lists more details on the debt service obligation for the Water Fund.

[4] From Local Water Supply Plans
[5] From Monthly Operating Reports 2021

Table 2.7. Existing Annual Operating Budget (FY 2021 Actual)	
Annual Revenues	
Water Revenue	$2,173,500
Miscellaneous Revenue	$15,000
Water Tap Revenue	$26,250
System Development Fees	$164,000
Fees for MSD Collections	$65,000
Interest Earned	$640
Total Annual Revenues	**$2,444,390**
Annual Expenses	
Water Administration	$260,139
Water Production	$850,016
Water Maintenance	$899,647
Contingency	$15,000
Reserve for Bond Payments	$300,471
Transfer to Capital Reserve Fund	$119,117
Total Annual Expenses	**$2,444,390**
Surplus / (Deficit)	$ 0

Table 2.8. Existing Debt	
Existing Loan #1	
Date of loan:	12/14/2020
Owed to:	USDA
Security for the loan:	None
Purpose:	Waterline Extension Project
Original amount of Loan:	$2,500,000.00
Term of loan (yrs):	40
Interest Rate:	2.13%
Date of first payment:	6/1/2021
Date of last payment:	6/1/2060
Annual principal and interest payments required by the debt instrument:	$92,275.00
Annual reserve payment required by the debt instrument:	None
Current balance owed:	$2,460,000.00
Source	Total Annual Payment
Existing Loans	**$296,248.00**

3. NEED FOR PROJECT

The plant is approaching water production values which trigger mandated actions to begin the planning, design, and construction process for increase capacity of this facility. In addition, the Town has begun discussions with surrounding communities to provide them with potable water through an existing interconnection within the distribution system. Preliminary discussions indicate the potential for the Town to supply 200,000 to 400,000 gallons per day through this interconnection. Therefore, the Town is positioned to be a regional provider due to its ability to withdrawal 4.0 MGD from the Ivy River.

3.1. HEALTH, SANITATION & SECURITY

The WTP has not received any recent notices of violation or any other notices from federal or state agencies regarding health, sanitation, or security issues. The WTP finished water meets all Maximum Contaminant Levels (MCLs) established by the Primary Drinking Water Standards and most MCLs established by the Secondary Drinking Water Standards. These standards include, but are not limited to, total suspended solids of 45 mg/L, total residual chlorine of 17 µg/L, and total copper of 5.24 µg/L.

3.2. AGING INFRASTRUCTURE

The project does not directly address aging infrastructure. The proposed project will add infrastructure at the WTP to support a growing population both in Weaverville and areas to the north of Weaverville.

The WTP uses approximately 10% of its treated water for internal processes, which is typical for treatment plants. This internal process water is used for backwashing, water in sludge from the Claricone, cleaning the sedimentation basins, and routine system flushing. There are no safety concerns at the WTP.

3.3. REASONABLE GROWTH

Growth is the main driver for this project. The Town of Weaverville has grown by 46.4% between 2010 and 2020. The Town continues to see growth as evidenced by the flow commitments tracked by the Town. During the first and second quarter of 2021, the average flow from the WTP was 0.82 MGD which is considerably more than the 2019 and 2020 annual average of 0.6 and 0.66 MGD, respectively (**Table 2.6**). With this increase demand and carrying forward historical projections, the future flow projection was estimated in **Figure 3-1**.

It should be noted that Mars Hill has a connection with the Town (earmarked at 0.2 MGD) however the contract has expired. It is uncertain whether this connection will become active or not. Typically for planning purposes, an emergency allocation would be included in the projection to ensure water is available in the event Mars Hill could not otherwise provide water to customers. With this in mind, the anticipated year when 80% of the WTP capacity is reached in 2025. Per regulations[6], once the combined WTP demand and flow allocation reaches 80%, the Town must submit a plan to address water needs.

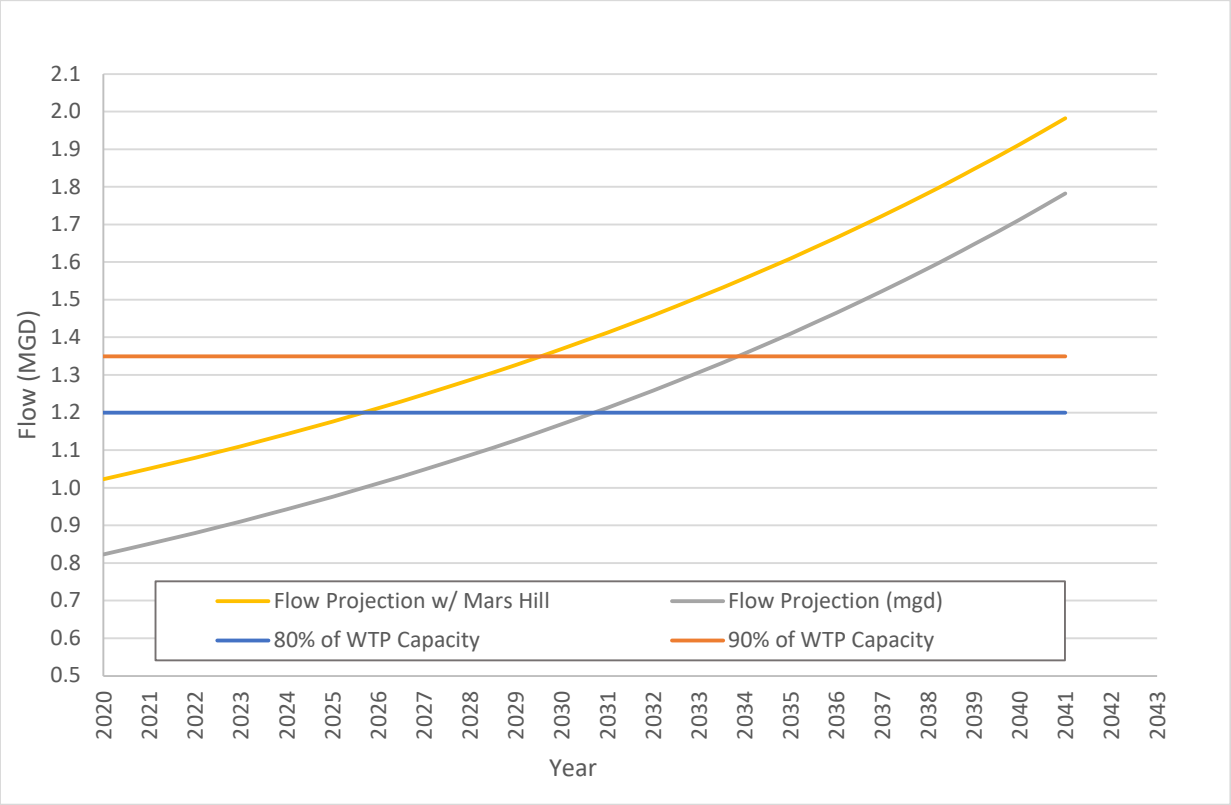


Figure 3-1. Projected Population Growth

4. ALTERNATIVES CONSIDERED

4.1. ALTERATIVE 1 - NO ACTION

The "No Action" Alternative would keep the Weaverville WTP operating at the same capacity with the same treatment process as currently employed. The design treatment capacity at the plant would remain at 1.5

[6] North Carolina General Statues 143-355 paragraph L

MGD and water would continue to be withdrawn from the Ivy River and treated by clarification, coagulation, flocculation, sedimentation, filtration, and disinfection.

Although the current treatment process is effective, the current treatment capacity of 1.5 MGD is not sufficient to keep up with the current rate of growth in the Town of Weaverville and projected demands. Based on current average metered water use, unaccounted for water, outstanding commitments, and (potential) agreements to provide water to nearby towns, the plant will soon utilize approximately 77% (or 1.16 MGD of 1.5 MGD) of its design capacity (see **Appendix A, Item 1**). Based on the projections presented in **Section 1.3**, the Town is expected to continue its rapid rate of growth and will need additional treatment capacity to meet demand.

As a result of the current water use, commitments, need from nearby towns, and the rapid growth rate of the Town of Weaverville, the current treatment capacity of 1.5 MGD will be insufficient within the next 5 years. In order to meet this demand, the treatment capacity must be expanded, and the No Action alternative is not feasible.

4.2. ALTERNATIVE 2 – INTAKE AND WATER TREATMENT PLANT EXPANSION

4.2.1. DESCRIPTION

Expanding the existing plant was planned for in the original design, layout, and construction. A second treatment train would be added to the WTP on the northeast side of the current main building. Generally, the upgrades include the following items.

1. *Upgrade of the raw water pump station in the existing intake structure to increase the pumping capacity by the addition of a third pump*
2. *New Claricone*
3. *New Flash Mix Chamber, flocculation basins, sedimentation basins, and multimedia gravity filters with air scour*
4. *Construction of a new 0.5 MG Clearwell*
5. *New high service and backwash pumps*
6. *Conversion of existing Clearwell to Sludge Decant Basin*
7. *Addition of Powder Activated Carbon Feed System*
8. *1,330 LF of Drain line for the NPDES Discharge to Ivy Creek*
9. *Building Improvements for expanded lab testing and ADA accessibility*

Alternative 2 would expand the existing WTP by mirroring the plant configuration on the northeast side of the existing site and constructing a second treatment train. The original treatment plant was designed and configured for this exact expansion alternative. The Ivy River would continue to serve as the raw water source, and the second treatment train would utilize the same processes currently employed for treatment including clarification, coagulation, flocculation, sedimentation, filtration, and disinfection. This expansion would effectively double the treatment capacity of the plant from 1.5 MGD to 3.0 MGD. The allocation for drinking water withdrawal at this site is already approved for up to 4.0 MGD. Individual components of the expansion would include:

- Addition of a third pump at the raw water pump station to increase its capacity
- Addition of one (1) clarification/pretreatment unit
- Addition of four (4) flocculation basins with mixers and motors
- Addition of two (2) sedimentation basins with sludge transfer pumps
- Addition of two (2) multimedia gravity filters and two (2) backwash pumps
- Addition of one (1) new 500,000 gallon clear well
- Addition of a new pump station with three (3) high service pumps and two (2) backwash pumps
- New liquid chlorine system for the WTP
- Associated piping, appurtenances, chemical feed equipment, monitoring equipment/SCADA, and electrical work

- Conversion of the old clear well to a second sludge settling tank
- Addition of a Powder Activated Carbon (PAC) feed system
- New standby generator to power the WTP and one to service the intake pump station
- 1,330 LF of drain line for the NPDES Discharge to Ivy Creek
- Building Improvements for expanded lab testing and ADA accessibility

The main advantages of Alternative 2 are:

- Use of the same treatment process currently utilized at the WTP. This process has been shown to effectively treat the source water to the required state and federal standards.
- The original WTP was designed to be expanded and mirrored to double the treatment capacity by the original engineer. Space is available on the existing site and the design will be simplified.
- Operators and Town staff are already familiar with the treatment process, chemicals used, etc.
- The additional withdrawal amount from the Ivy River (3.0 MGD total capacity) is already allocated and recognized by the Division of Water Resources.
- The existing water source is good, and the water supply watershed is protected and documented. Procuring and implementing protections for a new water supply would be time consuming, costly, and difficult.
- Expanding the WTP allows Weaverville to be an emergency provider for Marshall and/or support additional needs for Mars Hill. The Town is in discussion with both municipalities and the expansion could support future growth North of Asheville.

The main disadvantages of Alternative 2 are:

- Alternative 2 is not the least expensive alternative according to the present value calculations.
- Finished water will continue to be pumped a significant distance from the WTP to Town limits.

4.2.2. DESIGN CRITERIA

The main design criteria for the treatment plant expansion are that the finished water continues to meet NCDEQ and USEPA standards for drinking water, including all Maximum Contaminant Level (MCL) thresholds. According to the North Carolina Drinking Water Watch database, the Weaverville WTP has not had violation since 2013, and the Town's Consumer Confidence Report (CCR) indicates that treated water meets all applicable regulations. Thus, the existing treatment process has been shown to be effective for treating the raw water source and mirroring this process would produce water that also meets applicable regulations.

This alternative will double the treatment capacity of the plant from 1.5 MGD to 3.0 MGD. A third pump will be added to the raw water pump station to meet this capacity, and new treatment units/pumps that are part of the expansion will mirror capacities/sizes from the original plant. The proposed Claricone will be sized to carry 1.65 MGD as the operator has indicated the capacity of the existing Claricone is 10% less than 1.5 MGD. One new 0.5 MG clearwell will be installed at a higher elevation and closer to the WTP. This will reduce energy requirements for pumping and provide better accessibility to the high service pumps. The existing 0.25 MG clearwell will be converted to a second sludge basin. The existing sludge basin will decant water off the top of the settled solids to the converted clearwell for additional settling before discharge.

4.2.3. MAP

See **Appendix A, Items 3 and 4** for a process flow diagram and schematic layout map for Alternative 2.

4.2.4. ENVIRONMENTAL IMPACTS

See **Appendix C, Items 4 and 5** for a map of surrounding wetlands, 100/500-year floodplains, and major streams/rivers in the vicinity of the project site.

Environmental impacts from this alternative are expected to be minimal. This alternative will utilize the existing treatment plant site and intake site, which have already been cleared for the original plant construction. The existing WTP site lies outside of FEMA floodplains and wetlands, and no impacts are

expected on endangered species or other wildlife populations. Withdrawals from the Ivy River will increase from 1.5 MGD to 3.0 MGD as part of this alternative; however, the Division of Water Resources has concurred that the current allowable withdrawal is up to 4.0 MGD (see correspondence in **Appendix D, Item 2**). In addition, an Environmental Assessment has been completed in unison with this PER to ensure only minimal adverse environmental impacts will occur due to the construction/operation of this alternative.

Typical environmental impacts would be expected during construction of this alternative including increased noise, air emissions from heavy equipment, use of fossil fuels, and runoff from the site. These impacts will be mitigated to the extent practical during construction, and an approved Erosion and Sediment Control Plan will be implemented and enforced.

The operation and maintenance of the expanded WTP would have environmental impacts similar to the existing plant. Chemicals will be stored and used on-site for treatment of the raw water, and electricity from the local power utility will be utilized to power the treatment process. Backwash water will be discharged according to the current NPDES permit, and alum sludge will continue to be settled in clarifiers and transported via trucks to a disposal site.

4.2.5. LAND REQUIREMENTS

This alternative will utilize land already owned by the Town of Weaverville on the existing treatment plant and intake sites. No additional land will be leased or acquired to complete this project.

4.2.6. POTENTIAL CONSTRUCTION PROBLEMS

No major construction problems are anticipated with this alternative. The existing plant site has sufficient space for the expansion, so the existing WTP can be kept in service during construction. Access to the site for construction traffic is also already established. High groundwater is not expected to be an issue at this location; however, subsurface rock could be encountered during excavation for new foundations. It is not known if rock was encountered during construction of the original plant, so allowances will be made in the Bid Form to obtain unit prices for any required rock removal.

4.2.7. SUSTAINABILITY CONSIDERATIONS

The purpose of this project is to increase the capacity of drinking water that the Town of Weaverville can provide to its customers, so more water, energy, materials, and labor will be required to meet this demand. A major advantage of this alternative is operational simplicity since the same treatment process will be utilized at the same location. This increases the efficiency of the staff that manage and operate the facility, simplifies the delivery of materials/chemicals to the WTP, and reduces infrastructure needed to convey treated water to the Town.

4.2.8. CONSTRUCTION COST ESTIMATE

The opinion of cost for Alternative 2 is shown below. Line items and quantities were developed based on estimated values from preliminary calculations and design scope. Unit costs were obtained from vendors or prior bids.

Table 4-1 Alternative #2 - Estimated Construction Costs				
Item Description*	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
WTP Expansion				
Mobilization (2% of Subtotal)	1	LS	$ 223,370	$ 223,370
Earthwork	1	LS	$ 227,000	$ 227,000
Rock Excavation	1	LS	$ 572,000	$ 572,000
Backwash Pumps and Controls	1	LS	$ 75,000	$ 75,000
Finished Water Pumps and Controls	1	LS	$ 170,000	$ 170,000
Finished Water and Backwash Pump Station	1	LS	$ 290,000	$ 290,000
Conversion of Clearwell to Sludge Tank	1	LS	$ 375,000	$ 375,000
Access to Sludge, New Pump Station Paving	440	SY	$ 105	$ 46,200
Liquid Chlorine System	1	LS	$ 60,000	$ 60,000
Raw Water Intake Pump	1	EA	$ 160,000	$ 160,000
Intake Air Scour	1	EA	$ 15,000	$ 15,000
0.5 MG Clearwell Tank 65' Ø	1	LS	$ 750,000	$ 750,000
Sample Pumps	4	EA	$ 4,000	$ 16,000
Flash Mix, Flocculator, Sed. and Filter Basins	1	LS	$ 800,000	$ 800,000
Flash Mixers	2	EA	$ 26,000	$ 52,000
Flocculators	4	EA	$ 30,000	$ 120,000
Claricone (1)	1	EA	$ 1,253,000	$ 1,253,000
New Filters (Media, Underdrains, Etc)	1	EA	$ 555,000	$ 555,000
Filter Air Scour (All Filters)	4	EA	$ 50,000	$ 200,000
Sludge Submersible Mixer	2	EA	$ 25,000	$ 50,000
Sludge Transfer Pump	2	EA	$ 30,000	$ 60,000
8-inch Drain Line 1,330 LF	1	LS	$ 280,000	$ 280,000
Piping and Appurtanances	1	LS	$ 650,000	$ 650,000
Electrical Improvements (incl generators)	1	LS	$ 2,386,000	$ 2,386,000
Misc. Metals	1	LS	$ 150,000	$ 150,000
Misc. Concrete	1	LS	$ 230,000	$ 230,000
SCADA Upgrades	1	LS	$ 239,000	$ 239,000
Erosion Control	1	LS	$ 72,300	$ 72,300
Line Existing and New Sed Basins	8000	SF	$ 30	$ 240,000
PAC Feed System	1	LS	$ 25,000	$ 25,000
Building Improvements	1	LS	$ 750,000	$ 750,000
ADA Improvements	1	LS	$ 300,000	$ 300,000
Sub-total				**$ 11,391,870.00**

Table 4-2 Alternative #2 - Total Estimated Project Costs		
Sub-total Construction Cost Estimate	$	11,391,870
*Contingency @ (10%)**	$	1,139,187
Total Construction Cost	$	12,531,057
*Engineering Services***	$	1,018,900
*Preliminary Engineering Report (ls)****	$	132,500
Environmental Report (ls)	$	-
Basic Services (ls)	$	424,000
*RPR-Resident Project Representative(hr)****	$	226,400
Additional Service: Bidding and Negotiating	$	61,000
Additional Service: Construction Admin & Observation	$	112,500
Additional Service: Post Construction	$	62,500
Legal Fees (Local Attorney)	$	10,000
Legal Fees (Bond Counsel)	$	10,000
Administrative Costs		
Equipment		
Capitalized Interest		
Total	**$**	**13,570,000**

4.2.9. O&M COST ESTIMATE

Costs for Operation and Maintenance for Alternative 2 are expected to increase from the existing WTP. Based on previous year's O&M, it costs $1,167,600 per MGD per year for treatment. This number was used to scale up to treating 2.7 MGD (90% of future capacity) and fed into the present worth O&M costs.

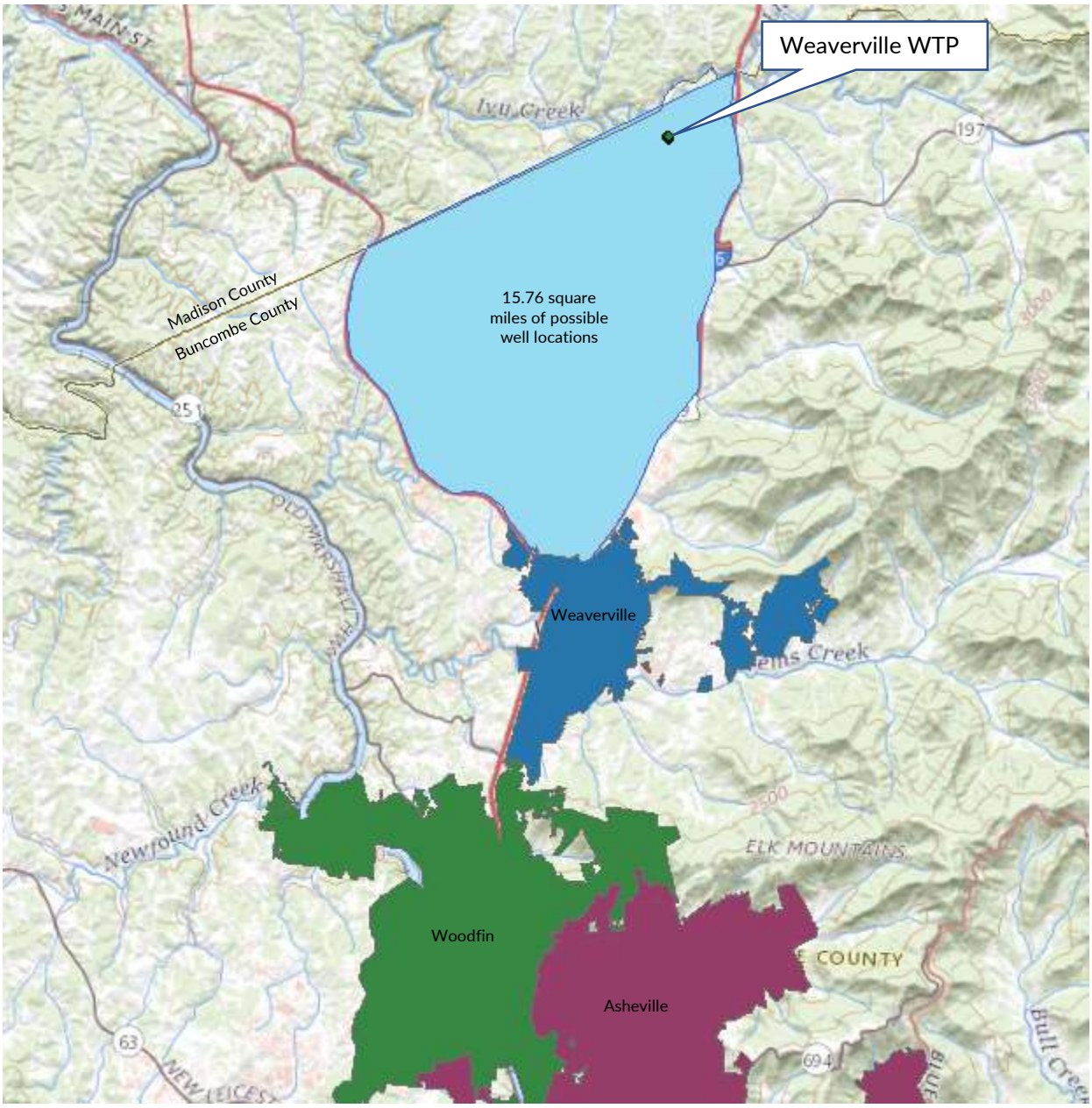
Table 4-3 Alternative #2 Annual Operating & Maintenance Expenses		
Administrative Costs (i.e. Office Supplies, Printing, etc…)	$	273,277
WTP Production	$	1,690,783
Distribution System Operation and Maintenance	$	729,566
Total Annual Expenses	**$**	**2,693,700**

4.3. ALTERNATIVE 3 – NEW GROUNDWATER WELLS AND WTP EXPANSION

4.3.1. DESCRIPTION

For Alternative 3, consideration was given to expand the WTP onsite as in Alternative 2 but use a different source water: groundwater. In this alternative, the wells were assumed to be in the general area depicted in the figure on the next page. It was assumed the wells would be located north of the Town of Weaverville but within Buncombe County in the 15.76 square mile shown below. The area considered is approximately 15.76 square miles. Well yield estimates were made based on wells located in Marshall (about 7.4 miles west of the existing WTP). The average yield is 86 gpm and average well depth of 467 ft. Estimates for new wells for Weaverville was based on these wells that will likely be similar to the well Weaverville would see. At 86 gpm per well, the Town would need approximately 25 wells. The furthest distance from the WTP in this area is 23,600 ft and this was assumed the furthest distance a well could be. All other wells would be closer,

and distances were approximated by creating a normally distributed curve of well distances. The total of all raw water piping (with a 25% reduction for manifolding) is 165,000 ft of pipe.



Individual components of this alternative include:

- 25 new groundwater wells
- Approximately 165,000 LF of raw water lines to connect new wells to the WTP
- Addition of one (1) clarification/pretreatment unit
- Addition of two (2) flocculation basins with mixers and motors
- Addition of two (2) sedimentation basins with sludge transfer pumps
- Addition of two (2) multimedia gravity filters and two (2) backwash pumps
- Addition of one (1) new 500,000 gallon clear well
- Addition of a new pump station with three (3) high service pumps and two (2) backwash pumps

- New liquid chlorine system for the entire WTP
- Associated piping, appurtenances, chemical feed equipment, monitoring equipment/SCADA, and electrical work
- Conversion of the old clear well to a second sludge settling tank
- New standby generator to power the WTP and one to service the intake pump station

The WTP improvements/expansion are the same items described in Alternative 2 without the Ivy Creek intake modifications.

The main advantages of Alternative 3 are:

- No additional raw water above 1.5 MGD would be withdrawn from the Ivy River.
- The existing WTP would be utilized for expanded treatment

The main disadvantages of Alternative 3 are:

- Project cost and present worth are the highest of all four alternatives considered.
- Construction of significant raw water line infrastructure would be required to convey raw water to the existing WTP site, increasing impacts to land and property owners.
- Additional operation and maintenance for new wells.
- Finished water will continue to be pumped a significant distance from the WTP to Town limits.
- Mixing raw surface water and groundwater could create water chemistry and treatment issues. Sampling and pilot testing would be needed to ensure the blended water could be effectively treated with the current treatment process.
- Groundwater withdrawals could impact existing nearby private wells.

4.3.2. DESIGN CRITERIA

The main design criteria for this alternative are that the finished water continues to meet NCDEQ and USEPA standards for drinking water, including all Maximum Contaminant Level (MCL) thresholds. According to the North Carolina Drinking Water Watch database, the Weaverville WTP has not had violation since 2013, and the Town's Consumer Confidence Report (CCR) indicates that treated water meets all applicable regulations. The existing treatment process has been shown to be effective for the Ivy River raw water source; however, sampling and pilot testing of groundwater from potential well sites blended with Ivy River water will be required to confirm that the existing treatment process is adequate for the blended water source.

This alternative will also double the treatment capacity of the plant from 1.5 MGD to 3.0 MGD. The proposed groundwater wells will provide the additional raw water capacity over 1.5 MGD, and new treatment units/pumps that are part of the expansion will mirror capacities/sizes from the original plant. Required raw water lines from the groundwater wells to the WTP will be sized based on maximum expected velocities in the pipelines and routed in existing rights-of-way where possible.

4.3.3. MAP

See **Appendix A, Items 5 and 6** for a schematic layout map and a process flow diagram for Alternative 3.

4.3.4. ENVIRONMENTAL IMPACTS

See **Appendix C, Items 4 and 5** for a map of surrounding wetlands, 100/500-year floodplains, and major streams/rivers in the vicinity of the WTP site.

Environmental impacts from construction of Alternative 3 are expected to be moderate. As mentioned in Section 4.2.4, the existing WTP site is located outside of FEMA floodplains and wetlands, so the expansion of the treatment plant equipment on the existing site will not adversely impact environmental resources. However, overall environmental impacts will be more significant than Alternative 2 due to the proposed groundwater wells and raw water conveyance lines. Additional land would need to be cleared if the existing

WTP site could not support all new groundwater wells, and additional construction, clearing, and impacts to landowners would be required to install the raw water conveyance lines from the wells to the WTP.

Like Alternative 2, typical environmental impacts would be expected during construction of this alternative including increased noise, air emissions from heavy equipment, use of fossil fuels, and runoff from the site. These impacts would be mitigated to the extent practical during construction, and an approved Erosion and Sediment Control Plan would be implemented and enforced.

The operation and maintenance of the expanded WTP would have environmental impacts similar to the existing plant as described in Section 4.2.4. Increased electricity use will be needed to pump raw water from the wells to the WTP.

4.3.5. LAND REQUIREMENTS

The expanded treatment plant will be constructed on the existing WTP site owned by the Town of Weaverville, so no additional land or clearing is required for this portion of Alternative 3. Additional land easement/acquisition and clearing will be required for the groundwater well sites and raw water conveyance lines depending on the location and availability of an adequate groundwater supply. The land requirements for this alternative have the potential to be significantly more than Alternative 2.

4.3.6. POTENTIAL CONSTRUCTION PROBLEMS

Like Alternative 2, the main potential construction problem is the presence of subsurface rock. The Bid Form will include a line item for rock removal to establish a unit price if rock is encountered during construction.

In addition, the design of this alternative will need to establish the locations of the new groundwater wells. Additional construction problems could be encountered depending on the location and required depth of these wells including access for construction/drilling equipment. The selected well locations would also dictate the route and length of the raw water conveyance lines to the WTP which could lead to additional construction issues including conflicts with existing utilities, acquisition of easements, and presence of sensitive environmental areas.

4.3.7. SUSTAINABILITY CONSIDERATIONS

Like Alternative 2, the purpose of this project is to increase the capacity of drinking water that the Town of Weaverville can provide to its customers, so more water, energy, materials, and labor will be required to meet this demand. Treatment will still take place at the existing WTP site using the same processes, which increases operator efficiency. Additional capacity will not be withdrawn from the Ivy River under this alternative, which leaves existing surface water capacity for future needs or other water systems.

In contrast, decentralizing the raw water source will create challenges for operator efficiency. Operators will spend more time and resources checking, operating, and maintaining each of the wells. Also, ground water levels could be impacted by the substantial number of wells proposed. Depending on the results of pilot testing of the blended raw water source, additional treatment chemicals may be required, especially for water softening.

4.3.8. CONSTRUCTION COST ESTIMATE

The cost opinion of Alternative 3 is shown below. Line items and quantities were developed based on estimated values from preliminary calculations and design scope. Unit and well costs were obtained from vendors or prior bids. Property acquisition was estimated based on current property values.

Table 4-4 Alternative #3 - Estimated Construction Costs				
Item Description*	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
Mobilization	1	LS	$ 653,370	$ 653,370
Well Development				
Development of Groundwater Wells	25	EA	$ 200,000	$ 5,000,000
Raw Water Lines to Connect Wells to WTP	165,000	LF	$ 100	$ 16,500,000
WTP Expansion				
Earthwork	1	LS	$ 227,000	$ 227,000
Rock Excavation	1	LS	$ 572,000	$ 572,000
Backwash Pumps and Controls	1	LS	$ 75,000	$ 75,000
Finished Water Pumps and Controls	1	LS	$ 170,000	$ 170,000
Finished Water and Backwash Pump Station	1	LS	$ 290,000	$ 290,000
Conversion of Clearwell to Sludge Tank	1	LS	$ 375,000	$ 375,000
Access to Sludge, New Pump Station Paving	440	SY	$ 105	$ 46,200
Liquid Chlorine System	1	LS	$ 60,000	$ 60,000
Raw Water Intake Pump	1	EA	$ 160,000	$ 160,000
Intake Air Scour	1	EA	$ 15,000	$ 15,000
0.5 MG Clearwell Tank 65' Ø	1	LS	$ 750,000	$ 750,000
Sample Pumps	4	EA	$ 4,000	$ 16,000
Flash Mix, Flocculator, Sed. and Filter Basins	1	LS	$ 800,000	$ 800,000
Flash Mixers	2	EA	$ 26,000	$ 52,000
Flocculators	4	EA	$ 30,000	$ 120,000
Claricone (1)	1	EA	$ 1,253,000	$ 1,253,000
New Filters (Media, Underdrains, Etc)	1	EA	$ 555,000	$ 555,000
Filter Air Scour (All Filters)	4	EA	$ 50,000	$ 200,000
Sludge Submersible Mixer	2	EA	$ 25,000	$ 50,000
Sludge Transfer Pump	2	EA	$ 30,000	$ 60,000
8-inch Drain Line 1,330 LF	1	LS	$ 280,000	$ 280,000
Piping and Appurtanances	1	LS	$ 650,000	$ 650,000
Electrical Improvements (incl generators)	1	LS	$ 2,386,000	$ 2,386,000
Misc. Metals	1	LS	$ 150,000	$ 150,000
Misc. Concrete	1	LS	$ 230,000	$ 230,000
SCADA Upgrades	1	LS	$ 239,000	$ 239,000
Erosion Control	1	LS	$ 72,300	$ 72,300
Line Existing and New Sed Basins	8000	SF	$ 30	$ 240,000
PAC Feed System	1	LS	$ 25,000	$ 25,000
Building Improvements	1	LS	$ 750,000	$ 750,000
ADA Improvements	1	LS	$ 300,000	$ 300,000
Sub-total				**$ 33,321,870**

Table 4-5 Alternative #3 - Total Estimated Project Costs		
Sub-total Construction Cost Estimate	$	33,321,870
*Contingency @ (10%)**	$	3,332,187
Total Construction Cost	$	36,654,057
*Engineering Services***	$	1,731,100
*Preliminary Engineering Report (ls)****	$	132,500
Environmental Report (ls)	$	-
Basic Services (ls)	$	848,000
*RPR-Resident Project Representative(hr)****	$	339,600
Additional Service: Bidding and Negotiating	$	61,000
Additional Service: Construction Admin & Observation	$	225,000
Additional Service: Post Construction	$	125,000
Easements for Wells and Piping	$	464,000
Legal Fees (Local Attorney)	$	10,000
Legal Fees (Bond Counsel)	$	10,000
Administrative Costs		
Equipment		
Capitalized Interest		
Total	**$**	**38,405,200**

4.3.9. O&M COST ESTIMATE

In Alternative 3, there will be extra O&M due to the new wells that need to be maintained. It is estimated that the annual O&M costs for each groundwater well are $2,500. All the water (surface and groundwater) will be treated in the expanded facility so the WTP production costs for Alternative 2 and 3 are similar but Alternative 3 is slightly less since the groundwater will likely not as many chemicals and reduced sludge production. There will be more raw water distribution lines to manage so the Distribution O&M will increase.

Table 4-6 Alternative #3 Annual Operating & Maintenance Expenses		
Administrative Costs (i.e. Office Supplies, Printing, etc…)	$	273,277
WTP Production	$	1,690,783
Distribution System Operation and Maintenance	$	1,459,132
Well O&M	$	62,500
Total Annual Expenses	**$**	**3,485,700**

4.4. ALTERNATIVE 4 – NEW GROUNDWATER WELLS WITH TREATMENT AT EXISTING SITE

4.4.1. DESCRIPTION

Alternative 4 is like Alternative 3 however instead of blending groundwater and surface water before treatment, the two streams will go through separate treatment processes and be combined in the clearwell before distribution. A total of 3 MGD of water would be produced at the WTP. The groundwater treatment train would be located in the open space northeast of the existing building. Once groundwater well locations have been identified and sampled, the type of treatment will be finalized. It is possible only chlorine and caustic addition is needed but will ultimately need to be determined. Ground water would be pumped from

each well location to the head of the groundwater treatment train. After treatment, groundwater would be combined with treated Ivy Creek water for distribution. Individual components of this alternative include:

- 25 new groundwater wells
- 1 treatment train for groundwater including green sand filters, liquid chlorination, and caustic addition
- 0.5 MG clearwell
- New finished water pumps and paved access

The main advantages of Alternative 4 are:

- No additional raw water above 1.5 MGD will be withdrawn from the Ivy River.
- The WTP will not need to be expanded, which reduces the capital cost for the project.

The main disadvantages of Alternative 4 are:

- Decentralized raw water sources and treatment systems could create issues for maintenance and monitoring by Town staff.
- Water quality and treatment needs could differ between the different wells.
- Mixing treated surface water and groundwater could create water chemistry issues. Sampling and pilot testing will be needed to ensure the blended water could be distributed without negative impacts to the distribution system.
- Additional land will need to be purchased/acquired for the groundwater well sites.

4.4.2. DESIGN CRITERIA

As with the other alternatives, the main design criteria for this alternative are that the finished water continues to meet NCDEQ and USEPA standards for drinking water, including all Maximum Contaminant Level (MCL) thresholds. According to the North Carolina Drinking Water Watch database, the Weaverville WTP has not had violation since 2013, and the Town's Consumer Confidence Report (CCR) indicates that treated water meets all applicable regulations. The existing treatment process has been shown to be effective for the Ivy River raw water source. Since this alternative will use an alternative treatment process for the groundwater wells, sampling, and pilot testing of groundwater from potential well sites should be completed with the proposed treatment process. In addition, blended treated groundwater and surface water from the WTP should be sampled and tested to ensure the combined water characteristics do not have an adverse effect on the distribution system (I.e., corrosion).

This alternative will also double the treated water produced by the Weaverville system from 1.5 MGD to 3.0 MGD. The proposed groundwater wells with separate treatment systems will provide the additional treated water capacity over 1.5 MGD. Required raw waterlines from the groundwater wells to the WTP site will be sized based on maximum expected velocities in the pipelines and routed in existing rights-of-way where possible.

4.4.3. MAP

See **Appendix A, Items 7 and 8** for a schematic layout map and a process flow diagram for Alternative 4.

4.4.4. ENVIRONMENTAL IMPACTS

See **Appendix C, Items 4 and 5** for a map of surrounding wetlands, 100/500-year floodplains, and major streams/rivers in the vicinity of the WTP site. Note that the proposed groundwater well sites would need to be thoroughly researched and could change during final design if this alternative is selected.

Environmental impacts from construction of Alternative 4 are expected to be moderate. Overall environmental impacts will be as significant as Alternative 3. Additional land will need to be acquired and cleared for the offsite wells, and additional construction, clearing, and impacts to landowners will be required to install the finished waterlines from the wells to the distribution system tie-in points. Land already cleared and graded on the existing WTP site would not be utilized.

Like the other alternatives, typical environmental impacts would be expected during construction of this alternative including increased noise, air emissions from heavy equipment, use of fossil fuels, and runoff from the site. These impacts will be mitigated to the extent practical during construction, and an approved Erosion and Sediment Control Plan will be implemented and enforced. The construction impacts for this alternative will be more widespread since the wells and treatment systems may be spread over a significant area.

The operation and maintenance of the groundwater treatment systems will have environmental impacts similar to the existing WTP as described in Section 5.2.4. Additional operation and maintenance of the groundwater wells and raw waterlines will be required, and increased electricity consumption for pumping is expected. This alternative will not increase water used/discharged for backwashing filters like the first two alternatives would, and alum sludge residuals would not be increased because of the different treatment process used for the groundwater. However, additional chlorine requirement for treatment will be similar to Alternatives 2 and 3.

4.4.5. LAND REQUIREMENTS

The land requirements for this alternative will likely be the most significant of all five alternatives. Land will need to be acquired/purchased for all the offsite groundwater wells, and easements may be required for the new raw waterlines. The actual amount of land required for the wells will be dependent upon how close the wells could be installed to one another. Land already owned by the Town of Weaverville and cleared for use on the existing treatment plant site will be utilized under this alternative for the separate groundwater treatment process.

4.4.6. POTENTIAL CONSTRUCTION PROBLEMS

Like the other alternatives, the main potential construction problem is the presence of subsurface rock. The Bid Form will include a line item for rock removal to establish a unit price if rock is encountered during construction.

Like Alternative 2, this alternative will need to establish the locations of the new groundwater wells during the design phase. Additional construction problems could be encountered depending on the location and required depth of these wells including access for construction/drilling equipment. The selected locations will also dictate the route and length of the finished waterlines to connect to the distribution system which could lead to additional construction issues including conflicts with existing utilities, acquisition of easements, and presence of sensitive environmental resources.

4.4.7. SUSTAINABILITY CONSIDERATIONS

Like the other alternatives, the purpose of this project is to increase the capacity of drinking water that the Town of Weaverville can provide to its customers, so more water, energy, materials, and labor will be required to meet this demand. Additional capacity will not be withdrawn from the Ivy River under this alternative, which leaves existing surface water capacity for future needs or other water systems. Operator and staff efficiency will decrease under this alternative since the wells and treatment systems could be located significant distances from the existing WTP and different treatment processes will be used. WTP Operators will have to be trained and certified for both Surface Water and Well Water Treatment. In addition, aquifer capacity could be impacted by the substantial number of wells proposed, and additional (different) chemicals will be needed to treat the groundwater.

4.4.8. CONSTRUCTION COST ESTIMATE

The cost opinion of Alternative 4 is shown below. Line items and quantities were developed based on estimated values from preliminary calculations and design scope. Unit and well costs were obtained from vendors or prior bids. Property acquisition was estimated based on current property values.

Table 4-7
Alternative #4 - Estimated Construction Costs

Item Description*	Quantity	Unit	Unit Cost	Extended Cost
Well Development				
Mobilization	1	LF	$ 430,000	$ 430,000
Development of Groundwater Wells	25	EA	$ 200,000	$ 5,000,000
Raw Water Lines to Connect Wells to WTP	165000	EA	$ 100	$ 16,500,000
0.5 MG Clearwall	1	EA	$ 750,000	$ 750,000
Access to New Clearwell and Ex. Sludge	340	SY	$ 105	$ 35,700
Grading and Sitework	1	LS	$ 120,000	$ 120,000
Finished Water Pumps and Station	1	LS	$ 170,000	$ 170,000
Sub-total				**$ 23,005,700**

Table 4-8
Alternative #4 - Total Estimated Project Costs

Sub-total Construction Cost Estimate	$	23,005,700
*Contingency @ (10%)**	$	2,300,570
Total Construction Cost	$	25,306,270
*Engineering Services***	$	1,018,900
*Preliminary Engineering Report (ls)****	$	132,500
Environmental Report (ls)	$	-
Basic Services (ls)	$	424,000
*RPR-Resident Project Representative(hr)****	$	226,400
Additional Service: Bidding and Negotiating	$	61,000
Additional Service: Construction Admin & Observation	$	112,500
Additional Service: Post Construction	$	62,500
Easements for Wells and Piping	$	464,000
Legal Fees (Local Attorney)	$	10,000
Legal Fees (Bond Counsel)	$	10,000
Administrative Costs		
Equipment		
Capitalized Interest		
Total	**$**	**26,345,200**

4.4.9. O&M COST ESTIMATES

In Alternative 4, there will be extra O&M due to the new wells that need to be maintained. It is estimated that the annual O&M costs for each groundwater well are $2,500. All the water (surface and groundwater) will be treated on the existing WTP however a separate treatment train of sand filters and chlorine will be used to treat groundwater. All surface water will go through the existing train. Addition WTP production costs will be less that Alternative 2 and comparable to Alternative 3 due to the reduced chemical and electrical required for groundwater treatment. There will be more raw water distribution lines to manage so the Distribution O&M will increase.

Table 4-9 Alternative #4 Annual Operating & Maintenance Expenses		
Administrative Costs (i.e. Office Supplies, Printing, etc…)	$	273,277
WTP Production	$	1,368,972
Distribution System Operation and Maintenance	$	1,459,132
Additional Chlorine Costs	$	14,000
Total Annual Expenses	**$**	**3,116,000**

4.5. ALTERNATIVE 5 – PURCHASE WATER FROM THE CITY OF ASHEVILLE

4.5.1. DESCRIPTION

The Town of Weaverville has an emergency water connection with the City of Asheville. The City of Asheville runs three water treatment plants totaling 43.5 MGD. In 2020, the combined demand was 21.89 MGD (~50% of current capacity). Alternative 5 considers the option of continuing to run Weaverville's WTP and supplementing 1.5 MGD from the City of Asheville connection.

At the connection with the City, there is a reservoir nearby. The calculated pressure in the vicinity of the interconnection is approximately 107 psi based on the City of Asheville's hydraulic model. In order to provide the necessary flow, a booster pump station may need to be added to the base of the closest Asheville reservoir, Woodfin. The line between the Woodfin tank and the connection point (on Asheville's side) will need to be upsized from 8 to 12-inch. The line from the interconnect to Hamburg Mtn. Rd. (on Weaverville's side) will need to be upsized from 8 to 12-inch, as well. These improvements will allow for sufficient flows and pressures to supply 1.5 MGD to the Town of Weaverville from the City of Asheville.

Individual physical components of this alternative include:

- Approximately 10,600 LF of 12-inch DIP water line from Woodfin Tank to Old Home Road/Weaverville Road
- Booster pump station at Woodfin Tank
- Approximately 16,400 LF of 12-inch DIP waterline from Old Home Road/Weaverville Road to Hamburg Mountain Road
- Horizontal directional drill (HDD) under Reems Creek
- Associated valves and appurtenances

The main advantages of Alternative 5 are:

- Lower capital cost than all other alternatives considered.
- No additional raw water above 1.5 MGD would be withdrawn from the Ivy River.
- Regionalization would increase efficiency of treatment and distribution by centralizing labor, equipment, and materials.

The main disadvantages of Alternative 5 are:

- Customer rates in the Town of Weaverville may increase over time as more water from the City of Asheville is utilized.
- Blending treated water from Weaverville and the City of Asheville could create water chemistry/corrosion issues; sampling and testing should be completed to ensure the two water sources are compatible.
- Growth in Asheville and other parts of Buncombe County may require current excess water capacity.

- Easements/land acquisition may be required for both of the 12-inch waterlines.
- This alternative would reduce the Town of Weaverville's ability to supply water to nearby communities, namely Marshall and Mars Hill.

4.5.2. DESIGN CRITERIA

As with the other alternatives, the main design criteria for this alternative are that the finished water continues to meet NCDEQ and USEPA standards for drinking water, including all Maximum Contaminant Level (MCL) thresholds. According to the North Carolina Drinking Water Watch database, the Weaverville WTP has not had violation since 2013, and the Town's Consumer Confidence Report (CCR) indicates that treated water meets all applicable regulations. The existing treatment process has been shown to be effective for the Ivy River raw water source. Water sampling and lab testing of the proposed blended water from the Town of Weaverville and the City of Asheville should be completed to ensure the two water sources are compatible and will not cause water chemistry issues (I.e., corrosion problems).

The new 12-inch waterline will need to maintain and provide the Town with 30 psi pressure during typical demands and 20 psi during fire demands. The Town's existing water system with the proposed 12-inch waterline would be modeled in WaterCAD to ensure these requirements are met. Bore and jacks with encasement pipes will be used to cross under NCDOT roadways and horizontal directional drills (HDDs) will be used to cross creeks and other sensitive environmental areas.

According to the City of Asheville's 2020 Local Water Supply Plan (LWSP), the City currently uses approximately 50% of its total water supply capacity on average. However, the availability of water for purchase by the Town of Weaverville would need to be confirmed before this alternative is selected.

4.5.3. MAP

See **Appendix C** for a general map of the Town of Weaverville's water system. The interconnection and proposed waterline improvements are located on the southern end of Weaverville's system.

4.5.4. ENVIRONMENTAL IMPACTS

See **Appendix C** for a map of wetlands, 100/500-year floodplains, and major streams/rivers in the vicinity of the Town's existing water system.

Overall environmental impacts for this alternative are expected to be minimal. Some clearing and land acquisition/easements may be required depending on the final route selected and existing utilities present along the alignment. However, the majority of the alignment will be installed in existing NCDOT right-of-way. Impacts to sensitive environmental areas would be avoided by crossings with HDDs.

Like the other alternatives, typical environmental impacts would be expected during construction of this alternative including increased noise, air emissions from heavy equipment, use of fossil fuels, and runoff from the site. These impacts would be mitigated to the extent practical during construction, and an approved Erosion and Sediment Control Plan would be implemented and enforced.

Operation and maintenance environmental impacts for the proposed waterline would be minimal and impacts from the Weaverville WTP would be similar to those described in Section 5.2.4. Chemical use, backwash water use and disposal, and alum sludge residuals would increase over time at the City of Asheville WTP due to the added water demand from Weaverville.

4.5.5. LAND REQUIREMENTS

Land requirements for this alternative would be minimal and would include only easements required to install the proposed 12-inch waterline. It is assumed the booster pump station will be on City of Asheville's property.

4.5.6. POTENTIAL CONSTRUCTION PROBLEMS

Like the other alternatives, the main potential construction problem is the presence of subsurface rock. The Bid Form will include a line item for rock removal to establish a unit price if rock is encountered during

construction. Other potential construction problems could include the presence of sensitive environmental areas, such as wetlands and streams. These areas would need to be avoided as much as possible. Additionally, existing utilities along the proposed alignment could cause construction issues depending on the number, size, and location of utilities present. Subsurface Utility Engineering (SUE) will be conducted during the design phase to mark the location of existing utilities on the drawings.

4.5.7. SUSTAINABILITY CONSIDERATIONS

Like the other alternatives, the purpose of this project is to increase the capacity of drinking water that the Town of Weaverville can provide to its customers, so more water, energy, materials, and labor will be required to meet this demand. For this alternative, those additional resources would come from the City of Asheville. Additional capacity will not be withdrawn from the Ivy River under this alternative, which leaves existing surface water capacity for future needs or other water systems. Operator and staff efficiency would be increased under this alternative since labor and materials would be consolidated under the City of Asheville.

The most significant sustainability concern for this alternative is the economic sustainability of purchasing water from the City of Asheville. The City could increase rates over time as the Town of Weaverville becomes more dependent on the additional water supply, which would have negative economic impacts on the Town's water customers.

4.5.8. CONSTRUCTION COST ESTIMATE

The opinion of cost for Alternative 5 is shown below. In Table 4-11, it should be noted there is a one-time wholesale capacity fee for wholesale consumption and is included as an upfront cost.

Table 4-10
Alternative #5 - Estimated Construction Costs

Item Description*	Quantity	Unit	Unit Cost	Extended Cost
Mobilization	1	LS	$ 162,300	$ 162,300
16,400 LF of 12-inch DIP Old Home Rd to Hamburg Mtn. Road	16,400	LF	$ 255	$ 4,182,000
10,600 LF of 12-inch DIP Woodfin Tank to Old Home Rd	10,600	LF	$ 255	$ 2,703,000
Booster Pump Station	1	LS	$ 550,000	$ 550,000
Fire Hydrant Assembly	40	EA	$ 5,000	$ 200,000
Valving and Appurtenances	40,000	LB	$ 12	$ 480,000
Sub-total				**$ 8,277,300**

Table 4-11 Alternative #5 - Total Estimated Project Costs		
Sub-total Construction Cost Estimate	$	8,277,300
*Contingency @ (10%)**	$	827,730
Total Construction Cost	$	9,105,030
*Engineering Services***	$	1,048,900
*Preliminary Engineering Report (ls)****	$	132,500
Environmental Report (ls)	$	-
Basic Services (ls)	$	424,000
*RPR-Resident Project Representative(hr)****	$	226,400
Additional Service: Bidding and Negotiating	$	61,000
Additional Service: Construction Admin & Observation	$	112,500
Additional Service: Post Construction	$	62,500
One Time Connection Fee to City of Asheville	$	30,000
Legal Fees (Local Attorney)	$	10,000
Legal Fees (Bond Counsel)	$	10,000
Administrative Costs		
Equipment		
Capitalized Interest		
Total	**$**	**10,174,000**

4.5.9. O&M COST ESTIMATES

As demand surpasses the WTP capacity of 1.5 MGD, water will be purchased from the City of Asheville. WTP O&M costs will be capped at 1.5 MGD, and the current City of Asheville water rates will be applied to all demand exceeding 1.5 MGD. The current purchase agreement with the City of Asheville expires in 2037 and charges the Town of Weaverville $1.59 per 1,000 gallons. Asheville also charges a monthly capacity for wholesale connections and a monthly meter fee. It is assumed for this analysis that the cost per 1,000 gallons will remain the same for the study period; however, the City of Asheville water rates are subject to change.

Table 4-12 Alternative #5 Annual Operating & Maintenance Expenses		
Administrative Costs (i.e. Office Supplies, Printing, etc…)	$	273,277
WTP Production	$	1,139,108
Distribution System Operation and Maintenance	$	1,094,349
City of Asheville Wholesale Charge	$	928,734
Total Annual Expenses	**$**	**3,435,500**

5. SELECTION OF AN ALTERNATIVE

5.1. LIFE CYCLE COST ANALYSIS

A life cycle cost analysis was performed on the selected Alternatives to determine the most cost effective option. Non-monetary factors are considered in the following section. Table 5-1 summarizes the Alternatives capital, 20-year, and Total Project Costs. Calculated values of Capital Cost and O&M Cost were rounded to the nearest $100 for clarity. Table 5-2 show the Life Cycle cost analysis and the calculations made to reach the quantities below.

Alternative 3 had the highest Capital, O&M, and Total Project Costs of all the Alternatives. Alternative 2 and 4 were similar comparing total project costs. Naturally, Alternative 1 had the lowest cost and is only showing O&M for the existing 1.5 MGD WTP running. The lowest cost alternative was Alternative 5.

Table 5-1
Alternatives Analysis Summary

Alternative	Capital Costs	20-Year O&M Costs	Total Project Costs
1) No Action	$ -	$ 2,120,200	$ 41,526,500
2) Intake and Water Treatment Plant Expansion	$ 13,570,000	$ 2,693,700	$ 66,329,100
3) New Groundwater Wells and Water Treatment Plant Expansion	$ 38,405,200	$ 3,485,700	$ 104,318,100
4) New Groundwater Wells with Treatment at Existing Site	$ 26,345,200	$ 3,116,000	$ 85,017,100
5) Purchase Water from the City of Asheville	$ 10,174,000	$ 3,435,500	$ 71,408,900

Table 5-2 Life Cycle Cost Analysis						
Discount rate (i) =	0.20%	Use "real" discount rate taken from Appendix C of OMB circular A-94: http://www.whitehouse.gov/omb/circulars_a094/a94_appx-c				
Number of Years (n)=	20	The planning period is recommended to be 20 years.				
		Alternative #1	Alternative #2	Alternative #3	Alternative #4	Alternative #5
Initial Capital Costs (C)=		$ -	$ 13,570,000	$ 38,405,200	$ 26,345,200	$ 10,174,000
Annual Operation and Maintenance Costs (O&M) =		$ 2,120,200	$ 2,693,700	$ 3,485,700	$ 3,116,000	$ 3,435,500
Future Salvage Value (S) =		$ -	$ -	$ 2,454,500	$ 2,454,500	$ 6,300,000
Present Worth of (n) years of Operations &		$ 41,526,500	$ 52,759,100	$ 68,271,300	$ 61,030,300	$ 67,288,100
Present Worth of (n) year Future Salvage Value = [PW=(S)/(1+i)^n]		$ -	$ -	$ 2,358,400	$ 2,358,400	$ 6,053,215
Net Present Value (Cost) = [NPV=(C)+PW(O&M)-PW(S)]		**$ 41,526,500**	**$ 66,329,100**	**$ 104,318,100**	**$ 85,017,100**	**$ 71,408,900**

5.2. SUMMARY OF NON-MONETARY FACTORS

In addition to the Life Cycle Cost Analysis, non-monetary factors were also considered. The non-monetary factors are summarized in the Matrix Rating system shown below. The most critical non-monetary factors considered were Community Objections and Advantages/Disadvantages Analysis.

Table 5-3 Non-Monetary Factors Matrix Rating System (1=Least Desirable ; 10 = Most Desirable)					
	Alternative #1	Alternative #2	Alternative #3	Alternative #4	Alternative #5
Sustainability Considerations	2	9	7	7	5
Operator Training Requirements	10	10	5	3	4
Ease of Operation	5	10	3	4	5
Permit Issues	3	10	3	3	8
Community Objections	2	9	3	3	5
Reduction of Green House Gas Emissions	6	4	4	4	4
Legalities	8	9	5	5	3
Advantages/Disadvantages Analysis	0	8	2	2	3
Ease of Future Expansion	8	4	5	5	6
Environmental Impacts	8	8	3	3	5
Totals	**52**	**81**	**40**	**39**	**48**

Based on the results of the alternatives analysis, Alternative 5) Purchase Water from the City of Asheville has been determined to be the alternative with the lowest total project costs. This alternative would allow the Town of Weaverville water system to supply future growth and development, however the Town may want to consider other options to expand the water system due to non-monetary factors. The ongoing legal battle over the ownership of the Asheville water system casts doubt on which entity Weaverville will be buying water from. Uncertainties in future water prices and the possible need to renegotiate/extend a water purchase agreement further cloud the issue. This Alternative makes it more difficult for Mars Hill and Marshall to get water from Weaverville. Even if there is enough volume and pressure, there would be water age issues due to the long lengths water must travel between Asheville and Mars Hill and Marshall. Furthermore, when the existing interconnection with Asheville has been used in the past, differences in

water chemistry has negatively affected sensitive water users in the vicinity of the interconnection. For these reasons, Alternative 5 has not been selected as the preferred alternative.

Alternative 2) Intake and Water Treatment Plant Expansion offers the next lowest total project cost. This alternative includes the previously and originally planned expansion of existing infrastructure at the existing intake site and water treatment plant. Based on historical documentation, it appears that the Town has previously received authorization to increase its surface water withdrawals to meet the demands described throughout the planning period of the report. The Town would not have to purchase additional property for wells or manage water quality and maintenance at remote well sites. All treatment would occur centrally at the expanded water treatment plant. The expanded WTP will allow Weaverville to be a regional provider for Mars Hill and Marshall which helps them grow and increases the water security of their systems. Therefore, Alternative 2 is determined to be the preferred alternative.

Alternatives 3) and 4) were also considered for completeness. Nearby, Marshall has previously attempted to drill water supply wells, but those wells were contaminated with trichloroethylene (TCE). Though this is an isolated incident, uncertainties concerning well yields, property availability, water quality, the ability to receive funding for such a project scope, and the feasibility of having a large quantity of water supply wells and the piping needed to connect 25 wells cause these Alternatives to be considered infeasible.

6. PROPOSED PROJECT

6.1. PRELIMINARY PROJECT DESIGN

The preferred alternative for expanding the Weaverville WTP is Alternative 2 which includes the following items:

1. *Upgrade of the raw water pump station in the existing intake structure to increase the pumping capacity by the addition of a third pump*
2. *New Claricone*
3. *New Flash Mix Chamber, flocculation basins, sedimentation basins, and multimedia gravity filters with air scour*
4. *Construction of a new 0.5 MG Clearwell*
5. *New high service and backwash pumps*
6. *Conversion of existing Clearwell to Sludge Decant Basin*
7. *Addition of Powder Activated Carbon Feed System*
8. *1,330 LF of Drain line for the NPDES Discharge to Ivy Creek*
9. *Building Improvements for expanded lab testing and ADA accessibility*

Alternative 2 was selected as the preferred alternative upon the completion of the alternatives analysis comparing capital cost, 20-year present worth, ease of construction and operation, system redundancy, ease, and cost of future expansion. Even though the capital cost is higher for Alternative 2 than Alternative 5, ease of construction and operation and 20-year present worth is better than other Alternatives. The Town will be able to provide water for future growth north of Asheville.

6.2. PROJECT SCHEDULE

The Town of Weaverville will likely pursue funding through grants and/or loans to finance the capital costs of the project. The figure below shows the anticipated project schedule for the expanding the WTP.

Task Name	Duration	Start	Finish
Project 12/31 + 52 mos = 5/1/2025 (plus close-out time)	1666d	03/01/21	09/21/25
RFQ Process	61d	03/01/21	04/30/21
Notice to Proceed	0	05/01/21	05/01/21
Funding Application & Approval (4 months)	215d	05/01/21	12/01/21
Agreement Phase	150d	03/09/21	08/05/21
Pre-Design Tasks	126d	05/01/21	09/03/21
Design (13 months)	392d	12/02/21	12/28/22
Permitting (9 months)	308d	12/29/22	11/01/23
Final Submittal	42d	10/19/23	11/29/23
Bid & Award (2 months)	56d	11/29/23	01/24/24
Construction (18 months)	574d	01/24/24	08/20/25
Phase 6: Post-Construction Phase	60d	07/23/25	09/21/25

If the PER and funding application are approved in the 4th quarter of 2021, the projected construction date would be in the first quarter 2024. Based on the upper limit of flow projections, Weaverville will hit 80% of capacity in 2025. With the current scheduling, the new expansion should come online just before the WTP hits 80%.

6.3. PERMIT REQUIREMENTS

The following permits will need to be acquired for the project:

- NC Division of Water Quality Authorization to Construct
- NC Division of Minerals, and Land Resources, Erosion and Sedimentation Control Permit
- NC Department of Environmental Quality Public Water Supply
- Stormwater Management Plan
- NC DOT Encroachment Permit
- Updated NPDES Discharge Permit
- WNC Regional Air Quality Agency

No permits are anticipated for wetlands or streams.

6.4. TOTAL PROJECT COST ESTIMATE (ENGINEER'S OPINION OF PROBABLE COST)

The Engineer's Opinion of Probable Costs and the non-construction related costs are shown in Tables 6-1 and 6-2 below.

Table 6-1
Selected Alternative - Estimated Construction Costs

Item Description*	Quantity	Unit	Unit Cost	Extended Cost
WTP Expansion				
Mobilization (2% of Subtotal)	1	LS	$ 223,370	$ 223,370
Earthwork	1	LS	$ 227,000	$ 227,000
Rock Excavation	1	LS	$ 572,000	$ 572,000
Backwash Pumps and Controls	1	LS	$ 75,000	$ 75,000
Finished Water Pumps and Controls	1	LS	$ 170,000	$ 170,000
Finished Water and Backwash Pump Station	1	LS	$ 290,000	$ 290,000
Conversion of Clearwell to Sludge Tank	1	LS	$ 375,000	$ 375,000
Access to Sludge, New Pump Station Paving	440	SY	$ 105	$ 46,200
Liquid Chlorine System	1	LS	$ 60,000	$ 60,000
Raw Water Intake Pump	1	EA	$ 160,000	$ 160,000
Intake Air Scour	1	EA	$ 15,000	$ 15,000
0.5 MG Clearwell Tank 65' Ø	1	LS	$ 750,000	$ 750,000
Sample Pumps	4	EA	$ 4,000	$ 16,000
Flash Mix, Flocculator, Sed. and Filter Basins	1	LS	$ 800,000	$ 800,000
Flash Mixers	2	EA	$ 26,000	$ 52,000
Flocculators	4	EA	$ 30,000	$ 120,000
Claricone (1)	1	EA	$ 1,253,000	$ 1,253,000
New Filters (Media, Underdrains, Etc)	1	EA	$ 555,000	$ 555,000
Filter Air Scour (All Filters)	4	EA	$ 50,000	$ 200,000
Sludge Submersible Mixer	2	EA	$ 25,000	$ 50,000
Sludge Transfer Pump	2	EA	$ 30,000	$ 60,000
8-inch Drain Line 1,330 LF	1	LS	$ 280,000	$ 280,000
Piping and Appurtanances	1	LS	$ 650,000	$ 650,000
Electrical Improvements (incl generators)	1	LS	$ 2,386,000	$ 2,386,000
Misc. Metals	1	LS	$ 150,000	$ 150,000
Misc. Concrete	1	LS	$ 230,000	$ 230,000
SCADA Upgrades	1	LS	$ 239,000	$ 239,000
Erosion Control	1	LS	$ 72,300	$ 72,300
Line Existing and New Sed Basins	8000	SF	$ 30	$ 240,000
PAC Feed System	1	LS	$ 25,000	$ 25,000
Building Improvements	1	LS	$ 750,000	$ 750,000
ADA Improvements	1	LS	$ 300,000	$ 300,000
Sub-total				**$ 11,391,870.00**

Table 6-2 Selected Alternative - Total Estimated Project Costs		
Sub-total Construction Cost Estimate	$	11,391,870
*Contingency @ (10%)**	$	1,139,187
Total Construction Cost	$	12,531,057
*Engineering Services***	$	1,018,900
*Preliminary Engineering Report (ls)****	$	132,500
Environmental Report (ls)	$	-
Basic Services (ls)	$	424,000
*RPR-Resident Project Representative(hr)****	$	226,400
Additional Service: Bidding and Negotiating	$	61,000
Additional Service: Construction Admin & Observation	$	112,500
Additional Service: Post Construction	$	62,500
Legal Fees (Local Attorney)	$	10,000
Legal Fees (Bond Counsel)	$	10,000
Administrative Costs		
Equipment		
Capitalized Interest		
Total	**$**	**13,570,000**

6.5. ANNUAL OPERATING BUDGET

The Town of Weaverville is expecting a USDA loan or grant funding to cover 100% of the $13.6 M project cost. To offset the costs for this project and future anticipated projects, the Town's rate schedule once all gradual rate increases are incorporated over several years is proposed in Table 6-3.

Table 6-3 Proposed Rate Schedule		
	In-Town	Out-of-Town
Residential		
Minimum Charge (up to 2000 gallons)	$ 22.26	$ 44.52
Cost per 1000 gallons	$ 11.13	$ 22.26
Commercial/Industrial		
Minimum Charge (up to 0 gallons)	Same as above	Same as above
Cost per 1000 gallons	Same as above	Same as above
Bulk		
Minimum Charge (up to 0 gallons)	$ 25.00	$ 25.00
Cost per gallon	$ 0.05	$ 0.05

The current year (2021-2022) and the 1st typical year (2024-2025) are shown in Table 6-4 below.

Table 6-4 Proposed Annual Water/Sewer Operating Budget		
Annual Revenues	**Existing Budget CY**	**1st Typical Year CY**
Water Revenue	$ 2,173,500	$ 3,028,507
Misc Revenue	$ 15,000	$ 15,600
Water Tap Revenue	$ 26,250	$ 27,300
System Development Fees	$ 164,000	$ 170,560
Fees for MSD Collections	$ 65,000	$ 67,600
Interest Earned	$ 640	$ 666
Total Annual Revenues	**$ 2,444,390**	**$ 3,310,233**
Annual Expenses		
Annual Operations & Maintenance:		
Administrative Costs (i.e. Office Supplies,	$ 260,139	$ 284,208
WTP Production	$ 850,016	$ 1,131,541
Maintenance	$ 899,647	$ 935,633
Contingency	$ 15,000	$ 15,600
Trasfer to Capital Reserve Fund	$ 119,117	$ 119,117
Sub-Total	**$ 2,143,919**	**$ 2,486,099**
Annual Debt Payments:		
Hancock Whitley Bank	$ 300,471	$ 300,471
USDA	-	$ 518,067
Sub-total	**$ 300,471**	**$ 818,538**
Reserve Accounts:		
Sub-total	$ -	$ -
Total Annual Expenses	**$ 2,444,390**	**$ 3,304,637**
Surplus / (Deficit)	**$ -**	**$ 5,595**

6.6. SHORT LIVED ASSET RESERVE

Short lived asset reserves are set aside to cover the costs of routine replacement of project components. Doubling the size of the existing WTP will result in additional equipment, pumps, tanks, mixer, etc. Table 6-5 below summarizes the short-lived assets associated with this project. The costs are accounted for in the budget in Table 6-4 above.

Table 6-7
Short-Lived Assets

Item Description	Years (1-5)	Years (6-10)	Years (11-15)
Backwash Pumps and Controls	$18,750.00	$18,750.00	$18,750.00
Finished Water Pumps and Controls	$42,500.00	$42,500.00	$42,500.00
Finished Water and Backwash Pump Station	$72,500.00	$72,500.00	$72,500.00
WTP 2500 kW Generator	$301,000.00	$301,000.00	$301,000.00
Liquid Chlorine System	$15,000.00	$15,000.00	$15,000.00
Raw Water Intake Pump	$40,000.00	$40,000.00	$40,000.00
Intake PS Generator	$100,000.00	$100,000.00	$100,000.00
Sample Pumps	$4,000.00	$4,000.00	$4,000.00
Sludge Submersible Mixer	$12,500.00	$12,500.00	$12,500.00
Sludge Transfer Pump	$15,000.00	$15,000.00	$15,000.00
Electrical Improvements	$70,000.00	$70,000.00	$70,000.00
SCADA Upgrades	$40,000.00	$40,000.00	$40,000.00
Line Existing and New Sed Basins	$60,000.00	$60,000.00	$60,000.00
PAC Feed System	$6,250.00	$6,250.00	$6,250.00
Building Improvements	$187,500.00	$187,500.00	$187,500.00
Year Totals	**$985,000.00**	**$985,000.00**	**$985,000.00**

7. CONCLUSIONS AND RECOMMENDATIONS

It is recommended that the Town of Weaverville seek funding to incorporate the improvements outlined in Section 4 for Alternative 2: Intake and Water Treatment Plant Expansion as the proposed project. This expansion will allow the WTP to produce additional water and support growth in the Town, as well as provide emergency water supplies for Mars Hill and Marshall.