



Bull Run
TREATMENT
PROJECTS

*Economic Contributions
and Benefits*

June 2021



ACKNOWLEDGMENTS

For over 40 years ECONorthwest has helped its clients make sound decisions based on rigorous economic, planning, and financial analysis. For more information about ECONorthwest, visit: www.econw.com.

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- David Peters, Elliot Lisac, Bonita Oswald, Christopher Bowker, and Cindi Lombard from Portland Water Bureau;
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Bull Run
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EXECUTIVE SUMMARY

The Economic Contributions and Benefits of the Bull Run Treatment Projects

The Portland Water Bureau (Water Bureau) is upgrading the Bull Run water system with a water filtration facility, new pipelines, and an improved corrosion control treatment facility to protect public health and meet federal drinking water regulations. Filtration treatment must be in place by September 2027 to filter the water for *Cryptosporidium* and other contaminants. Improved Corrosion Control Treatment (ICCT) must be in place by April 2022 to further reduce the corrosiveness of the water to lead and other metals found in some home and building plumbing. The two projects, the Bull Run Filtration Project and ICCT Project, are located near one another just west of the Sandy River.

Economic Contribution of the Bull Run Treatment Projects

Planning, Design, and Construction Period

Construction of the Bull Run Treatment Projects will provide an influx of investment into the region. The estimated \$840 million (in 2019 dollars) in costs for planning, design, and construction will support direct economic activity and contribute to secondary economic activity as the funds recirculate through the local economy. The secondary economic contribution represents

additional economic activity supported by the Water Bureau's employee and supply chain purchases. **The approximately 10-year planning, design, and construction period for the Bull Run Treatment Projects will support approximately 4,600 jobs in Multnomah, Clackamas, and Washington counties.**

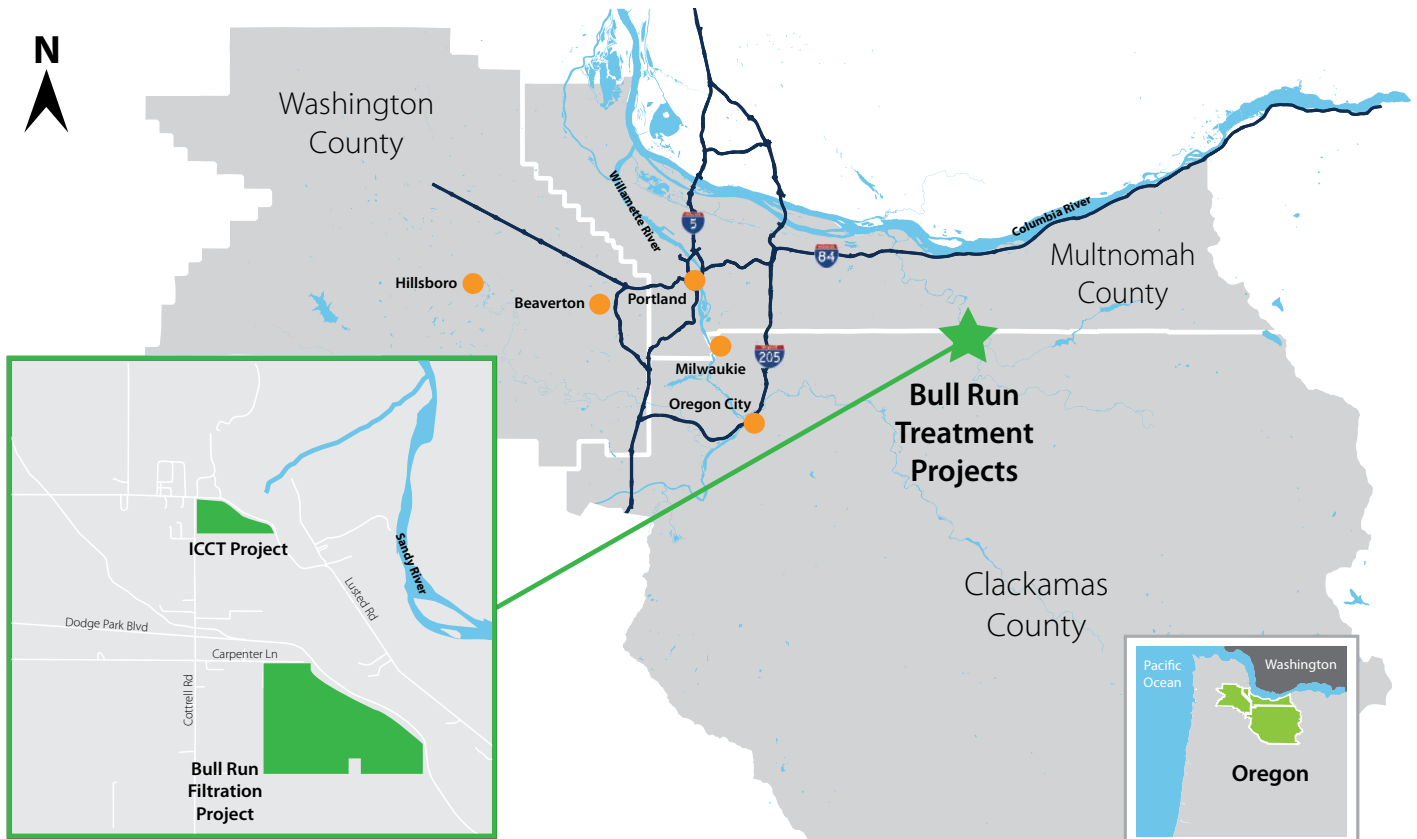
Operations Period

Once constructed, the Bull Run Treatment Projects will also support local economic activity from annual operations. The approximate annual operations expenses will be \$13.7 million per year. These funds will support local jobs from direct employment at the facilities as well as economic activity through local supply chain purchases. The portion of annual operations that remains in the local economy will support \$14.9 million in total economic activity each year.

Distribution of Impacts

The Bull Run Treatment Projects will meet or exceed City of Portland Contracting Social Equity Initiatives. Accordingly, the economic contributions during the planning, design, and construction period will benefit groups that have historically been under-included.

Location of Bull Run Treatment Projects



Source: Created by ECONorthwest

Executive Summary

The Economic Contributions and Benefits of the Bull Run Treatment Projects

Construction of the Filtration Project will deliver at least \$100 million in contracts to Disadvantaged, Minority-Owned, Women-Owned, and Emerging Small Businesses certified by Oregon’s Certification Office for Business Inclusion and Diversity (COBID).

- 22 percent of hard construction dollars for the filtration facility will go to Minority-Owned, Women-Owned, Service-Disabled Veteran Owned, and/or Emerging Small Businesses.
- 31 percent of apprentice-level and 28 percent of journey-level work hours will be dedicated to women and minority workers for construction of the filtration and ICCT facilities.
- One percent of the construction contract dollars will be invested in the City of Portland’s Community Opportunities and Enhancement Program that provides grants for workforce development and business technical assistance to increase

diversity of both business owners and tradespeople in Portland’s construction industry.

System Resilience Benefits

The improvements achieved through the Bull Run Treatment Projects will make Portland’s water system more resilient to turbidity resulting from wildfires, earthquakes, landslides, heavy storms, or other events — potentially avoiding or minimizing future service disruptions and boil water notices.

Without filtration, the Water Bureau has needed to switch to groundwater during high-turbidity events. **With the Filtration Project, the Bull Run water supply can be used even when turbidity levels are high in the raw water**, reducing the need to make supply changes.

Local Economic Contribution of Bull Run Treatment Projects During the Planning, Design and Construction Period (2018-2028)

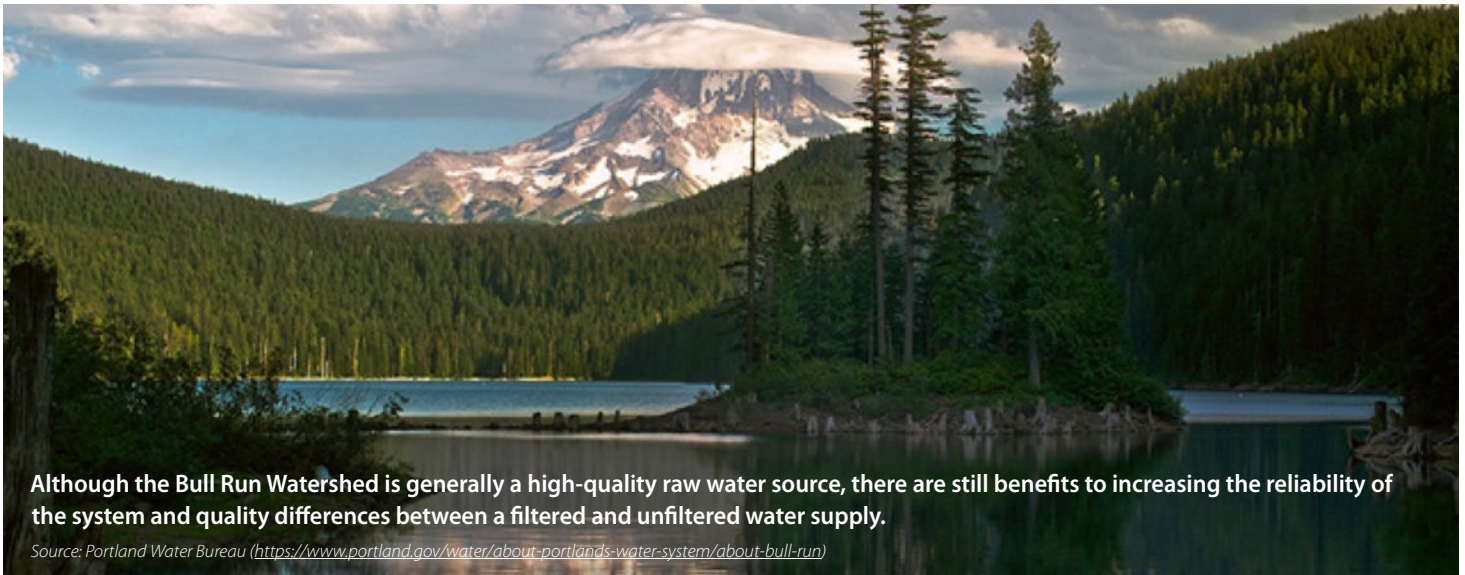
Contribution	Jobs	Labor Income	Output (Economic Activity)
Direct	2,900	\$665.9 million	\$732.8 million
Secondary	1,700	\$304.0 million	\$859.6 million
Total	4,600	\$969.9 million	\$1.59 billion

Source: Created by ECONorthwest with information from Portland Water Bureau and calculations from IMPLAN

Annual Local Economic Contribution of Bull Run Treatment Projects During the Operations Period

Contribution	Jobs	Labor Income	Output (Economic Activity)
Direct	13	\$5.6 million	\$8.1 million
Secondary	40	\$2.4 million	\$6.8 million
Total	53	\$8.0 million	\$14.9 million

Source: Created by ECONorthwest with information from Portland Water Bureau and calculations from IMPLAN



Although the Bull Run Watershed is generally a high-quality raw water source, there are still benefits to increasing the reliability of the system and quality differences between a filtered and unfiltered water supply.

Source: Portland Water Bureau (<https://www.portland.gov/water/about-portlands-water-system/about-bull-run>)

The Economic Contributions and Benefits of the Bull Run Treatment Projects

Other Benefits

In addition to system resilience and economic contribution to the local economy, the Bull Run Treatment Projects will provide other notable benefits.

Compliance Benefits

The Filtration Project will protect public health and meet Long-Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) requirements for *Cryptosporidium* removal. Similarly, the ICCT Project is designed to comply with the Lead and Copper Rule (LCR). By making these investments now, the Water Bureau is not only addressing current compliance requirements, but also adding the infrastructure needed to address potential future water quality requirements.

Public Health Benefits

Completing these projects will reduce health risks from the water supply from *Cryptosporidium* and other pathogens, as well as reduce corrosion that can contribute to lead, copper, and other metals leaching into household water. Reducing these risks avoids potential illnesses and health costs for Water Bureau customers. Individuals with weakened immune systems, those

with inadequate health care coverage, and low-income residents are disproportionately at risk from these potential illnesses. Lowering these risks for those most at risk furthers the City of Portland's equity goals.

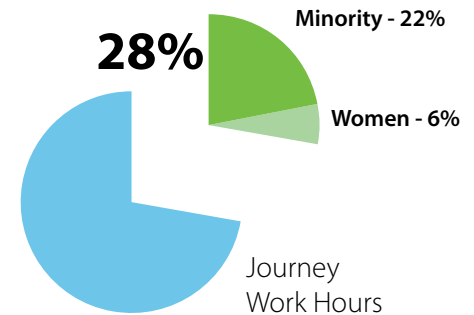
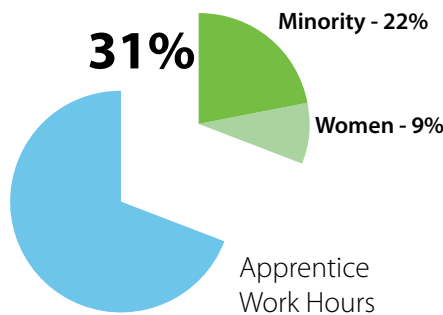
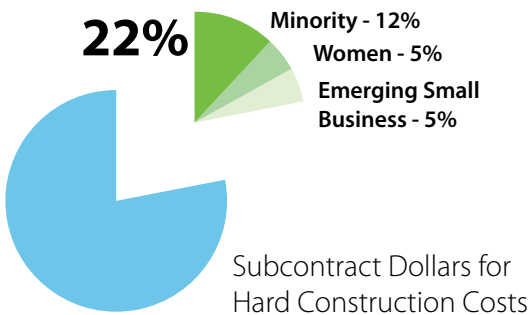
Benefits to Business Customers

Many businesses within the Water Bureau service area depend on consistent, high-quality water as inputs to their processes, including dialysis clinics, hospitals, beverage manufacturing and bottlers, microchip companies, and other business customers sensitive to water quality changes. The Filtration Project will benefit these businesses through decreased maintenance costs to clean sediment from pipes, lower risk for waterborne pathogens, and reduced need for additional water to clean their own filtration systems.

Educational Benefits

Educational tours of the working filtration facility are possible once it is fully operational. These educational offerings could provide information to participants about the science behind the water treatment, as well as opportunities to develop a broader understanding of the water cycle.

Community Benefits Agreement Contracting and Workforce Equity Commitments for Construction Contracts



Source: Created based on information from City of Portland Community Benefits Agreement

Prepared by ECONorthwest

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ECONorthwest is the largest economics consulting firm in the Northwest, with offices located in Portland, Los Angeles, Seattle, Boise, Bend, and Eugene. Founded in 1974, ECONorthwest works with public and private sector clients around the country to answer questions through the lens of applied microeconomics. This report was produced under contract to and with substantial assistance from Portland Water Bureau. For more information about this report, contact Laura Marshall at marshall@econw.com.

Introduction and Background

The Economic Contributions and Benefits of the Bull Run Treatment Projects

Introduction

The Portland Water Bureau (Water Bureau) directly or through wholesale contracts provides drinking water to more than 955,800 Oregonians, equal to almost one-quarter of the population in the state. The Water Bureau has a service area of approximately 225 square miles which includes 166,600 residential households and 20,000 commercial and industrial customers (as of fiscal year 2019-2020). The Water Bureau also provides water to wholesale customers including other local cities, water districts, and water companies. The Water Bureau operates from two primary sources of water, the Bull Run Watershed and the Columbia South Shore Well Field (CSSWF) (Figure 1).

Bull Run Treatment Projects Background

The Water Bureau is upgrading the Bull Run water system with a water filtration facility, new pipelines, and an improved corrosion control treatment facility to protect public health and meet federal drinking water regulations. These upgrades are happening through the Bull Run Treatment Projects, which includes two projects: the Bull Run Filtration Project (Filtration Project) and the Improved Corrosion Control Treatment Project (ICCT Project). The Filtration Project includes the filtration facility that will filter the water for *Cryptosporidium* and other contaminants, as well as the pipelines needed for water conveyance. The ICCT Project includes a building for the new corrosion control treatment system, a utility water pump station, and associated piping and support systems.

History of the Bull Run Treatment Projects

The Bull Run Treatment Projects will achieve compliance with two federal drinking water act regulations. The Filtration Project

Purpose of this Report

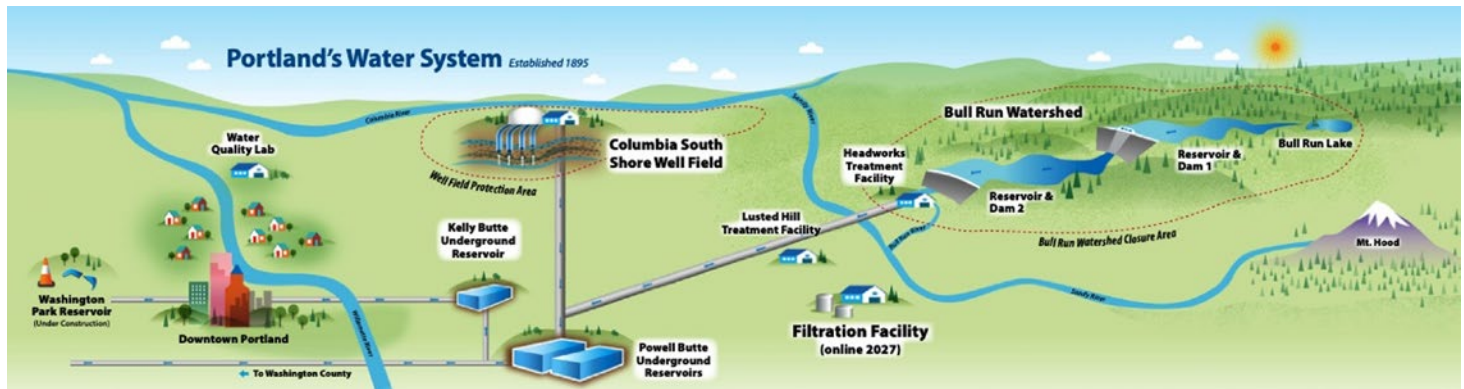
This report documents the economic contributions and benefits of the Bull Run Treatment Projects. Although both benefits and costs are important, this is not a benefit-cost analysis and costs are documented elsewhere. The Water Bureau does not have a single resource that summarizes the economic benefits of the Bull Run Treatment Projects in a consistent, up-to-date, and detailed way that is accessible to non-technical audiences. To this end, *the purpose of this report is to evaluate and synthesize information about the economic contributions and benefits of the Bull Run Treatment Projects.*

will put Portland in compliance with the Long-Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) issued by the EPA in 2006. The ICCT Project is required by the Lead and Copper Rule (LCR), originally issued by the EPA in 1991 and revised most recently in January 2021.

Filtration Project History

From 2012 to 2017, the City of Portland operated under a variance to the LT2 Rule from the Oregon Health Authority (OHA) to maintain an unfiltered water supply that did not treat for *Cryptosporidium*. This variance was initially permitted based on the results of a year-long intensive sampling program and the limited sources and low occurrence of *Cryptosporidium* in the Bull Run supply. However, after a series of low-level *Cryptosporidium* detections in the Bull Run supply from January to May 2017, OHA gave notice to the City of Portland that it would revoke its variance and the City would need to traditionally comply with LT2 Rule.

Figure 1 | Portland Water Bureau System



Source: Provided by Portland Water Bureau

The Economic Contributions and Benefits of the Bull Run Treatment Projects

In August 2017, the Water Bureau reviewed treatment options, including ultraviolet and filtration, with the Portland City Council and community partners. The City Council selected filtration to comply with OHA's order to treat for *Cryptosporidium* and to provide other significant water quality benefits (Resolution 37309). In December 2017, the Water Bureau entered into a bilateral compliance agreement with OHA to have filtration in place by 2027.

ICCT Project History

The ICCT Project will achieve compliance with the LCR. The LCR requires systems to monitor drinking water at customer taps for lead and copper. In Portland, lead in water comes from home plumbing (not from the water sources). The Water Bureau has been providing corrosion control treatment since 1997 to reduce exposure to lead at the tap. The Water Bureau monitors high-risk homes known to have copper pipes and lead solder. Levels of lead and copper in the water can vary depending on the corrosiveness of the water. The ICCT Project, which will be completed in 2022, will increase both the alkalinity and pH of water delivered to customers, reducing the corrosiveness and therefore the risk of these metals in the drinking water.

Location of the Bull Run Treatment Projects

The primary sites for both projects are in unincorporated Multnomah County just north of the Clackamas County line and approximately 3 miles east of the City of Gresham urban boundary (Figure 2). A raw water pipeline will be located in Clackamas County. The Water Bureau has owned the site for the Filtration Project since 1975 for the purpose of future water facilities. Lusted Hill currently has a water treatment facility that is being expanded under the ICCT Project.

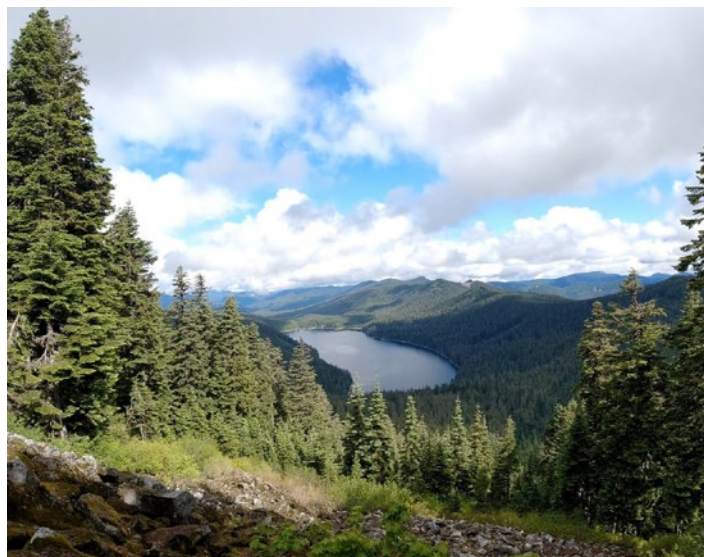
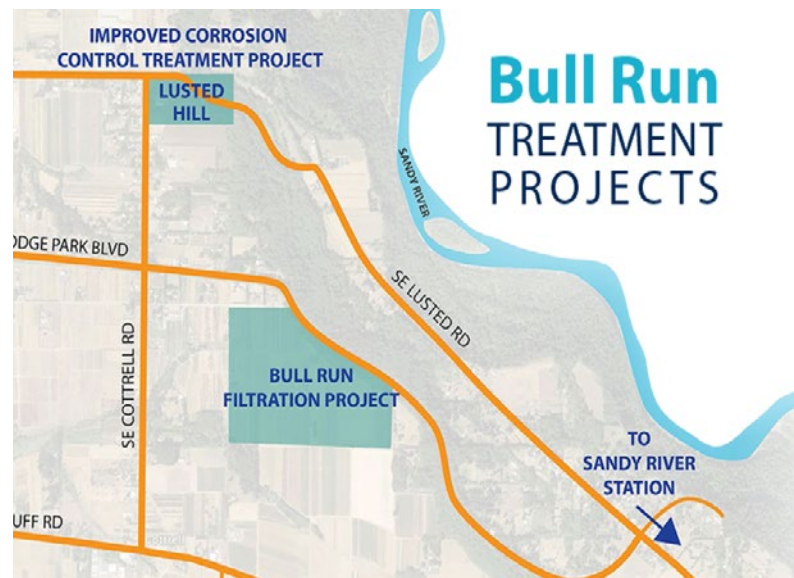


Figure 2 | Location of Bull Run Treatment Projects



Source: City of Portland, Bull Run Treatment: <https://www.portland.gov/water/bullruntreatment>

Current Status of the Bull Run Treatment Projects

Design is underway for the Filtration Project, with construction expected to begin in fiscal year 2023-24. The Filtration Project will meet its compliance deadline of September 2027. Construction of the ICCT Project is underway and will be finished by April 2022.

The Filtration Project is estimated to cost approximately \$820 million (in 2019 dollars). The ICCT Project will cost approximately \$20 million (in 2019 dollars). Together, these projects will allow the Water Bureau to protect public health, meet federal drinking water regulations, and to more consistently deliver the high-quality water the region's customers and visitors depend on.

Overview of Benefits

The primary benefits from the Bull Run Treatment Projects include: economic contributions to the local economy, increased water system resilience, and community benefits. This report is organized to discuss each of these economic contributions and benefits.

Jobs, Income, and Economic Activity Impacts

During the Planning, Design, and Construction period, the Bull Run Treatment Projects will support approximately 4,600 total jobs, \$969.9 million in labor income, and \$1.59 billion in economic activity within the Portland metropolitan area. This category of benefits considers both the direct impacts from spending on the Bull Run Treatment Projects, as well as the secondary impacts that result as spending recirculates through

Introduction and Background

The Economic Contributions and Benefits of the Bull Run Treatment Projects



the local economy. This spending will support Minority-Owned Business Enterprises, Women-Owned Business Enterprises, Disadvantaged Business Enterprises, Service-Disabled Veteran Owned Businesses, and Emerging Small Businesses (M/W/DBE/SDVB/ESB) through contracting agreements and commitments to workforce development. **Once the facilities are operational, the annual spending will support approximately \$14.9 million in total economic activity each year.**

System Resilience

The improvements achieved through the Bull Run Treatment Projects **will make Portland's water system more resilient to turbidity** resulting from wildfires, earthquakes, landslides, heavy storms, or other events — potentially avoiding or minimizing future service disruptions and boil water notices.

Without filtration, the Water Bureau has needed to switch to groundwater during high-turbidity events. **With the Filtration Project, the Bull Run water supply can be used even when turbidity levels are high in the raw water**, reducing the need to make supply changes.

Community Benefits

Additional benefits from the Bull Run Treatment Projects will flow to the Portland metropolitan area and Water Bureau customers. These benefits include compliance with federal drinking water regulations, health benefits from more consistent water quality, and benefits to business customers.

Data Sources

Information used to identify and evaluate the economic contributions and benefit categories was obtained from a variety of sources, including:

- Publicly available Water Bureau reports and presentations;
- Publicly available information from the City of Portland;
- Interviews with Water Bureau officials and contractors; and
- Publicly available literature and other sources.



The Economic Contributions and Benefits of the Bull Run Treatment Projects

Jobs, Income, and Economic Activity Impacts

The Bull Run Treatment Projects, including the filtration facility, filtration pipelines, and ICCT Project, will cost approximately \$840 million (in 2019 dollars) to construct. An investment of this size will support more than 4,600 jobs and \$1.59 billion in total economic activity in the Portland metropolitan area. After the projects are complete, annual operations spending will continue to support jobs and economic activity in the region. All calculations and results are separated into the two phases of the project: 1) Planning, Design, and Construction, and 2) Operations.

Methodology

To calculate the total economic contribution that the Bull Run Treatment Projects will have in the regional economy this analysis applied the 2018 version of IMPLAN, an input-output model.¹ Input-output models are mathematical representations of the economy that show how different industries or sectors are linked to one another.

The total economic contribution of the Bull Run Treatment Projects is the sum of the direct impacts from the businesses and employees supported by spending on the project and the secondary impacts (indirect and induced) that are created when the direct economic activity recirculates through the economy. How direct impacts create secondary impacts from this

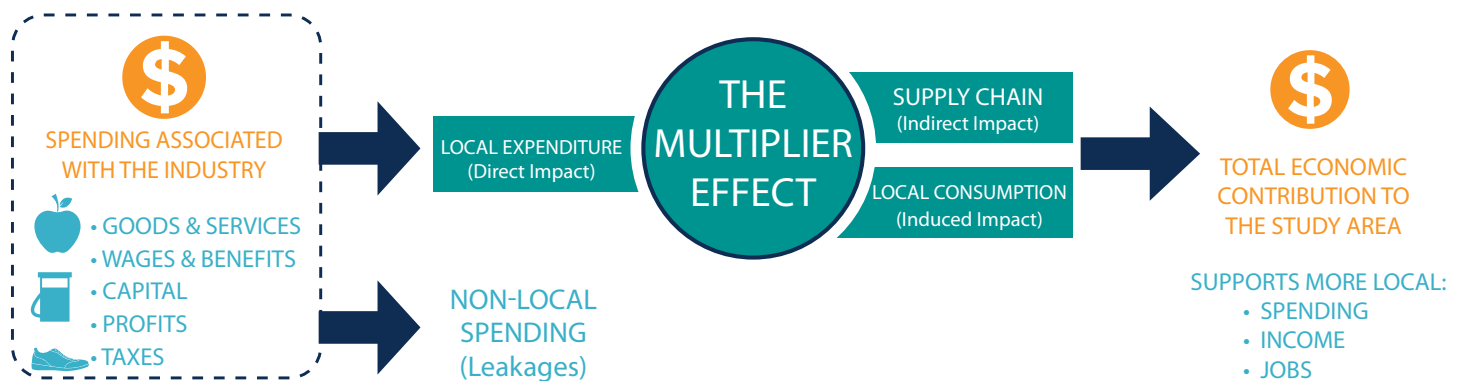
recirculation of spending is referred to as **the multiplier effect** (Figure 3).

Definitions

There are specific terms associated with input-output modeling. Relevant terms that we use are defined below.

- **Direct Impacts** are the jobs, income, and economic activity associated with the local expenditures for the Bull Run Treatment Projects. These are typically described as the “inputs” to the model. Examples of direct effects includes the spending on people, time, and materials to build and operate the Filtration Project and ICCT Project.
- **Secondary Impacts** are the combination of indirect and induced impacts (see definitions below).
 - **Indirect (Supply Chain) Impacts** are the economic effects supported by the purchase of goods and services in the study region. When demand for goods and services increases, businesses may purchase more goods and hire additional staff to meet this increased demand. These are typically referred to as “supply chain effects”.
 - **Induced (Consumption) Impacts** are the changes in regional household spending patterns caused by changes in household income. For example, employees in the industries that experience increased economic activity from spending to construct the Bull Run Treatment Projects

Figure 3 | Pathways to Calculate Total Economic Contribution



Source: Created by ECONorthwest

Technical Note

All information regarding projects plans, spending, and timelines presented in this report are current as of October 2020. Dollar values are as of 2020 without inflation or discounting. Changes to these factors will result in corresponding changes to the results of this analysis.

¹ The term “economic contribution” is used throughout this memo to indicate that the analysis is quantifying the gross effects on the economy resulting from the Bull Run Treatment Projects and not net effects (“economic impact”). A net effect economic impact analysis would compare the economic activity resulting from the Bull Run Treatment Projects with the alternative uses of the funds, which is beyond the scope of this analysis.

Economic Contribution

The Economic Contributions and Benefits of the Bull Run Treatment Projects

may increase their household spending, leading to further economic activity. These are typically referred to as “consumption effects”.

- **Total Impacts** are the sum of direct and secondary impacts.

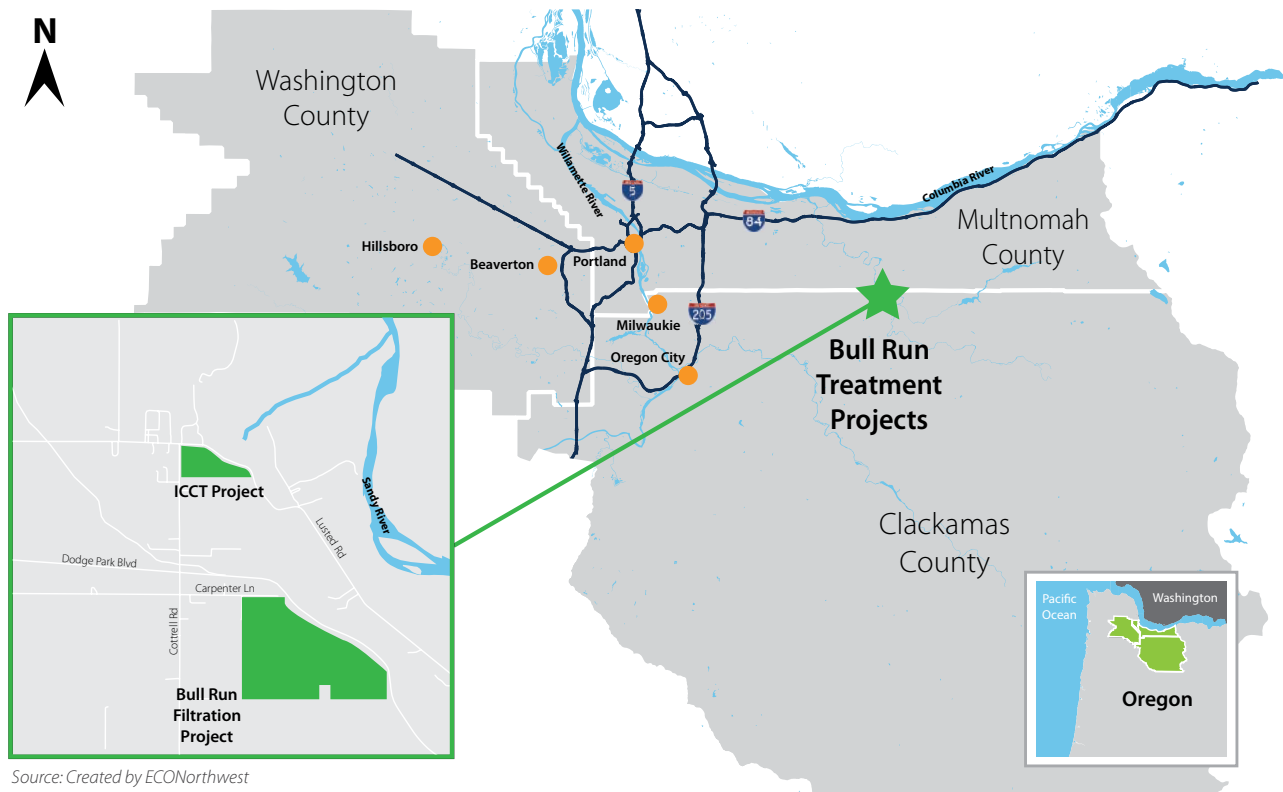
These impacts are measured in terms of output, labor income, jobs, and the multiplier effect.

- **Output** represents the total value of all goods and services produced from an action and is the broadest measure of economic activity. It is a measure of all the spending that occurs, and does not deduct the cost of intermediate inputs, such as the costs of energy, materials, labor, etc. The total output impact is also referred to as the total economic contribution of the project.
- **Labor Income** consists of employee compensation and proprietor income. This includes workers’ wages and salaries, as well as other benefits such as health, disability, and life insurance, retirement payments, and non-cash compensation.

- **Jobs** is the measure of employment which is expressed in terms of full-year-equivalents (FYE). One FYE job equals work over 12 months in an industry.² A FYE job can be full-time or part-time, seasonal or permanent, and two jobs that each last six months would together count as one FYE job.³ IMPLAN is not designed to calculate jobs over a multi-year period. Jobs are expressed on an annual basis and need to be considered carefully if they are associated with multi-year spending, like in the case of this analysis.

- **The Multiplier** measures the strength of the multiplier effect at creating secondary impacts from direct impacts. The multiplier is calculated as the ratio of the total output compared to the direct impact. The multiplier describes how funds recirculate and multiply throughout a local economy until they are exhausted by leaving the study area or through savings or taxes. The multiplier will be largest for projects that spend a higher proportion of dollars locally.⁴

Figure 4 | Tri-County Study Area and Location of Bull Run Filtration Projects



Source: Created by ECONorthwest

² This measure of jobs is the same method used for the Bureau of Economic Analysis Regional Economic Accounts (BEA REA) and Bureau of Labor Statistics Census of Employment and Wages (BLS CEW) data.

³ The FYE job definition is not the same as full-time equivalent (FTE) definition nor is it the same as the number of employees. One FTE job represents full-time work for one position over an entire year. One FYE job could be part time or full-time work for one position over an entire year.

⁴ Because the strength of the multiplier effect depends on the definition of the study area, multiplier effects will be larger for larger study areas. For example, multipliers for states are larger than those for counties. Multipliers are also generally larger for service based industries that have a larger share of spending on employee wages rather than capital expenses like equipment because employees are more likely to continue spending in the local economy while large equipment purchases often are sourced from outside the local economy.

The Economic Contributions and Benefits of the Bull Run Treatment Projects

Study Area

Input-output models like IMPLAN require a clearly defined study area. For purposes of this analysis, the study area consists of Multnomah, Clackamas, and Washington counties (Figure 4). This tri-county region was selected because it represents the regional economy of interest — this area roughly corresponds to the service area for the Water Bureau and is the source of a large portion of the labor force and supplies that will be used for the Bull Run Treatment Projects.

Inputs for the Analysis

The inputs for this analysis are based on information obtained directly from the Water Bureau and Brown and Caldwell, the program management consultant for the Bull Run Treatment Projects, or calculated directly by IMPLAN based on spending levels. See the Technical Appendix for additional information about the inputs to this analysis.

Results

Planning, design, and construction of the Bull Run Treatment Projects will benefit communities throughout the Portland metropolitan area until approximately 2028. After this initial infusion of large economic activity, the Bull Run Treatment Projects will continue to support economic activity in the region, although at a lower level, through ongoing investments in

operations of the facilities (i.e., operations labor, expenses for water treatment chemicals).

Planning, Design, and Construction Period

Total Economic Contribution (All Years)

The estimated \$840 million (in 2019 dollars) that will be spent during planning, design, and construction will result in approximately \$732.8 million that will remain within the tri-county study area. The direct effect of that \$732.8 million will result in multiplier effects throughout the study area as the funds recirculate through the local economy. The average output multiplier for the Bull Run Treatment Projects is 2.17, a value that is consistent with other large infrastructure projects.

Considering direct and secondary impacts, **the total economic contribution to the tri-county study area is more than \$1.59 billion in output** over the approximately 10-year Planning, Design, and Construction Period (Table 1).

Annual Economic Contributions

The results in Table 1 represent the impacts across the 10-year Planning, Design, and Construction Period. To understand the average annual economic contributions requires calculating the annual average based on the years of spending for each period. Using this normalized calculation, the average annual direct

Table 1 | Output (All Years) — Planning, Design and Construction Period

	Direct Output	Indirect & Induced Output	Total Output	Output Multiplier
City Services	\$11.0 million	\$9.3 million	\$20.3 million	1.84
Program Management	\$22.6 million	\$22.2 million	\$44.8 million	1.98
Design	\$27.5 million	\$26.0 million	\$53.5 million	1.94
Construction	\$671.6 million	\$802.1 million	\$1,473.7 million	2.19
Total	\$732.8 million	\$859.6 million	\$1,592.3 million	2.17

Source: Created by ECONorthwest with information from Portland Water Bureau and calculations from IMPLAN

Table 2 | Average Annual Output — Planning, Design and Construction Period

	Active Years Estimate	Direct Output	Total Output
City Services	8	\$1.4 million	\$2.5 million
Program Management	8	\$2.8 million	\$5.6 million
Design	9	\$3.1 million	\$5.9 million
Construction	6	\$111.9 million	\$245.6 million
Total		\$119.2 million	\$259.7 million

Source: Created by ECONorthwest with information from Portland Water Bureau and calculations from IMPLAN

⁵ IMPLAN 2018 data for total output for the tri-county study area region.

Economic Contribution

The Economic Contributions and Benefits of the Bull Run Treatment Projects

output is approximately \$119.2 million per year and average annual total output is approximately \$259.7 million per year (Table 2). For comparison, the annual output for the tri-county study area is \$244.18 billion.⁵ This suggests that the annual economic contribution from the Bull Run Treatment Projects during the Planning, Design, and Construction Period will be equal to approximately 0.11 percent of the current total annual economic output for the region.

Jobs and Labor Income

Approximately 2,880 direct jobs will be supported through the Planning, Design, and Construction Period — the majority of which are in the construction industry. Some jobs will be filled by short-term, temporary workers who perform a very specific job on one of the construction sites. Other jobs will be held by workers who are on the project for the majority of the 10-year period. The Planning, Design, and Construction Period will support approximately 4,600 jobs in the tri-county area via secondary impacts (Table 3). In total, these jobs will support total labor income of \$969.9 million, consisting of both employee wages as well as proprietor income, over the 10-year period.

Note | Job Estimates

Other methods are used for projects like these to get general scale-level job estimates. For example, the EPA calculates job creation using empirical data from its previously funded WIFIA projects and estimates at least 4,745 jobs would be supported by the Bull Run Treatment Projects.⁶ In contrast, a recently published report from the American Water Works Association suggests that these projects would create or sustain over 12,500 jobs.⁷ These examples are included to demonstrate the ways in which jobs generated from projects can vary depending on the specific timeline, labor and capital mix, spending profile, geographic differences, as well as other project considerations.

Operations Period

Operations of the Bull Run Treatment Projects includes annual operations spending for the filtration facility and the ICCT facility. For purposes of this report, it was assumed that there will be no

Table 3 | Jobs and Labor Income Estimate — Planning, Design, and Construction Period (All Years)

	Direct Jobs	Total Jobs	Direct Labor Income	Total Labor Income
City Services	2	9	\$7.8 million	\$11.1 million
Program Management	21	39	\$18.6 million	\$26.6 million
Design	27	87	\$19.6 million	\$29.1 million
Construction	2,832	4,497	\$619.9 million	\$903.0 million
Total	2,882	4,632	\$665.9 million	\$969.9 million

Source: Created by ECONorthwest with information from Portland Water Bureau and calculations from IMPLAN.

Note: Jobs represent the total jobs over the construction period measured in FYE and include a combination of full-time and part-time workers. For more information about job estimates, please consult the Technical Appendix.

Table 4 | Average Annual Output Impact — Operations Period

	Direct Local Annual Operations Spending	Indirect & Induced Output	Total Output	Output Multiplier
Operations	\$8.1 million	\$6.8 million	\$14.9 million	1.84

Source: Created by ECONorthwest with information from Portland Water Bureau and calculations from IMPLAN.

Note: Calculated in IMPLAN using industry code 49 – Water sewage and other systems.

Table 5 | Average Annual Jobs and Labor Income Impacts — Operations Period

	Direct Jobs	Total Jobs	Direct Labor Income	Total Labor Income
Operations	13	53	\$5.6 million	\$8.0 million

Source: Created by ECONorthwest with information from Portland Water Bureau and calculations from IMPLAN.

⁶ Information provided by Portland Water Bureau based on email from U.S. Environmental Protection Agency “WIFIA Credit Program” on June 16, 2020.

⁷ American Water Works Association and Association of Metropolitan Water Agencies. (2020). *The Financial Impact of the COVID-19 Crisis on U.S. drinking Water Utilities*. April 14.

The Economic Contributions and Benefits of the Bull Run Treatment Projects

annual operations expense for the pipelines. There will also be maintenance costs associated with the facilities and pipelines, which will also generate economic activity, but are not included in these estimates. Of the annual operations expense of \$13.7 million, approximately \$8.1 million will be spent in the tri-county region on materials or services to operate the facilities (Table 4).

Based on the Water Bureau estimates, 10 to 13 full-time jobs will be supported at the new filtration and corrosion control facilities per year. Some of these positions are existing full-time jobs that will be shifted to operate the new facilities. These jobs are then estimated to support another 40 jobs in the local regional economy through secondary effects for a total of 53 jobs supported in the study area each year. The annual operations expense of \$13.7 million supports is \$5.6 million per year in direct labor income. With secondary effects, the total labor income supported each year will be approximately \$8.0 million per year (Table 5).

Distribution of Impacts

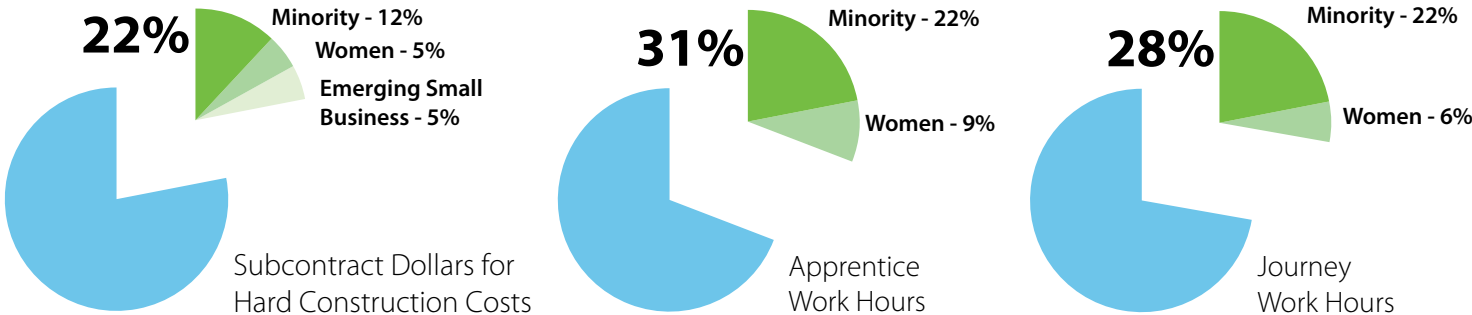
The impacts for both the Planning, Design, and Construction and the Operations Periods include only effects to the tri-county study area. The types of firms that are likely to benefit from increased jobs, labor income, and economic activity can be assessed by evaluating contracting requirements. The Water Bureau has contracting initiatives that benefit COBID-certified Minority-Owned Business Enterprises, Women-Owned Business Enterprises, Disadvantaged Business Enterprises, Service-Disabled Veteran Owned Businesses, and Emerging Small Businesses.

The City of Portland has Contracting Social Equity Initiatives that apply to different projects depending on contract type (i.e., construction, Professional Technical and Expert Services) as well as contract value.⁸



- The **Community Benefits Agreement (CBA)** guides contracting decisions for large Construction Manager/General Contractor (CM/GC) delivery construction projects — the CBA has been in place since 2017. Based on the CM/GC delivery and contract size, the CBA will govern construction of the Filtration Project. Figure 5 summarizes the contracting and workforce equity commitments within the CBA for construction contracts.
- The **Community Equity and Inclusion Program (CEIP)** applies to smaller CM/GC delivery construction contracts. The CEIP is applicable to the ICCT Project construction contract.
- The **Community Opportunities and Enhancement Program (COEP)** requires 1 percent of public improvement contract funding be collected and used for workforce development and technical assistance to increase contractor diversity. COEP applies to the construction contracts for the Filtration Project and ICCT Project.
- The **Subcontractor Equity Plan (SEP)** requires 20 percent or more of contract values to flow to COBID-certified

Figure 5 | Community Benefits Agreement Contracting and Workforce Equity Commitments for Construction Contracts



Source: Created based on information from City of Portland Community Benefits Agreement

⁸ More information about City of Portland Contracting Social Equity Initiatives by project size can be found at: <https://www.portlandoregon.gov/brfs/article/732965>

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subcontractors. The Professional Technical and Expert services contracts for design and program management apply the SEP utilization goals.

A summary of the applicable contracting initiatives for each of the contracts and the extent to which they are being met for the Bull Run Treatment Projects is detailed in Table 6.

The purpose of these programs is to ensure that spending on these projects flows to groups that have historically been under-included, including minorities, women, service-disabled veterans, and others. These agreements specify the amounts of project spending that need to flow to certified firms. Currently, contracting requirements have been settled for the planning and design phases of the project, but contracting is not yet finalized for the facility and pipeline construction (as of the writing of this report).

The Bull Run Treatment Projects embrace equity and will meet or exceed all requirements. As a result, the specific expected distributional impacts of the projects include the following features:

- Construction for the Filtration Project will deliver at least \$100 million in contracts to COBID-certified Minority-Owned, Women-Owned, Service-Disabled-Veteran-Owned, and

Emerging Small Businesses, exceeding the 22 percent requirement from the CBA.

- The ICCT Project commits 26 percent of hard construction costs — more than \$2 million — to COBID certified firms, exceeding the 22 percent requirement from the CEIP.



Table 6 | Contracting Requirements Associated with the Bull Run Treatment Projects

Contract	Applicable Contracting Initiatives	Minimum Requirements	Contract Details
Program Management	<ul style="list-style-type: none"> SEP 	20% or more to COBID-certified subcontractors	Exceeded: 22.7% to COBID-certified subcontractors
Design (Filtration Facility and Pipelines)	<ul style="list-style-type: none"> SEP 	20% or more to COBID-certified subcontractors	Exceeded: 20.2% for filtration facility design and 20.9% for pipeline design to COBID-certified subcontractors
Construction (Filtration Facility and Pipelines)	<ul style="list-style-type: none"> CBA COEP 	22% or more of hard construction costs to COBID-certified subcontractors 31% of apprentice-level and 28% of journey-level labor hours to minorities and women 1% invested in COEP	Will be met
Construction (ICCT Project)	<ul style="list-style-type: none"> COEP CEIP 	22% or more of hard construction costs to COBID-certified subcontractors 31% of apprentice-level and 28% of journey-level labor hours to minorities and women 1% invested in COEP	Exceeded: 26% to COBID-certified subcontractors; 31% of apprentice-level and 28% of journey-level labor hours to minorities and women

Source: Created by ECONorthwest with information from Portland Water Bureau and Nicki Pozos from The Formation Lab

The Economic Contributions and Benefits of the Bull Run Treatment Projects

Improving water system resilience is one of the greatest benefits of the Bull Run Treatment Projects. Although the Bull Run Watershed is a high-quality raw water source, the Filtration Project and ICCT Project will increase the reliability of the system and better protect the quality of the water supplied to Water Bureau customers.

The Oregon Resilience Plan identifies drinking water as a critical service that should be prioritized for restoration after a hazardous event, such as an earthquake.⁹ The status as a critical service highlights the importance of investments in a more resilient water system. A disruption in service would impose costs to residents and businesses and increase public health risk. Potential boil water notices also impose costs on water users and increase public health risk.

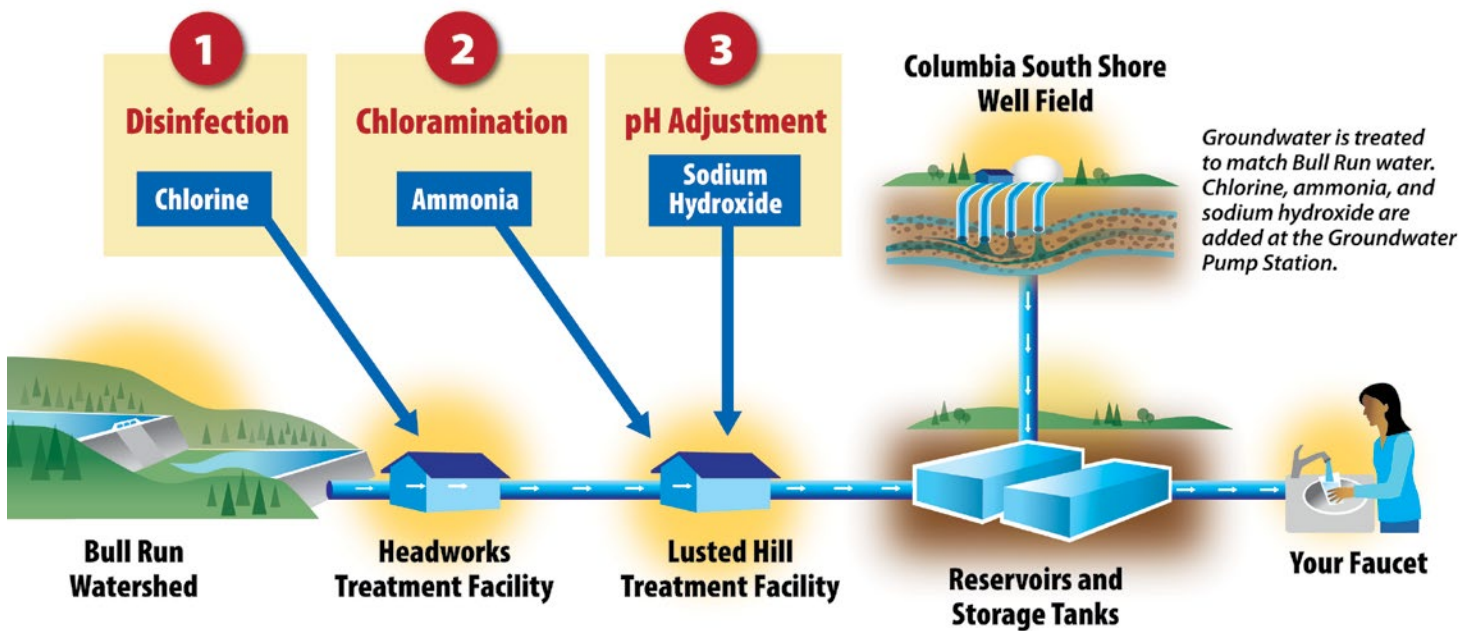
A 2017 study estimated that a two-day system-wide boil water notice affecting all Water Bureau customers would cost households approximately \$14 million dollars (2021 dollars) and more than \$3.8 million in economic activity for the food-service sector alone (2021 dollars). Many other businesses, particularly the manufacturing sector, would also face added costs and potential disruptions.¹⁰

With filtration, the Bull Run water system will recover more quickly from events such as turbidity resulting from wildfires, earthquakes, landslides, or heavy storms — minimizing or potentially avoiding service disruptions and boil water notices.

Current Conditions

The Water Bureau recorded water quality data in the Bull Run surface water supply from 2007 to 2018 including pH, turbidity, and the concentration of metals, nutrients, algae, and bacteria.¹¹ They found that the conditions of raw water vary immensely based on seasonal events. In the warmer summer months (with temperature-induced stratification), iron and manganese levels increase (concentration increases with water depth). Surface algal blooms are also typically more concentrated in the summer. During the fall, increased rain and leaf shedding increases the amount of total organic carbon at the intake. Although the current treatment system of disinfection, chloramination (i.e., chlorine treatment), and pH treatment (Figure 6) can treat for many of these water quality changes, filtration will provide more consistent water quality and added resilience to the system, especially related to turbidity.

Figure 6 | Water Bureau Current Methods of Source Water Treatment



Source: Portland Water Bureau, Source Water Treatment: <https://www.portlandoregon.gov/water/70284>

⁹ Oregon Seismic Safety Policy Advisory Commission (OSSPAC). (2013). *The Oregon Resilience Plan: Reducing Risk and Improving Recovery for the Next Cascadia Earthquake and Tsunami*. https://www.oregon.gov/oem/documents/oregon_resilience_plan_final.pdf

¹⁰ ECONorthwest. (2017). *Economic Effects of a 2-Day and 2-Week Boil Water Notice*. https://www.portland.gov/sites/default/files/2021/econw_economic-effects-bwn_final_2017-1025.pdf

¹¹ Portland Water Bureau and Brown and Caldwell. (2020). *Project Definition Report - Bull Run Treatment Projects: Filtration*. <https://www.portlandoregon.gov/water/article/757955>.

System Resilience Benefits

The Economic Contributions and Benefits of the Bull Run Treatment Projects

Resilience to System Disruptions with Filtration

System disruption events tend to be natural phenomena, such as wildfires, algal blooms, and earthquakes, that can over stress the existing supply system and lead to temporary shutdowns. With the implementation of a filtration facility and maintenance of the multiple source strategy, the water system will be better equipped to address these disruptions.

The Water Bureau operates a multiple-source water system — the two primary sources of water are the Bull Run Watershed surface water source and the CSSWF groundwater source. Historically, the Bull Run Watershed has been the region's primary water source and the CSSWF has been a secondary supply. The CSSWF is sometimes used after storms or other events that cause high turbidity or other water quality limited conditions within the Bull Run Watershed. The CSSWF is also used as a supplemental supply during high demand summer months. However, the CSSWF supply is only half the capacity of the Bull Run supply — the CSSWF alone would not be able to meet the region's needs during the summer.

The CSSWF groundwater and Bull Run surface water sources have different risks and considerations. While the Bull Run is sensitive to water quality changes from storms, landslides, wildfires, and algal blooms, the CSSWF has naturally occurring manganese, is located in soils susceptible to seismic deformation, and has high pumping costs.

Without filtration, the Water Bureau has needed to switch to groundwater during high turbidity events. With filtration, the Bull Run water supply can be used even when turbidity levels are high in the raw water, reducing the need to make supply changes.



¹² Portland Water Bureau and Brown and Caldwell. (2020). Project Definition Report. Pg. 3-24.

¹³ U.S. Environmental Protection Agency. (2017). *National Aquatic Resource Surveys, Indicators: Phosphorus*. <https://www.epa.gov/national-aquatic-resource-surveys/indicators-phosphorus>

Turbidity Events

Turbidity is one of the highest priority water quality impact scenarios the filtration facility is designed to address. The suspended particulate matter in turbid water leads to both aesthetic and potentially health-related problems.

Turbidity is measured in nephelometric turbidity units (NTU), a measure of the scattered light through a sample. Over the past decade, the average turbidity at the intake has been 0.6 NTU with a maximum measure of 25 NTU.¹² A measure of over 5 NTU triggers a shutdown event where service is suspended, and groundwater is supplied instead. Since 1986, there have been 10 shutdowns due to turbidity that resulted in four to 19 days of groundwater use.

Turbidity can result from many of the disruption events below, including wildfires, landslides, earthquakes, and heavy storms. **Because the filtration facility will treat the water for turbidity, Water Bureau customers will benefit from a more consistent and reliable supply during and after these events.**

Wildfire

Wildfires can deposit debris into surface water, as ash and organic matter collect into the water supply. These deposits not only lead to turbidity problems, but also alter the nutrients in a burned watershed, increasing the concentration of both nitrogen and phosphorus. Wildfires can also increase the risk of landslides that can lead to sedimentation and turbidity in the water supply. Phosphorus is the limiting nutrient in the Bull Run Watershed, meaning that this nutrient controls the production of aquatic plant growth.¹³ As a result, increasing the concentration of phosphorus can speed the development of harmful algal blooms, the effects of which are discussed in the following section of this report.

Wildfire has never been a direct cause for a Bull Run system shutdown. **However, as climate change increases the frequency of unconstrained fires in the Pacific Northwest, protecting water sources is an important consideration.** Filtration will enhance resilience to sediment and turbidity in the system in the case of a wildfire.

Earthquakes and Landslides

Like wildfires, earthquakes and landslides result in increased turbidity in water. Earthquakes shake the ground and shift the existing landscape, leading to turbidity in water sources and even

The Economic Contributions and Benefits of the Bull Run Treatment Projects

the disappearance of some streams and springs and the creation of new ones.¹⁴ The CSSWF groundwater system is in an area that has a high susceptibility to permanent ground deformation, meaning it may not be usable during and after an earthquake.¹⁵ The filtration facility will be designed to be seismically resilient and could become the sole water source if groundwater supplies are compromised.

Earthquakes have impacted the region before. In the past 30 years, the Portland region has experienced two major earthquakes greater than a 5.0 rating.¹⁶ There is also the looming threat of a Cascadia subduction zone earthquake that would have catastrophic impacts. An eruption on Mt. Hood is also a serious threat. Although Mt. Hood does not have a history of eruption (the last eruption was in the 1790s), its proximity to the Bull Run Watershed gives cause for concern.¹⁷

Even a minor earthquake can cause landslides and flooding that can deposit sediment and contaminants into surface water sources. These events would also lead to water quality concerns like turbidity that cannot be addressed in the current Water Bureau treatment system, but would be treated with filtration.

The Filtration Project will allow for continuous operation during and after most flooding events and will make the system more resilient to small landslides.¹⁸

Algal Blooms

Algae that is sometimes present in low quantities in the Bull Run Watershed can potentially pose a health risk to humans, pets, and local ecosystems, and change the taste and odor of water. The most harmful algae have the potential to release cyanotoxins. The Water Bureau has not detected the algal species associated with cyanotoxins at high enough levels to cause any impact but increases in phosphorus and nitrogen increase the risk of their growth.¹⁹

The Water Bureau currently manages the Bull Run system for algae by adjusting the level of water intakes, which can limit operational flexibility. Algae or other organic matter that enters



the system is currently treated with disinfectant, which can result in the formation of disinfection byproducts, such as trihalomethanes and haloacetic acids, in the finished water. Although chlorine treatment would still occur with the filtration facility, filtration physically removes algae and other organic matter from the raw water before disinfection. As a result, filtration will improve the Water Bureau's ability to regulate the amount of disinfection byproducts produced.²⁰ Filtration also better positions the system to protect against harmful algal blooms, should they become a concern in the Bull Run Watershed.

Climate Change

Climate change is expected to increase the risk of wildfire, the intensity and frequency of storms, and air and water temperatures.²¹ These phenomena are likely to increase water quality risks within the Bull Run Watershed. Extreme weather events may also result in more frequent flooding and landslides. Warmer air temperatures and drought conditions are anticipated to increase wildfire risk. There is potential for changing environmental factors or regulations that the Water Bureau may have to react to in the future. As such, **the benefits of the Filtration Project will likely be even greater in the future as the need for protecting water quality increases.**

¹⁴ Sneed, M., Galloway, D. L., & Cunningham, W. L. (2003). *Earthquakes: Rattling the Earth's Plumbing System* (pp. 1-5). US Department of the Interior, US Geological Survey. <https://pubs.usgs.gov/fs/fs-096-03/>

¹⁵ Lombard, C. (2020). Personal communication [Video Call]. August 12.

¹⁶ Cascadia Region Earthquake Workgroup, *History of Earthquakes in Cascadia*. <https://crew.org/earthquake-information/history-of-earthquakes-in-cascadia/>

¹⁷ Gardner, C. A., Scott, W. E., Major, J. J., & Pierson, T. C. (2000). Mount Hood-history and hazards of Oregon's most recently active volcano (No. 060-00). US Geological Survey. <https://pubs.usgs.gov/fs/2000/fs060-00/>

¹⁸ Portland Water Bureau and Brown and Caldwell. (2020). Project Definition Report. Pg. 4-29.

¹⁹ Portland Water Bureau and Brown and Caldwell. (2020). Project Definition Report. Pg. 6-4 and 3-34.

²⁰ Thompson, J. (2017). "CUB's resolution amendment to address Oregon Health Authority (OHA) revocation of *Cryptosporidium* treatment waiver". Oregon Citizen's Utility Board.

²¹ Mote, P.W., J. Abatzoglou, K.D. Dello, K. Hegewisch, and D.E. Rupp. (2019). *Fourth Oregon Climate Assessment Report*. Oregon Climate Change Research Institute. ocri.net/ocar4.

Community Benefits

The Economic Contributions and Benefits of the Bull Run Treatment Projects

This section includes other benefits that flow to the Portland metropolitan area and Water Bureau customers from the Bull Run Treatment Projects, including benefits from compliance with EPA regulations and public health benefits from higher water quality. This section also discusses potential educational benefits to visitors and the design considerations associated with the filtration facility.

Compliance Benefits

The primary reason for the Filtration Project is to protect public health and meet the LT2 rule for *Cryptosporidium* treatment. Similarly, the ICCT Project will protect public health and comply with the LCR.

LT2 Compliance

If the Water Bureau does not comply with the LT2 Rule requirements by September 2027, it faces fines and other regulatory actions. Non-compliance would also risk relinquishing control to state or federal authorities, which would then mean mandatory upgrades without considering other benefits and costs of capital improvements as they relate to the entire distribution system. The Water Bureau also faces potential public lawsuits if they do not make the required upgrades.

By making investments now, the Water Bureau is not only addressing the current need to treat for *Cryptosporidium*, but is also creating the infrastructure needed to address potential future water quality requirements. This reduced risk of future costs due to unmet compliance requirements will result in cost savings if future investments are avoided because they can be addressed by the upgrades associated with the Filtration Project or ICCT Project.

Lead and Copper Rule Compliance

The Water Bureau's existing corrosion control treatment increases the pH of the Bull Run supply to approximately 8.2 through the addition of sodium hydroxide. This treatment approach has not consistently kept the Water Bureau below the regulated action level of the LCR. The ICCT Project will allow the Water Bureau to increase both the alkalinity and pH of water delivered to customers. This treatment approach will reduce the corrosiveness of the water to lead and metals found in some home and building plumbing. As a result, there will be fewer instances of exceedances. Exceedances can trigger compliance actions such

as water quality monitoring, corrosion control treatment, and source water monitoring or treatment. Accordingly, reducing exceedances will reduce compliance requirements for the Water Bureau, as well as improve public health.

Health Benefits

The health benefits from the Bull Run Treatment Projects come from two primary sources:

1. Filtration of the Bull Run water supply to decrease the risk of *Cryptosporidium*.
2. Improved corrosion control to decrease the risk of lead, copper, and other metals leaching into household water from household pipes.

Filtration Health Benefits

The primary purpose of the Filtration Project is to reduce the risk of *Cryptosporidium* in the Bull Run drinking water supply. *Cryptosporidium* is a parasite that causes gastrointestinal illnesses that sometimes lead to more serious complications. Reducing the risk of contamination results in avoided illnesses and health costs for Water Bureau customers.

Case Study | Milwaukee

An analysis of a 1993 outbreak of *Cryptosporidium* in Milwaukee calculated over \$96.2 million in both medical and lost productivity costs.²² This cost amount does not consider litigation costs, the cost of preventive measures (e.g., switching to bottled water), intangible costs associated with pain and suffering, or the cost to the local, state, and federal government to investigate and control the outbreak.

The costs of not treating for *Cryptosporidium* are most likely to fall on individuals with weakened immune systems, those with inadequate health care coverage, and low-income residents within the Water Bureau service area. Accordingly, these are the individuals most likely to benefit from water treatment upgrades. Individuals with weakened immune systems, children, and pregnant women are most likely to develop more serious symptoms if they become infected with *Cryptosporidium*.²³ People

²² Corso, P. S., Kramer, M. H., Blair, K. A., Addiss, D. G., Davis, J. P., & Haddix, A. C. (2003). Costs of Illness in the 1993 Waterborne *Cryptosporidium* Outbreak, Milwaukee, Wisconsin. *Emerging Infectious Diseases*, 9(4), 426-431.

²³ Centers for Disease Control. *Cryptosporidium; General Information for the Public*. Available at: <https://www.cdc.gov/parasites/crypto/general-info.html>

The Economic Contributions and Benefits of the Bull Run Treatment Projects

who lack health insurance and paid sick leave could experience additional costs compared with those who do have these resources. Even if they are not infected, low-income residents could experience a larger financial hardship from purchasing bottled water in the event of a boil water notice related to a *Cryptosporidium* outbreak.^{24,25} In 2019, the Water Bureau conducted focus groups and found that low-income customers are more worried about water quality than the general customer population.²⁶

ICCT Health Benefits

The ICCT Project will adjust the chemistry of the water to further reduce the amount of lead that leaches from some home and building plumbing into the drinking water and to maintain compliance with the LCR.

Reducing the corrosiveness of the water will especially benefit residents in homes with plumbing and fixtures containing lead. Lead and heavy metal leaching from these fixtures are associated with a variety of effects that have severe implications for children and adults.²⁷ There is no safe exposure level for lead. It is a highly toxic contaminant that can damage neurological, cardiovascular, immunological, and developmental systems — particularly in children.²⁸

Nationally, the homes that are exposed to lead are disproportionately inhabited by low-income and minority populations.²⁹ Reducing risk from lead is a particular consideration for renters, who are less likely to have control over their plumbing fixtures. Homeowners or renters who are exposed to lead are likely to purchase bottled water, which burdens these community members with additional costs beyond health care.

Benefits to Businesses

Many businesses within the Water Bureau service area depend on consistent, high-quality water as inputs to their processes. Currently, when the Water Bureau switches from the Bull Run supply to the CSSWF groundwater supply, they notify select businesses so that they can adapt operations accordingly.

These businesses include dialysis clinics, hospitals, beverage manufacturing and bottlers, microchip companies, and other business customers sensitive to water quality changes. Although the filtration facility may not reduce the need to use the CSSWF during the summer months to supplement supply, it may reduce the instances of switching water sources after events that influence water quality. Maintaining a consistent water supply will benefit the businesses that are sensitive to water supply changes.

Communication with businesses indicates that the primary savings will be from decreased maintenance costs to clean sediment from pipes, lower risk for waterborne pathogens, and reduced need for additional water to clean their own filtration systems. **One manufacturing customer indicated that they could save as much as \$50,000 per year if filtration reduces the amount of water they need to clean their internal filtration system to remove solids and turbidity.** Another business indicated that the primary benefit of filtration will be the improved consistency of the water quality and the potential for deferred future investments in their own filtration system. Flushing pipes as part of the Bull Run Treatment Projects and Water Bureau operations will also benefit water-quality sensitive businesses.



²⁴ The CDC notes that susceptible populations to drinking water advisories include “Persons with low income; persons who may lack the resources to act on an advisory; or persons who may lack the awareness of a possible threat to their health and their family’s well-being.” Centers for Disease Control and Prevention. (2013). *Drinking water advisory communication toolbox*. U.S. Department of Health and Human Services, Centers for Disease Control, U.S. Environmental Protection Agency, American Water Works Association, Washington, DC.

²⁵ Centers for Disease Control and Prevention. (2013). *Drinking Water Advisory Communication Toolbox*. U.S. Department of Health and Human Services, Centers for Disease Control, U.S. Environmental Protection Agency, American Water Works Association, Washington, DC.

²⁶ Consumer Opinion Services. (2019). *Bull Run Treatment Projects Focus Groups: February 13 & 16, 2019 with Portland Water Bureau Customers*. Prepared for Portland Water Bureau and Barney & Worth.

²⁷ U.S. Environmental Protection Agency. (2017). *Basic Information about Lead in Drinking Water*. July 7. Available at: <https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water#:~:text=Adults%20exposed%20to%20lead%20can,in%20both%20men%20and%20women>

²⁸ U.S. Environmental Protection Agency. (2013). *Integrated Science Assessment for Lead*. Office of Research and Development and National Center for Environmental Assessment, Research Triangle Park, NC.

²⁹ Abt Associates. (2019). *Environmental Justice Analysis for the Proposed Lead and Copper Rule Revisions*. Prepared for the U.S. Environmental Protection Agency.

Community Benefits

The Economic Contributions and Benefits of the Bull Run Treatment Projects

The quality and abundance of Portland's water relative to other areas may be a driver for why businesses choose to locate in the region to begin with — and water quality will be even more consistent with filtration.

Water Bureau | Business interviews

Water Bureau has interviewed businesses in the community to understand how they rely on clean and consistent water quality. The below excerpts demonstrate the value of access to clean water for the business community.

"We really rely on having clean fresh water every day ... it is used for almost every single process in the brewing industry."

— Madeline McCarthy, Von Ebert Brewing

"Throughout the day, it is very important because we use water in everything we do ... without water we couldn't have a business."

— Fernando Rodriguez, Fernando's Alegria

"From Gravy's signature sauces, to our coffee, to our Bloody Marys — Portland water is at the heart of my business success."

— Mark Greco, Gravy restaurant



learning can increase student interest, knowledge, motivation, and even influence their adult careers.³² The impacts from these educational experiences can be even more pronounced for certain students, including minority students, low-income students, and students from rural areas.³³

Building Design

The City of Portland's Green Building Policy stipulates that all new, City-owned buildings will incorporate sustainable features. It also outlines specific minimum baselines that will need to be considered during design.³⁴ The occupied portions of the filtration facility will meet or exceed these standards and will be developed as a LEED Gold facility. LEED certified facilities use sustainable construction materials and are designed for efficient energy use, among other design considerations.

The Water Bureau has been working with a Site Advisory Group to develop a Good Neighbor Agreement for the filtration facility. The Site Advisory Group is comprised of adjacent property owners, farm operators, a local school representative, an area water utility, environmental organizations, and others. The group was formed to foster open communication by identifying and resolving community concerns early in the project. ***The Good Neighbor Agreement is intended to be used by the designer to ensure the filtration facility is well adapted to its rural setting.*** The facility will be designed to blend in with the surrounding environment. The Good Neighbor Agreement is anticipated to be completed in June 2021.

Educational Benefits

The Water Bureau is aware of its unique position to provide educational opportunities to the region it serves. Currently, the Water Bureau provides educational tours to teach students and the general public about drinking water treatment processes at Bull Run Dam at Headworks.³⁰ Educational tours of the working filtration facility are possible once it is fully operational.

Educational tours and field trips like the ones that could be offered at the filtration facility have been shown to have lasting impacts on the participants, many of whom can recall and retain information about the experience years afterwards.³¹ Experiential

³⁰ Portland Water Bureau and the U.S. Forest Service. (2017). *Bull Run Watershed Management Unit Annual Report*. April. Retrieved from: <https://www.portlandoregon.gov/water/article/635528>

³¹ Falk, J. H., & Dierking, L. D. (1997). School field trips: Assessing their long-term impact. *Curator: The Museum Journal*, 40(3), 211-218.

³² Behrendt, M., & Franklin, T. (2014). A review of research on school field trips and their value in education. *International Journal of Environmental and Science Education*, 9(3), 235-245.

³³ Greene, J. P., Kisida, B., & Bowen, D. H. (2014). The educational value of field trips: Taking students to an art museum improves critical thinking skills, and more. *Education Next*, 14(1), 78-87.

³⁴ More information about Portland's Green Building Policy is available at: <https://www.portlandoregon.gov/citycode/article/54355>

The Economic Contributions and Benefits of the Bull Run Treatment Projects

The Bull Run Treatment Projects will support jobs and economic activity in the tri-county region and enable the Water Bureau to provide consistently high-quality water, while protecting public health and meeting federal drinking water regulations.

Building the projects will support more than 4,600 jobs and \$1.59 billion in total economic activity in the tri-county region. After the projects are complete, annual operations spending will continue to support jobs and total local economic activity of \$14.9 million per year. By meeting and exceeding contracting requirements, construction of the Filtration Project will deliver at least \$100 million in contracts to Minority-Owned, Women-Owned, Service-Disabled Veteran Owned, and/or Emerging Small Businesses. Workforce equity commitments will ensure that a portion of apprentice and labor hours are dedicated to women

and minority workers for construction of the filtration and ICCT facilities.

The improvements to Portland's water system will make it more resilient to turbidity from wildfires, earthquakes, landslides, heavy storms, or other events — potentially avoiding or minimizing future service disruptions and boil water notices. With filtration, the Bull Run water supply can be used even when turbidity levels are high in the raw water, reducing the need to make supply changes.

In addition to system resilience and economic contribution to the local economy, the Bull Run Treatment Projects will also protect public health, achieve compliance with federal drinking water regulations, and provide consistent water quality for business customers.



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