# The Economic Benefits of Denver Water's North System Renewal Project

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Prepared For: DENVER WATER

Prepared By: Development Research Partners

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# PROJECT BACKGROUND

Denver Water is Colorado's oldest and largest water utility. Established in 1918, Denver Water serves 1.4 million customers throughout many communities in Adams, Arapahoe, Denver, Douglas, and Jefferson Counties, a service area of more than 335 square miles. Denver Water owns and operates many water resources in the state with its primary supply coming from the South Platte River, Blue River, Williams Fork River, and Fraser River watersheds. Denver Water is a public agency, independent of the City and County of Denver, supported through water rates and tap fees.

Denver Water operates with two geographically and physically distinct North and South Systems. Most of Denver Water's supply, about 80 percent, comes from basins in its South System. About 20 percent of Denver Water's supply is collected from its North System, largely from the Williams Fork and Fraser Rivers in Grand County. These rivers supply water through the Moffat Tunnel, under the continental divide, and into South Boulder Creek and the Gross Reservoir. Water from the North System supports communities in Jefferson County, Adams County, and the City and County of Denver.

Many components of Denver Water's North System have been in operation since the 1930s. The Moffat Water Treatment Plant was built in 1937 and is the oldest of Denver Water's treatment facilities still in operation. Denver Water is in the process of modernizing its North System, referred to as the North System Renewal (NSR) project. By 2024, Denver Water plans to build the new Northwater Treatment Plant next to Ralston Reservoir, install 8.5 miles of new pipeline, and make modifications to the Moffat Treatment Plant to allow for distribution of potable water from the Northwater Treatment Plant. This project will supplement and replace aging facilities with more modern and efficient infrastructure so that Denver Water can continue providing reliable water service by avoiding service failures and providing more flexible water treatment operations.

A safe, efficient, and reliable water supply is a critical public good that contributes to the health of a region. Water supports business development and contributes to economic growth, providing benefits to the Denver metro area. The additional reliability in Denver Water's North System will influence community development patterns, helping impacted communities support households and businesses. In addition, the construction activity associated with the project will provide large, but temporary benefits to communities throughout the Denver metro area. The intent of this study is to describe and quantify these economic benefits.

# ECONOMIC BENEFITS DEFINED

Economic impact analysis is the analytical approach used to assess the measurable direct and indirect benefits resulting from a project during a specific period. Only those benefits that can be measured or quantified are included. Intangible benefits, such as enhancement of community character or diversification of the job base, are not included.

The spending patterns associated with construction have spin-off effects or multiplicative impacts in the affected communities. Therefore, multiplier analysis is used to trace the impacts on businesses, organizations, and individuals affected by the construction activity. The multiplicative impacts are discussed in terms of "indirect" and "induced" economic benefits (often collectively referred to as simply indirect benefits). For example, when Denver Water or its contractors purchase supplies from a local vendor, that local vendor provides payroll to its employees and makes purchases from other vendors. These other vendors in turn provide payroll to their employees and make purchases from other vendors and so on, providing the indirect benefit of the initial dollar spent. On a separate but similar spending track, when construction employees spend their paychecks at local businesses, these local businesses provide payroll to their employees, make purchases from other vendors, and so on, creating the induced benefit.

As a result, the initial dollars spent by Denver Water for construction are circulated throughout the local economy a number of times. The number of times that the initial dollars are circulated throughout the local economy may be estimated using economic multipliers. An economic multiplier summarizes the total impact that can be expected within a specific geographic area due to a given industry's level of business activity. Generally, larger multipliers are associated with industries that (1) spend more dollars locally, (2) pay high salaries, and/or (3) sell their goods and services outside of the local area.

The indirect and induced jobs and income flows generated by the direct local spending patterns are estimated using the Regional Input-Output Modeling System (RIMS II) multipliers developed by the Bureau of Economic Analysis of the U.S. Department of Commerce. The RIMS II multipliers are the most widely used and respected for economic impact analysis. These multipliers are geographic and industry specific, and are used to estimate the total benefits of a project. This analysis estimates the benefits of the NSR project to the Denver metro area, with emphasis on the benefits in Jefferson County.

Development Research Partners estimated the economic benefits described in this report based on primary data provided by Denver Water. All project plans, costs, and timelines analyzed were current as of August 2018. Any changes in project plans, economic conditions, and other variables that factor into the construction project might change the impacts reported in this analysis. The economic and fiscal impacts estimated in this report are dependent on the project parameters and are not guaranteed.

When necessary, data from a variety of secondary sources and studies including the Statewide Water Supply Initiative (SWSI), the U.S. Census Bureau, U.S. Bureau of Labor Statistics, U.S. Bureau of Economic Analysis, and state and local governments was used. Development Research Partners made every attempt to collect necessary additional or missing information and believe the information used in this report is from sources deemed reliable but is not guaranteed.

Some numbers in the study may not add exactly due to rounding. In general, numbers reported in the text of the report are rounded to the nearest hundred thousand if more than $1 million. Figures that are less than $1 million are rounded to the nearest thousand. This analysis estimates the economic benefits of Denver Water in 2018 dollars.

# NORTH SYSTEM RENEWAL CONSTRUCTION BENEFITS

Renewal of the North System involves a combination of projects including building the new Northwater Treatment Plant, replacing 8.5 miles of pipe from the Northwater Treatment Plant to the Moffat Water Treatment Plant site in Lakewood, and modifying the existing Moffat Treatment Plant to allow for storage and distribution of water from Northwater Treatment Plan. Tunneling activity for the new pipeline began in 2017, and pipeline installation is expected to continue through 2022. Construction of the Northwater Treatment Plant will begin in 2018, with completion slated for 2023. The NSR will cost an estimated $606 million, comprised of $520 million for the Northwater Treatment Plant and $86 million for the new pipeline. The economic benefits reported in this study depend on current estimates and expectations for the project.

## *DIRECT ECONOMIC BENEFITS*

### Construction Spending

- In total, the direct economic benefit of the North System Renewal construction spending in the Denver metro area will be an estimated $197.3 million, including $44.4 million in Jefferson County, as described in the following bullets.

- Construction materials and equipment will comprise about 65 percent of the NSR construction activity, or about $392.6 million. Denver Water will source materials from suppliers both in Colorado and out of state. Specifically, a large quantity of the pipeline materials will come from outside of Colorado. Based on Denver Water estimates and potential local business activity, an estimated $61.6 million will be transacted with Denver metro area based suppliers, including an estimated $10.2 million in Jefferson County.
- Soft costs such as project management, design, and engineering will comprise an estimated 23.6 percent of the construction activity, or about $143.2 million. Denver Water assembled large teams of locally based engineers, consultants, and others to plan and design the components of the NSR. Based on an analysis of potential local business activity, an estimated $105.8 million will be contracted with Denver metro area based firms, including an estimated $25.4 million in Jefferson County.
- Denver Water estimates the need for about 985 FTE construction workers for the NSR from 2017 to 2023, or an average of 141 workers per year, of which about 53 percent of construction workers will come from the Denver metro area. Based on construction occupations in the Denver metro area, an estimated 21.8 percent of the workers will come from Jefferson County. Based on the anticipated local share of workers, NSR construction activity will support an estimated 520 FTE workers in the Denver metro area, including 215 that are residents of Jefferson County.
- Construction labor will comprise an estimated 11.6 percent of the construction activity, or about $70.2 million based on estimated labor for the project and anticipated wages and salaries from Denver Water. The direct economic benefit of construction worker earnings is based on local and regional wages and employee benefits. Adjusting employee benefits for the portion that will be spent locally, the direct benefit of construction earnings in the Denver metro area will be an estimated $29.9 million, including $8.9 in Jefferson County.

## Transitory Worker Spending

Workers living beyond commuting distance of projects for the NSR will likely establish a temporary residence in the Denver metro area during the project. These workers are referred to as transitory workers. These workers will spend money in the area during the course of the project for lodging, food, and other goods and services. The spending of these workers represents an additional economic benefit of the project.

- Denver Water estimates that about 53 percent of workers for the NSR projects will live within daily commuting distance, represented by workers expected to come from the Denver metro area. The economic benefit of these workers is included in the benefits of the labor costs described in the Construction Spending section. The remaining 47 percent will likely require lodging during the project. While the earnings of the transitory workers are not a direct benefit to the Denver metro area, the lodging and retail spending by these workers represents additional benefits to the region. Based on the availability of lodging options in Jefferson County compared with the Denver metro area, an estimated 30 percent of the transitory workers will stay in the county.
- Transitory workers will often use a variety of lodging options, including hotels/motels, RV parks, apartments, and homes. Denver Water estimates that about 14 percent of the worker days will be captured in hotels/motels in the area. The Denver metro area will capture an estimated 8,639 room nights of demand during the construction period based on an average of 1.5 persons per room and an eight-month period of activity each year, including 1,840 room nights of demand in Jefferson County.
- Based on an average room rate of $117 per night in areas of the Denver metro area likely to attract transitory workers, and $118 per night in Jefferson County from the Rocky Mountain Lodging Report for

2017, spending at hotels and motels will total an estimated $1 million in the Denver metro area, including $218,000 in Jefferson County.

- Denver metro area RV parks will benefit from an estimated 303 rental months based on capturing an estimated 5.7 percent of transitory workers. Part of the rental months will be captured at parks in Jefferson County, an estimated 109 months. Based on a monthly rental rate of $834, the economic benefit to the Denver metro area will be an estimated $253,000 during the construction period, including $91,000 in Jefferson County.
- Denver metro area apartment complexes will benefit from an estimated 1,626 rental months based on capturing an estimated 38 percent of transitory worker stays. Part of the rental months will be captured in Jefferson County, an estimated 725 months based on the availability of apartments within a radius of roughly 10 miles from the NSR sites. Based on estimated rent in Jefferson County of about $1,470 per month and an average of about $1,390 per month in other areas expected to benefit from the project workers, spending at apartments in the Denver metro area will total an estimated $2.3 million during the construction period, including $993,000 in Jefferson County.
- Some of the transitory workers will choose to rent homes in the Denver metro area during the construction period, about 42 percent based on estimates from Denver Water. Based on workers renting homes for a full 12 months of the year during the construction period, the Denver metro area will capture 1,798 rental months, including 803 months in Jefferson County. Based on a median home rent of $1,913 during 2017 according to Zillow research for areas of the metro area likely to benefit from home rentals, the economic benefit to the Denver metro area will be an estimated $3.4 million. Based on median home rent of $1,809 in Lakewood, the economic benefit to Jefferson County will be an estimated $1.5 million.
- Adding the spending on all lodging options for the transitory workers, lodging spending in the Denver metro area will total $7 million, including $2.8 million in Jefferson County.
- Based on the reimbursement rates set by the U.S. General Services Administration for the area, transitory workers will spend an average of $69 per day for meals and incidental expenses (excluding lodging). In total, the spending activity in the Denver metro area of transitory workers during the construction period will be an estimated $9 million for food and expenses, including $4.3 million in Jefferson County.
- The direct economic benefit of retail spending is based on the retailer margin, or the retail spending less the cost of goods sold. Adjusting the transitory worker spending for the retailer margin, the direct economic benefit of transitory workers in the Denver metro area is an estimated $3.3 million during the construction period, including $1.6 million in Jefferson County.
- In total, the direct economic benefit of transitory workers working on the NSR in the Denver metro area will be an estimated $10.3 million, including $4.4 million in Jefferson County.

**Table 1: Direct Economic Benefits of the North System Renewal Project Construction Activity, 2017-2023**

| | Total Spending | Direct Benefits: Jefferson County | Direct Benefits: Denver Metro Area |
|---|---|---|---|
| Construction Spending | | | |
| Construction Materials | $392,600,000 | $10,160,000 | $61,573,000 |
| Soft Costs | $143,200,000 | $25,372,000 | $105,825,000 |
| Employee Compensation | | | |
| Wages and Salaries | $48,789,000 | $7,665,000 | $25,837,000 |
| Employee Benefits (Earnings Portion) | $21,411,000 | $1,211,000 | $4,082,000 |
| **Total Construction Benefits** | **$606,000,000** | **$44,408,000** | **$197,317,000** |
| Employment (FTE) | 985 | 215 | 520 |
| Transitory Worker Spending | | | |
| Lodging and Rentals | | $2,755,000 | $6,962,000 |
| Retailer Impacts* | | $1,606,000 | $3,328,000 |
| **Total Transitory Worker Spending Benefits** | | **$4,361,000** | **$10,290,000** |
| Transitory Workers from Out of Local Gov't | | 295 | 465 |
| **Total Direct Economic Benefits of Construction** | | **$48,769,000** | **$207,607,000** |

**Retail margin after subtracting the cost of goods sold and freight. Based on total retail spending of $4.3 million in Jefferson County and $9 million in the Denver metro area.*

## *TOTAL DIRECT, INDIRECT, AND INDUCED BENEFITS*

The construction activity will have temporary, multiplicative impacts on the Denver metro area and Jefferson County during the construction period. Multiplicative impacts are based on the value of output, or revenues received in various affected industries from the construction expenditures and the transitory worker spending. These industries include the construction industry, the retail trade industry, the food and drinking services industry, accommodations industry, and real estate industry.

### Denver Metro Area

- **Value of Output:** NSR construction activity will contribute direct economic benefits in the Denver metro area totaling an estimated $207.6 million, comprised of $197.3 million in construction spending and $10.3 million in transitory worker spending. Based on the RIMS II multipliers, construction activity will likely support $197.5 million in additional output in all industries throughout the metro region. This consists of the value of the local spending by the construction workers (the induced benefit) and the Denver metro area-based supplier companies and their employees (the indirect benefit). Therefore, **the total direct and indirect benefit will be an estimated $405.1 million in total output** ($207.6 million direct output + $197.5 million indirect and induced output), as shown in Table 2.

**Table 2: Total Economic Benefits of the North System Renewal Project Construction Activity in the Denver Metro Area, 2017-2023**

| | Direct Impact | Multiplier | Indirect & Induced Impact | Total Impact |
|---|---|---|---|---|
| Construction Spending | | | | |
| Value of Output ($M) | $197.3 | 1.9576 | $189.0 | $386.3 |
| Earnings ($M) | $29.9 | 1.9686 | $29.0 | $58.9 |
| Employment | 520 | 2.2900 | 670 | 1,190 |
| Transitory Worker Spending | | | | |
| Value of Output ($M) | $10.3 | 1.8303 | $8.5 | $18.8 |
| Earnings ($M) | $2.4 | 2.0467 | $2.5 | $4.9 |
| Employment | 118 | 1.5811 | 68 | 186 |
| Total | | | | |
| Value of Output ($M) | $207.6 | | $197.5 | $405.1 |
| Earnings ($M) | $32.3 | | $31.5 | $63.8 |
| Employment | 638 | | 738 | 1,376 |

*Source: Development Research Partners, based on multipliers for the Denver metro area from the U.S. Department of Commerce, Bureau of Economic Analysis, Regional Input-Output Modeling system (RIMS II), 2007 U.S. Benchmark I-O Data and 2013 Regional Data.*
*Calculation Note: Direct x Multiplier = Total Impact*
*Total Impact - Direct Impact = Indirect & Induced Impact*
*Numbers may not add exactly due to rounding.*

- **Employment:** NSR construction spending will support an estimated 520 full-time equivalent workers in the Denver metro area and transitory worker spending will support an additional 118 workers in the region during the course of the project. Based on the RIMS II multipliers, the production of the $197.5 million in indirect and induced output in all industries throughout the Denver metro area will require about 738 employees. Therefore, **the NSR projects will support an estimated 1,376 workers** (638 direct employees + 738 indirect and induced employees).
- **Earnings:** The direct workers from the Denver metro area will have estimated earnings of $32.3 million. This includes the value of wages and salaries for the employees as well as a portion of employee benefits. Based on the relationships revealed through the RIMS II multipliers, the 738 indirect employees that will produce the $197.5 million in indirect and induced output will have associated earnings of about $31.5 million. In total, **the direct and indirect employees that will be supported by the construction activity will have estimated earnings of $63.8 million** ($32.3 million direct earnings + $31.5 million indirect and induced earnings). All earnings values are included in the total value of output; earnings are not in addition to the value of output.

**North System Renewal construction activity will have a total economic benefit of $405.1 million in the Denver metro area, produced by 1,376 workers earning $63.8 million from 2017 to 2023.**

## Jefferson County

- **Value of Output:** NSR construction activity will contribute direct economic benefits in Jefferson County totaling an estimated $48.8 million, comprised of $44.4 million in construction spending and $4.4 million in transitory worker spending. Based on the RIMS II multipliers, construction activity will likely support $18.1

million in additional output in all industries throughout the county. This consists of the value of the local spending by the construction workers (the induced benefit) and county-based supplier companies and their employees (the indirect benefit). Therefore, **the total direct and indirect benefit will be an estimated $66.9 million in total output** ($48.8 million direct output + $18.1 million indirect and induced output), as shown in Table 3.

**Table 3: Total Economic Benefits of the North System Renewal Project Construction Activity in Jefferson County, 2017-2023**

| | Direct Impact | Multiplier | Indirect & Induced Impact | Total Impact |
|---|---|---|---|---|
| Construction Spending | | | | |
| Value of Output ($M) | $44.4 | 1.3659 | $16.2 | $60.6 |
| Earnings ($M) | $8.9 | 1.4554 | $4.0 | $12.9 |
| Employment | 215 | 1.6450 | 139 | 354 |
| Transitory Worker Spending | | | | |
| Value of Output ($M) | $4.4 | 1.4458 | $1.9 | $6.3 |
| Earnings ($M) | $0.6 | 1.5557 | $0.4 | $1.0 |
| Employment | 26 | 1.3468 | 9 | 35 |
| Total | | | | |
| Value of Output ($M) | $48.8 | | $18.1 | $66.9 |
| Earnings ($M) | $9.5 | | $4.4 | $13.9 |
| Employment | 241 | | 148 | 389 |

*Source: Development Research Partners, based on multipliers for Jefferson County from the U.S. Department of Commerce, Bureau of Economic Analysis, Regional Input-Output Modeling system (RIMS II), 2007 U.S. Benchmark I-O Data and 2016 Regional Data.*

*Calculation Note: Direct x Multiplier = Total Impact*

*Total Impact - Direct Impact = Indirect & Induced Impact*

*Numbers may not add exactly due to rounding.*

- **Employment:** NSR construction spending will support an estimated 215 full-time equivalent workers in Jefferson County and transitory worker spending will support an additional 26 workers in the county during the course of the project. Based on the RIMS II multipliers, the production of the $18.1 million in indirect and induced output in all industries throughout Jefferson County will require about 148 employees. Therefore, **the NSR projects will support an estimated 389 workers** (241 direct employees + 148 indirect and induced employees).
- **Earnings:** The direct workers from Jefferson County will have estimated earnings of $9.5 million. This includes the value of wages and salaries for the employees as well as a portion of employee benefits. Based on the relationships revealed through the RIMS II multipliers, the 148 indirect employees that will produce the $18.1 million in indirect and induced output will have associated earnings of about $4.4 million. In total, **the direct and indirect employees that will be supported by the construction activity will have estimated earnings of $13.9 million** ($9.5 million direct earnings + $4.4 million indirect and induced earnings). All earnings values are included in the total value of output; earnings are not in addition to the value of output.

**North System Renewal construction activity will have a total economic benefit of $66.9 million in Jefferson County, produced by 389 workers earning $13.9 million from 2017 to 2023.**

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