



**Larimer County Analysis –
Technical Memorandum No. 3
Conveyance Pipeline Route Study & Analysis**

Prepared for:
Larimer County

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Water Activity Enterprise**

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APPENDICES

Appendix A – Route Alternatives Analysis

1.0 NISP Conveyance

This section provides information on the NISP conveyance system and documentation of the routing evaluation study performed through Larimer County. The main conveyance pipeline will begin at the proposed Glade Reservoir facilities and bring water both east and south to the project Participants. An additional Poudre Release Pipeline (also known as the Glade Release Pipeline) will bring water from the Glade facilities directly to the Poudre River. The main delivery pipeline is the County Line Pipeline, which generally follows the Larimer County-Weld County border south to the existing Southern Water Supply Pipeline just north of State Highway 66 in Weld County. The County Line Pipeline would receive water from the Northern Tier Pipeline and the Poudre Intake Pipeline and deliver water directly to the Participants or to existing Northern Water infrastructure (Southern Water Supply Project). The approximate size of the pipeline will be 48 inches in diameter. The final pipeline sizing will be determined following additional analyses during final design. Additional pumping will be required on the existing Southern Water Supply Pipeline to provide for additional delivery capacity within the system to the participants. Water would be delivered from Glade Reservoir to the County Line Pipeline using two different mechanisms:

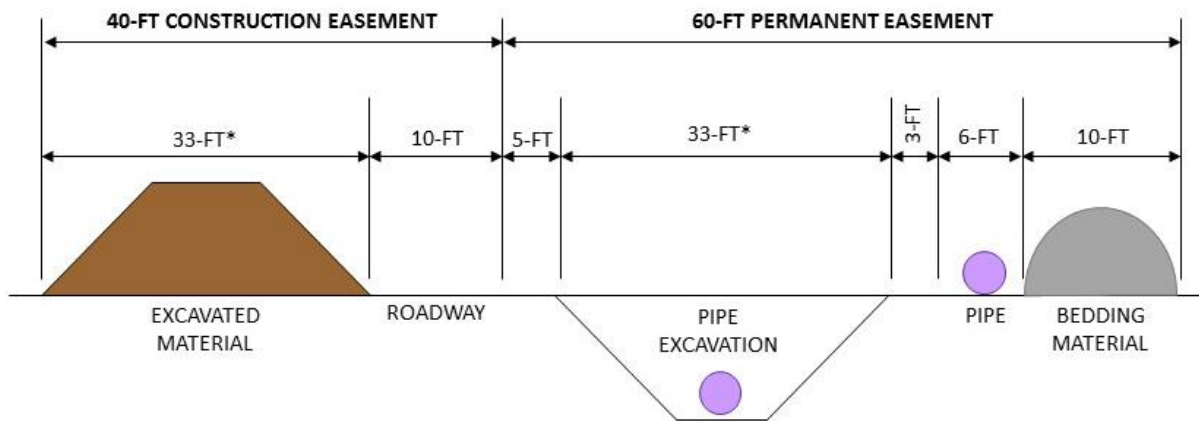
- Poudre/Glade Release and Poudre Intake Pipelines – Water from Glade Reservoir would be conveyed directly to the Poudre River via the Poudre/Glade Release Pipeline. The water would travel down 13 miles of the Poudre River before being pumped into the participant conveyance system. The intake for that water is the Poudre River Intake and Pump Station, which would be located upstream of the Mulberry Reclamation Plant discharge location and constructed to allow for 18 to 25 cfs, or 14,350 acre-feet annually, of NISP delivery. The Poudre River Intake would have a diversion structure, sedimentation basin, and pump station (1,000 to 1,300 horsepower). Water would be delivered from the intake to the County Line Pipeline via the approximately 32-inch diameter Poudre Intake Pipeline.
- Northern Tier Pipeline – The Northern Tier Pipeline would deliver water directly from Glade Reservoir to the County Line Pipeline via a closed pipeline. The Northern Tier Pipeline would be a 45-inch to 54-inch diameter pipeline capable of conveying 81 to 106 cfs of water to the NISP Participants, depending upon the need for redundancy between the pipeline and river conveyance options. The need for redundancy and final pipeline sizing will be determined following additional analyses during final design.

1.1. Working Area & Corridor

To construct pipelines in the 32-inch to 60-inch diameter range, a large construction area is advantageous to facilitate quicker and more efficient construction. However, a smaller area is

acceptable in certain areas where existing constraints and utilities may limit the working area. In the preliminary stage of the Project, Northern Water is anticipating an approximately 100-foot-wide work area. Approximately 60 feet of this would be utilized as a permanent easement to access the pipeline in the future, while 40 feet would be acquired temporarily and used only for the initial construction of the pipeline. This 100-foot-wide corridor will be modified as needed in tight construction areas and where existing constraints and utilities limit the construction space. See Figure 1 below for a schematic of the working area.

**Northern Integrated Supply Project
PRELIMINARY 100-ft Easement
for Single 48-inch Pipeline**



*= Exact width of trench excavation will vary depending on the depth of the pipeline and types of soils encountered from approximately 20-ft to 35-ft. The width and height of the excavated material pile will vary with the amount and types of soils from the excavation trench.

Figure 1: Preliminary Pipeline Easement

For this stage in the routing analysis, final survey, title and deed search, and final design is not completed. Northern Water will follow the route selected as part of this technical memorandum to the extent feasible, recognizing that the final route designed and constructed may deviate from the presented route as more information is gathered and final design is completed. The corridor developed from this study will be the baseline route as final design is initiated and Larimer County may review each additional deliverable as design progresses.

1.2. Route Alternatives Analysis

See Appendix A to this TM No. 3 for the complete Route Alternatives Analysis for pipeline routes within Larimer County for NISP. This analysis includes the following overall sections that describe various criteria and procedures that are applied to all pipeline routes in Larimer County:

- Decision Model and Criteria – A discussion of the criteria used to evaluate different alternative routes against each other. The identified performance metrics and requirements for various criteria are also explained.
- Development of Alignment Alternatives – This section includes resources utilized to develop various alignments and a discussion of the use of private easement instead of public right-of-way.
- Impacts Minimization Plan – A description of the various steps taken to minimize negative impacts on public and private resources such as public streets and traffic, wetland areas, and future development among others.

Three different sections detail the route analysis for each pipeline alignment. These sections include detailed information on how each route was evaluated with the various criteria.

1.2.1 Northern Tier Pipeline Alternatives Analysis

The route analysis for the Northern Tier Pipeline included over 10 different alignments evaluated against the criteria and decision model. Information and input from various public and stakeholder meetings that were held in 2017 and 2019 were incorporated into the development of the alignments, as well as information from multiple site visits. Fact sheets were developed for each route alternative explaining how the route was evaluated against the criteria. A quantitative summary of the scoring and preferred alignment is presented at the end of the analysis. Figure N.19 exhibits the Northern Tier Preferred Alignment.

1.2.2 County Line Pipeline Alternatives Analysis

The route analysis for the County Line Pipeline included multiple different alignments evaluated against the criteria and decision model. Due to existing and future development along this alignment, fewer route alternatives are available. Information and input from Timnath, Windsor, and Johnstown were incorporated into the creation of the alignments along with available development information. Fact sheets were developed for each route alternative explaining how the route was evaluated against the criteria. A quantitative summary of the scoring and preferred alignment is presented at the end of the analysis. Figure C.20 exhibits the County Line Preferred Alignment.

1.2.3 Poudre Intake Pipeline Alternatives Analysis

The route analysis for the Poudre Intake Pipeline was broken into two segments, the Main Section and the West Section. Information and input from various site visits and data gathering were incorporated into the development of the alignments. Fact sheets were developed for each route alternative explaining how the route was evaluated against the criteria. A quantitative summary of the scoring and preferred alignment is presented at the end of the analysis. Figures PW.4 and P.8 demonstrate the Poudre Intake Preferred Alignment.

2.0 Conclusions

The pipeline routes analyzed as part of this technical memorandum are preliminary routes that focus on evaluation criteria reviewed and discussed with Larimer County, as well as environmental concerns discussed with state and federal agencies. For this stage in the routing analysis, final survey, title and deed search, and final design are not completed. While Northern Water will follow the route selected as part of this technical memorandum as feasible, the final route designed and constructed may deviate from the presented route as more information is gathered and final design is completed.

See Figure 2 below with the preferred pipeline routes in Larimer County (also found as Figure 1 in Appendix A to this memorandum).

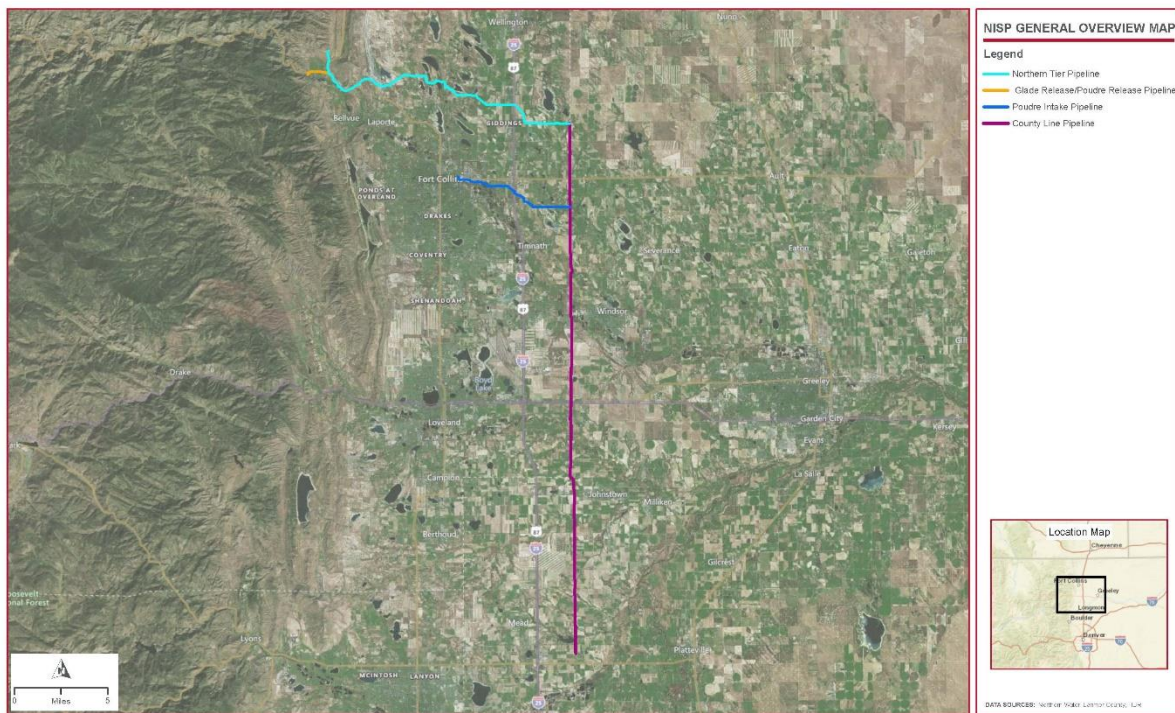


Figure 2: Preferred Pipeline Alignment