

Northern Integrated Supply Project

Route Alternatives Analysis Introduction

for

Pipelines within Larimer County

February 2020

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DECISION MODEL AND CRITERIA

Dewberry/HDR and Northern Integrated Supply Project Water Activity Enterprise (NISP WAE) developed a decision model to evaluate alternative pipeline routes for all of the alignments within Larimer County that will comprise the Northern Integrated Supply Project. These pipelines include: Northern Tier, Poudre Release/Glade Release, Poudre Intake and County Line Pipelines. The general location of these four alignments can be seen in **Figure 1**.

The decision model considers multiple criteria including cost and non-cost criteria to determine a preferred alignment. The non-cost criteria considered include the following:

- Conduit Length
- Easement Difficulty
- Right-of-Way Impact
- Landowner Impact
- Proximity to Occupied Dwellings
- Environmental Impacts
- Existing Utilities
- Hazardous/Permitted Crossings
- Surface and Street Impacts
- Traffic Impacts
- Water Storage Reservoirs Impacts
- Construction Durations and Relative Constructability
- Required Trenchless Crossings
- Development Pressure
- Operation and Maintenance (O&M) Access
- O&M Requirements
- Natural Resources Impacts

Dewberry/HDR and NISP WAE established the criteria based on the project scope, key differentiators, Larimer County concerns, and relative importance to NISP WAE. After identifying and defining criteria, a relative performance system was established where alternative alignments were evaluated against the criteria and given a rating of "Green" for good performance, "Yellow" for moderate performance and "Red" for poor performance under the criteria. A detailed description of the evaluation criteria, performance metrics, and scoring is provided in the evaluation criteria section below.



Figure 1 - Overview of alignments located in Larimer County: Northern Tier, Glade Release/Poudre Release, Poudre Intake and County Line

Bewberry HCR

Legend
Northern Tier Pipeline
Glade Release/Poudre Release Pipeline
Poudre Intake Pipeline
County Line Pipeline
Location Map
print print
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Greley
Longmon
Denver _

NORTHERN INTEGRATED SUPPLY PROJECT

DEVELOPMENT OF ALIGNMENT ALTERNATIVES FOR ANALYSIS

Dewberry/HDR utilized multiple resources to develop GIS based mapping to begin identifying potential pipeline routes for the project. Resources used included:

- Publicly available aerial imagery
- Property boundary information available from Larimer County
- National databases for wetland and riparian areas
- Publicly available topography information
- Local databases for existing underground utilities

Alternative routes for each alignment were developed following detailed review of aerial mapping and multiple site visits. The following paragraphs provide additional information regarding key issues impacting development of routes for analysis.

Pre-Evaluation Screening

After the development of preliminary alignment alternatives, an initial screening was performed to determine the viability of the potential route segments for further analysis. In a few isolated cases, route segments were eliminated because they did not meet the project need or were not reasonable to construct. For the preliminary alternative segment where this pre-evaluation elimination occurred, it is noted and the reasoning for elimination is provided.

Reconciliation of End Points

It was also determined that an approach would need to be developed to reconcile differences in alignment alternative end points. This applies to alignments within multiple project areas. An initial alignment evaluation was performed within the specific project areas, and if the selected alternatives in adjacent project areas required reconciliation in order to provide a continuous pipeline alignment, then the evaluation criteria were applied to the combined alternatives in the adjacent project areas which provided a continuous route and then compared against the other combined alternative alignments within the adjacent project areas.

IMPACTS MINIMIZATION PLAN

A comprehensive Impacts Minimization Plan was utilized for this analysis. This plan included steps to decrease impacts on public, private, and environmental resources. When developing the criteria in **Table 1**, emphasis was placed on mitigating negative impacts and enhancing the area if possible throughout the construction process. The specific steps taken were as follows:

- 1. Identifying pipeline alignment alternatives within private Right-of-Way as much as possible to minimize general public impact (road closures and access impacts)
- 2. Developing pipeline alignments that are adjacent to property lines and avoid splitting a property
- 3. Routing alignment options to avoid occupied dwellings/homes
- 4. Assessing environmental impacts to wetlands and adjusting routes to cause as little disturbance as possible
- 5. Routing alignment options to minimize number of street crossings, potential utility conflicts, and traffic disturbances
- 6. Routing alignment options to minimize impacts to water storage reservoirs by avoiding dam toes
- 7. Configuring pipeline alignments to avoid or minimize conflicts with future developments

8. Routing alignment options to minimize construction impact on trees and other natural resources .

EVALUATION CRITERIA

The route alternatives were evaluated against multiple criteria identified to reflect both quantitative (measurable) and qualitative (subjective) factors. Many of these criteria have both quantitative and qualitative components. Where possible, the project team identified numeric scoring parameters to assist in evaluating criteria that is mostly qualitative in nature.

Scoring

The route scoring methodology that best accommodates this blend of qualitative and quantitative evaluation criteria is a "green, yellow, red" assignment; where green is more favorable and red is least favorable. Where quantitative scoring is possible and appropriate, the routes will be assigned scores based upon a poor ¼ (red), middle ¼ (yellow), and good ¼ (green) methodology. There are instances where either the small number (2 or 3) of route alternatives and/or a poorly distributed scoring pattern does not lend itself to assigning all three scores. In these instances, the scoring will be based on the judgement of the evaluation team. These instances are noted in the evaluation.

Capital Cost

This is a purely quantitative criterion. An AACE Level 5 construction cost opinion was developed for each of the proposed routes that passed the initial screening process. These cost opinions included; pipe materials and installation, basic tunneling, pipeline appurtenances, surface improvement impacts and restoration, and roadway restoration. The construction cost opinions were based on cost curves developed by the project team from past similar constructed projects. The cost curve results were supplemented to account for route specific construction elements such as major dewatering, tunnels, and major crossings. The construction cost of the pipelines is to be paid by the NISP Participants, including Fort Collins-Loveland Water District that serves residents within Larimer County. The construction cost for each route was ranked against the other alternative routes within each project area. The greater the construction cost, the lower the route ranking.

Conduit Length

This criterion is scored numerically, but has both quantitative and qualitative factors. The length of a pipeline typically has a strong correlation to cost, however longer pipelines in unconstrained/open-county areas can be constructed at lower per foot cost than shorter pipelines located in constrained areas. Pipeline length is also utilized as a criterion due to its impact on hydraulic capacity in the gravity NISP delivery system. Pipelines with a greater length reduce hydraulic capacity due to additional friction losses, which directly impacts the project's function and could potentially require the installation of larger diameter pipelines. Larger diameter pipeline installation results in higher costs, potentially increased easement requirements, and increased impacts for multiple other criteria. In addition, greater length and/or diameter also increases the carbon footprint of the project due to increase construction duration, increased material requirements, and greater land disturbance. A longer pipeline also tends to increase impacts to the majority of the criteria listed below. Therefore, longer route length is ranked lower than shorter routes.

Easement Difficulty

This criterion is scored both numerically and subjectively as it has both quantitative and qualitative factors.

This criterion assesses the relative difficulty of acquiring a 60-foot wide permanent easement and an adjacent 40-foot wide temporary easement for a total 100 foot wide work area. At this phase of the project, the qualitative component of the assessment is based upon:

• The ability to route along the perimeter of the property adjacent to property lines,

- The relative percentage of non-perimeter property crossings, and
- The relative impacts of the easement and subsequent pipeline construction on property owners (surface improvements, proximity to buildings, etc)

Numerically, the number of total easements required for each route is determined (based upon the number of parcels crossed) and ranked against the other routes within that specific area. Routes with a higher number of easements required are ranked lower than those with fewer required easements. The routes judged to have the greater overall easement procurement difficulty are ranked lower than those judged to be less difficult.

Right-of-Way Impact

This criterion is scored numerically. As presented in further detail under the 'Right of Way Acquisition Process' section of this memorandum, NISP WAE's standard is to route as much of the conveyance system as possible in private easement rather than in public right-of-way. Numerically, the length of each route in public right-of-way was determined and ranked against the other routes within that specific area. Routes with more lineal footage within public right-of-way are ranked lower than those with less footage in public right-of-way due to the many construction impacts on the public ROW including traffic impacts and decreased space for local utilities.

Land Owner Impact

This criterion is scored both numerically and subjectively as it has both quantitative and qualitative factors. Impacts to residential properties can be one of the more sensitive issues relative to pipeline routing, making them highly subjective. Subjective factors include:

- Impact of construction disturbance on the use of the property
- Impact to and restoration of surface improvements
- Impacts to future uses of the property
- Impacts of temporary access requirements during construction activity

The routes judged to have the greater overall land owner impacts are ranked lower than those judged to have fewer land owner impacts.

Numerically, the number of access points crossed and therefore the number of locations requiring temporary access provisions for each property are determined and ranked against the other routes within that specific area. Routes with a greater number of access issues are ranked lower. It is important to note that all accesses will remain open during construction, not blocked. In any situations requiring the traversing of an existing access point by the pipeline construction, the contractor will be required to provide temporary access provisions.

Proximity to Occupied Dwellings/Businesses

This criterion is scored numerically. It is important to note that during the identification of alternative routes, specific attention was given to minimize the proximity to existing residences, or businesses in commercial areas, where possible. The number of locations where the pipeline alignment passes within 100 feet of an occupied dwelling, or businesses in commercial areas, was determined for each route and ranked against the other alternative routes within that specific area. Pipeline routes with a greater number of dwellings/businesses within 100 feet are ranked lower.

Environmental Impacts

The length of pipeline within identified wetland/riparian areas are determined for each route. National databases were used for determination of wetland and riparian area boundaries. These databases provide a consistent source of information from which to evaluate all alternatives. However, detailed wetlands information for the preferred pipeline routes and Glade Reservoir can be found in the 1041 Permit wetlands report. Pipeline routes with a greater overall number of stream crossings and greater length of wetland/riparian crossings are ranked lower. The length of pipeline within identified floodplains (using the FEMA national floodplain mapping) are determined for each route.

Since wetlands and floodplains frequently occur in the same areas but rarely have identical boundaries, the lineal footage for each was added together for a total numeric score and ranked against the other alternative routes within that specific area. Pipeline routes with a greater overall length of wetland/riparian plus floodplain crossings are ranked lower.

While floodplains can pose risks to any conveyance system (pipelines, roadways, conduits and even supports for aerial systems) they are frequently unavoidable and must be a major consideration in design. Floodplains are not considered a significant risk to this pipeline due to the following practices:

- Use of double-lap-welded steel pipelines
- Performance of a scour analysis for each major crossing to ensure that pipeline burial depth is adequate
- Siting of critical appurtenances outside of floodplains
- Restoring to existing grades after pipeline construction to avoid any changes to the floodplain to obtain a "no rise" finding

It is important to note that NISP WAE's welded-steel Southern Water Supply Pipeline (SWSP) remained operational throughout and after the September 2013 floods even though it traversed four of the major affected floodplains (Big Thompson, St. Vrain, Left Hand Creek, and Boulder Creek). Additionally, of the City of Longmont's 5 raw water delivery systems (3 pipelines and 2 canals), the SWSP was their only operational supply following the September 2013 floods.

Existing Utilities

This criterion is scored subjectively. The relative density of anticipated existing utility corridors and level of coordination required with adjacent and crossing utilities are assessed for each route and ranked against the other alternative routes within that specific area. This determination is based on existing utility information obtained from Colorado 811/SUE requests submitted for each route considered. Field utility locating was not performed. The existing utility information obtained through the Colorado 811/SUE system is highly variable in accuracy and level of detail and can range from hand-drawn sketches to GIS based mapping, but generally consists only of a line on a map with minimal information on size, type, and exact location of the facility. As such, the scoring of the existing utilities criteria is based on the relative number of existing utilities identified to be within close proximity to or crossed by a particular pipeline route. In general, a higher number of existing utilities are found along road rights-of-way and in highly developed areas. However, even in areas considered to be more unconstrained, existing utilities such as oil and gas pipelines, larger water transmission pipelines, and overhead and buried electrical transmission lines are still relatively common.

It is important to note that existing utility conflict avoidance is a fundamental practice in pipeline routing and design, but existing utility corridors can also provide the potential for parallel routing alternatives. The vast majority of the existing utilities identified as being in the vicinity of the NISP project will be avoided by route adjustments within the proposed easements or by crossing over or under the existing utility while maintaining proper clearance. We anticipate a limited number of existing utility relocations.

Any utility relocations that are deemed to be unavoidable will be thoroughly coordinated with the utility owner during the final design phase of the project. NISP will be responsible for all costs, permits, and planning for any relocations of existing utilities.

Hazardous/Permitted Crossings

This criterion is scored numerically. The project mapping includes boundaries for known potentially hazardous groundwater or soil conditions which could require remediation or mitigation during pipeline construction. Those boundaries were developed from the following publicly available databases regarding potentially hazardous sites:

https://ops.colorado.gov/Petroleum/maps https://www.colorado.gov/pacific/cdphe/superfund-sites https://www.colorado.gov/pacific/cdphe/voluntary-cleanup https://www.colorado.gov/pacific/cdphe/hmcovenants https://www.epa.gov/cleanups/cleanups-my-community https://www.colorado.gov/pacific/cdphe/brownfields

Pipeline routes with the greater number of crossings of potentially hazardous sites are ranked lower than those determined to have less.

Surface and Street Impacts

This criterion is scored numerically. Each alternative pipeline route was evaluated for the level of impact to public infrastructure by determining the lineal feet of pipeline in paved and gravel roads. An open-cut length of pipeline in paved roads is weighted as 2 versus a length of pipe in gravel roads weighted as 1. Crossings of paved roads utilizing trenchless methods are not counted in this criteria. The length of pipeline within roads was determined for each route and ranked against the other alternative routes within that specific project area. Pipeline routes with a greater lineal footage in roads are ranked lower.

Traffic Impacts

This criterion is scored numerically. The traffic impacts from pipeline construction are determined as follows:

- Trenchless pipe construction below paved roadways is considered to have "low" traffic impacts since it will remain completely open during the crossing
- Pipe construction in paved roadways is considered to have "high" traffic impacts since there will be at least partial lane closures and paved roadways typically have higher traffic volumes
- Pipe construction in gravel roadways is considered to have "medium" traffic impacts since there will be at least partial lane closures and gravel roadways typically have lower traffic volumes than paved roadways
- Open-cut crossings of gravel roads is considered to have "medium" traffic impacts due to an expected phased lane closures and gravel roadways typically have lower traffic volumes than paved roadways

The lineal footage of high, medium, and low traffic impacts is determined for each route and ranked against the other alternative routes within that specific area. High impacts receive a multiplier of 4, medium impacts receive a multiplier of 2, and low impacts receive a multiplier of 1. A Traffic Impact Scope is then calculated for each pipeline route by multiplying each length of low, medium, and high times the respective length.

Water Storage Reservoirs Impacts

This criterion is scored numerically. The number of locations where the pipeline alignment passes within 100 feet of the toe of a dam, other critical dam-safety facilities, or reservoir inlet/outlet infrastructure was determined for each route and ranked against the other alternative routes within that specific area.

Construction Duration and Relative Constructability

This criterion is scored numerically. Duration of pipeline construction has both quantitative and qualitative factors. Duration of construction tends to correlate significantly with pipeline length and construction cost. Longer construction durations also tend to magnify qualitative factors such as public inconvenience, landowner impacts, and carbon footprint.

Pipeline production rates are estimated using factors including pipe diameter, route complexity, route length, available construction corridor area and access, utility density, and terrain challenges. An approximate total construction duration for each route was estimated and ranked against the other alternative routes within a specific project area. Routes with a greater construction duration are ranked lower.

Required Trenchless Crossings

This criterion is scored numerically. The impact of trenchless crossing construction has both quantitative and qualitative factors. Quantitatively, trenchless crossings can add significantly to the overall project cost. Qualitatively, trenchless crossings add elements of construction risk and high localized impacts at the tunnel portals. It has been assumed that all railroads, highways and all paved roads will be trenchless crossing.

Both the number of trenchless crossings and the total length of trenchless crossings are determined for each route and ranked against the other alternative routes within each specific area. Pipeline routes with greater length of trenchless construction are ranked lower.

Development Pressure

This criterion is scored numerically. The presence of known current or near term (within 2 years) development within each route alternative was investigated by conducting field visits, researching county, city, and town websites/databases, as well as attending in-person discussions with these entities. The lineal feet of pipeline traversing these known developments is determined for each route and ranked against the other alternative routes within each specific area. Pipeline routes with a greater length traversing near-term developments are ranked lower.

Operation and Maintenance (O & M) Access

This criterion is scored subjectively. Accessibility to the pipeline for the maintenance of pipeline appurtenances and to make repairs was evaluated for each pipeline route and ranked against the other alternative routes within each specific area. Adequate access is key to proper maintenance and prevention of leaks and or appurtenance failures which would adversely impact residents near the pipeline. Pipelines that have greater length adjacent to (but not within) public roadways are ranked higher. Pipeline routes with reduced or limited access for pipeline operation and maintenance are ranked lower.

O & M Requirements

This criterion is scored numerically. The anticipated number of air vacuum/release (AV/AR) and blowoff (BO) facilities based upon the traversed topography (high and low points) are estimated for each alternative route. Additionally, apparent locations where additional cathodic (corrosion) protection may be required due to foreign utility crossings (principally oil and gas) are also identified for each alternative route. These anticipated facilities are then totaled for each route and ranked against the other alternative routes within the specific area. Pipeline routes with greater combined O & M requirements are ranked lower.

Natural Resources

This criterion is scored numerically. Natural areas (natural tree areas, riparian areas, designated wildlife areas) are identified along each route. The lineal footage of pipeline traversing these areas is determined for each route and ranked against the other alternative routes within the specific area. Pipeline routes with a greater length traversing natural areas are ranked lower.

Grassland areas, farmed areas, and improved areas are considered to be temporarily impacted and more readily restorable over a shorter period of time than the above-mentioned natural areas and have not been included in this category.

Table 1 – Matrix Evaluation Criteria, Description, and Metrics

Evaluation Criteria	Performance Metrics - Green	Performance Metrics - Yellow	Performance Metrics - Red
Capital Cost	Lower ¼ of comparative alternatives	Middle ½ of comparative alternatives	Upper 1/4 of comparative alternatives
Conduit Length	Lower ¼ of comparative alternatives	Middle ½ of comparative alternatives	Upper ¼ of comparative alternatives
Easement Difficulty	Lower ¼ of comparative alternatives & subjective factors	Middle ½ of comparative alternatives & subjective factors	Upper ¼ of comparative alternatives & subjective factors
Right-of-Way Impact	Lower ¼ of comparative alternatives	Middle 1/2 of comparative alternatives	Upper ¼ of comparative alternatives
Land Owner Impact	Lower ¼ of comparative alternatives & subjective factors	Middle ½ of comparative alternatives & subjective factors	Upper ¼ of comparative alternatives & subjective factors
Proximity to Occupied Dwellings	Lower 1/4 of comparative alternatives	Middle ½ of comparative alternatives	Upper ¼ of comparative alternatives
Environmental Impacts	Lower 1/4 of comparative alternatives	Middle ½ of comparative alternatives	Upper ¼ of comparative alternatives
Existing Utilities	Lower density of existing utilities (subjective)	Moderate density of existing utilities (subjective)	Higher density of existing utilities (subjective)
Hazardous/ Permitted Crossings	Lower ¼ of comparative alternatives	Middle ½ of comparative alternatives	Upper ¼ of comparative alternatives
Surface and Street Impacts	Lower 1/4 of comparative alternatives	Middle ½ of comparative alternatives	Upper ¼ of comparative alternatives
Traffic Impacts	Lower ¼ of comparative alternatives	Middle 1/2 of comparative alternatives	Upper ¼ of comparative alternatives
Water Storage Reservoirs Impacts	Lower ¼ of comparative alternatives	Middle ½ of comparative alternatives	Upper ¼ of comparative alternatives
Construction Duration and Relative Constructability	Lower ¼ of comparative alternatives	Middle ½ of comparative alternatives	Upper ¼ of comparative alternatives
Required Trenchless Crossings	Lower ¼ of comparative alternatives	Middle ½ of comparative alternatives	Upper ¼ of comparative alternatives

Table 1 – Matrix Evaluation Criteria, Description, and Metrics

Evaluation Criteria	Performance Metrics - Green	Performance Metrics - Yellow	Performance Metrics - Red
Development Pressure	Lower ¼ of comparative alternatives	Middle 1/2 of comparative alternatives	Upper ¼ of comparative alternatives
Operation and Maintenance (O&M) Access	Better access (subjective)	Moderate access (subjective)	Poorer access (subjective)
O&M Requirements	Lower ¼ of comparative alternatives	Middle ½ of comparative alternatives	Upper ¼ of comparative alternatives
Natural Resources Impacts	Lower ¼ of comparative alternatives	Middle 1/2 of comparative alternatives	Upper ¼ of comparative alternatives

Appendix 1: Responses to Larimer County Comments

The following appendix is a summary of comments received from Larimer County related to the previous memo submission. Comments and associated responses are included.

Route Evaluation Comments:

- 1. Routing through and around the Eagle Lake Subdivision Please see "Construction Approach for Eagle Lake" supplemental document for additional information. Document is currently in working draft status.
- 2. Routing Adjacent to Boxelder Floodplain Noted that disturbance to the floodplain that results from construction of the pipeline will be subject to floodplain regulations.
- 3. Routing Near the Budweiser Effluent Lines

We are aware of the presence of the Anheuser-Busch effluent lines in the County Road 52 corridor. We will coordinate with A-B as design progresses.

4. Impacts to Larimer County Right-of-Way (ROW)

It is preferable to have alignments remain on the same side of the road to avid the impacts and cost of crossings. We have crossed the roadway at locations where it was determined that impacts to existing surface improvements, impact to residences, or level of disturbance to occupied structures would be significantly mitigated by doing so. The goal of the routing study was to find a route with the overall least disturbance alignments and this has resulted in isolated locations that enter the public ROW.

5. Staging Locations

Staging locations have not yet been identified. These are typically identified during final design once the pipelines are divided into construction contracts. NISP WAE will work with Larimer County to ensure that staging and access requirements are delineated and coordinated in final design.



Northern Integrated Supply Project

Northern Tier Delivery Pipeline Alternatives Analysis

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ROUTE COMPARISONS

Each of the alternatives developed was subjected to the evaluation criteria and metrics described in **Table 1** of the introduction section. The Northern Tier segment was broken into 4 Project Areas to facilitate comparison of alternatives of reasonable length. The Project Areas also enabled the project team to look at combinations of alternatives for each Project Area and facilitated a thorough analysis for the final preferred alignment.

An overview of all of the Project Areas and the identified alternative alignments is provided in **Figure N.1**. The overview page is followed by detailed fact sheets for each alternative alignment that describe the alignment and its performance against the evaluation criteria. Each fact sheet is accompanied by a figure illustrating the proposed routing and pertinent features in the area. The ranking column on the fact sheet provides the summary performance results of that alignment relative to other alternatives (green = good performance, yellow = fair performance, red = poor performance). In the end, the alternate with the best overall performance (least reds, most greens) was chosen to be the preferred alternate. This Preferred Northern Tier Alignment can be seen in **Figure N.19** at the end of this document.

In total, one (1) route was considered for Project Area 0, six (6) alternates were identified and assessed for Project Area 1, five (5) alignment alternates were identified and assessed for Project Area 2, and four (4) alignment alternates were identified and assessed for Project Area 3.

The pipeline segment identified in Project Area o can be seen on the individual alignment alternative maps (**see Figure N.2**), as well as on the overall maps. This segment is symbolized as a dashed grey and black line and is assessed in this document. This section of Northern Tier connects the Proposed Glade Reservoir with the alignment alternates in Project Area 1. Due to the short length and previous landowner coordination, a single route is assessed for this section of the pipeline.

Additionally there is a segment identified as the "Glade Release/Poudre Release Pipeline" which can be seen on the individual alternative maps (**see Figure N.3**), as well as on the overall maps. This segment is symbolized as black and white dashed and is assessed in this document. The Poudre Release Pipeline connects the Poudre River with the alignments in Project Area 1. Similar to the alignment in Project Area 0, a single route is assessed for this pipeline due to previous landowner coordination and direction. Neither of these pipelines were scored with color rankings, since there was only one alternative.



Figure N.1 Northern Tier Project Areas and Alternatives

Dewberry HX



NORTHERN INTEGRATED SUPPLY PROJECT

Alternative Name	Projec	Project Area 0- Alternative N-0.1				
Alternative Location & Description	Alternative N-0.1 begins at the proposed Glade Reservoir Dam Outlet Works, about 6,500 feet north of the intersection of Highway 14 and Highway 287. From the Dam, It traverses generally south until encountering Highway 287, then follows the Highway 287 right-of-way across the Poudre Valley Canal and across Highway 14. It then follows the south side west property lines of two parcels before converging with the south ROW of Highway and the Northern Tier PA 1 alignment alternatives.					
Criteria		Ranking*	Comments			
Capital Cost		-	\$ 6,242,000			
Conduit Length		-	2.1 miles; 11,100 feet			
Easement Difficulty		-	10 parcels crossed. 2 non-perimeter crossings			
Right-of-Way Impact		-	3,000 LF in parallel ROW			
Land Owner Impact		-	2 driveways crossed, minimal subjective landowner impacts			
Proximity to Occupied Dwellings	b	-	Within 100 feet from 1 dwelling			
Environmental Impac Floodplain Crossings	ts and	-	200 LF of wetlands/riparian areas crossed and 0 LF of floodplain crossed			
Existing Utilities -		-	Low utility density			
Hazardous/Permitted		-	No hazardous/permitted crossings expected			
Surface and Street Impacts -		-	0 LF in gravel road and 0 LF in paved roads			
Traffic Impacts -		-	150 LF of low,0 LF of medium, 0 LF of high, Traffic Impact Score of 150			
Water Storage Reservoirs		-	No impacts expected			
Construction Duration and -		-	68 days of construction			
Required Trenchless		-	1 other crossing (Highway 14) and 150 feet total trenchless			
Development Pressu	re	-	0 LF of near-term developments			
Operation and Maintenance Access		-	Convenient access. Near roadways			
O&M Requirements -		-	1 ARV and BO pairs. Large elevation increase over alignment			
Natural Resources Impacts -		-	50 LF in natural areas			



* Rankings not provided since only one alignment is available

Alternative Name	Glade	Glade Release/Poudre Release Pipeline			
Alternative Location & Description	The G N-0.1 Highw for ab to trav until tu	Glade Release/Poudre Release Pipeline begins in the middle of alignment 1 (approximately 250 feet west of the intersection of Highway 14 and 1way 287). It generally goes west, following the north side of Highway 14 about a mile, before crossing to the south side of the highway. It continues averse westerly along the south side of Highway 14 for about 1,000 feet turning southwest and terminating at the Poudre River.			
Criteria		Ranking*	Comments		
Capital Cost		-	\$ 3,978,000		
Conduit Length		-	1.3 miles; 6,900 feet		
Easement Difficulty		-	7 parcels crossed. 1 non-perimeter crossing		
Right-of-Way Impact		-	0 LF in parallel ROW		
Land Owner Impact		-	0 driveways crossed, minimal subjective landowner impacts		
Proximity to Occupied Dwellings	b	-	Within 100 feet from 0 dwellings		
Environmental Impac Floodplain Crossings	ts and	-	150 LF of wetlands/riparian areas crossed and 150 LF of floodplain crossed		
Existing Utilities		-	Low utility density		
Hazardous/Permitted Crossings		-	No hazardous/permitted crossings expected		
Surface and Street In	npacts	-	0 LF in gravel road and 0 LF in paved roads		
Traffic Impacts		-	150 LF of low,0 LF of medium, 0 LF of high, Traffic Impact Score of 150		
Water Storage Reser	voirs	-	Crossing pond/canal. No major impacts		
Construction Duration Relative Constructab	n and ility	-	49 days of construction		
Required Trenchless Crossing		-	1 other crossing (Highway 14) and 150 feet total trenchless		
Development Pressu	re	-	0 LF of near-term developments		
Operation and Maintenance Access		-	Convenient access. Near roadways		
O&M Requirements		-	4 ARV and BO pairs		
Natural Resources Impacts		-	50 LF in natural areas		



* Rankings not provided since only one alignment is available

Alternative Name	Projec	Project Area 1 - Alignment N-1.1			
Alternative Location & Description	Alignm Pipelin before the no throug Hwy 2 back c crosse Water	Alignment N-1.1begins at the end of the first segment of the Northern Tier Pipeline. It then follows the south ROW of highway 14 for about 1,000 feet before crossing to the north side of the highway. The alignment then parallels the north side of Hwy 14 until it turns to the southeast over a ridge and passes through the concrete plant. This alignment follows the proposed ROW of the Hwy 287 relocation. It continues east passing diagonally until reaching the back of Homes of Distinction development. From there, it turns east and crosses the Union Pacific Railroad before paralleling the southern edge of Water Supply and Storage Reservoir 3.			
Criteria		Ranking	Comments		
Capital Cost		Green	\$ 18,744,000		
Conduit Length		Green	5.9 miles; 31,100 feet		
Easement Difficulty		Yellow	18 parcels crossed, 8 non-perimeter crossings		
Right-of-Way Impact		Yellow	12,000 LF of Highway 14 ROW disturbance.		
Land Owner Impact		Green	1 driveway crossed, minimal subjective landowner impacts		
Proximity to Occupied Dwellings	ł	Green	Within 100 feet from 2 dwellings		
Environmental Impacts and Floodplain Crossings		Yellow	1,100 LF of wetlands/riparian areas crossed and 1,900 LF of floodplain crossed		
Existing Utilities		Yellow	Medium utility density		
Hazardous/Permitted Crossings		Yellow	1 hazardous/permitted crossing. Crosses old cement plant which is indicated to be a "Solid Waste Facility"		
Surface and Street Impacts		Yellow	400 LF in gravel roads (CR-56 2x CR-56E, CR-21C) and 0 LF in paved roads		
Traffic Impacts		Green	900 LF of low, 400 LF of medium, 0 LF of high, traffic impact score of 1,700		
Water Storage Reser	voirs	Green	No impacts expected. Over 100 feet from toe of WSSC No. 3 dam.		
Construction Duration Relative Constructabi	n and lity	Yellow	253 days of construction		
Required Trenchless Crossing		Yellow	2 RR crossings (UP RR 2x), 1 HW crossing (Highway 14) , 2 CR crossing (CR-56 2x), 1 other road crossing (Taft Hill) and 900 feet total trenchless		
Development Pressu	re	Green	0 LF of near-term developments		
Operation and Maintenance Access		Yellow	Moderate access, both close and far proximity to roadways		
O&M Requirements		Green	1 ARV/BO pair		
Natural Resources Im	pacts	Yellow	700 LF in natural or riprarian areas		



igure N.4 – Alternative N-1.1

Alternative Name	Proje	ct Area 1 – Ali	gnment N-1.2		
Alternative Location & Description	Alignment N-1.2begins at the end of the first segment of the Northern Tier Pipeline on the north side of Hwy 14 approximately 1,500 feet northwest of the intersection with CR 54E, at the same location as the other Project Area 1 alignments. Alignment N-1.2 begins following the same route as the Alignment N-1.1, but diverts south before skirting the southern edge of the concrete plant. It follows up the eastern side of the plant, where it then follows residential property lines, while heading east until crossing Union Pacific Railroad. After crossing the railroad, it traverses south, then east towards Water Supply and Storage Reservoir 4, where it crosses a channel between Kluver Reservoir and Storage Reservoir 4, before ending in the same location as Alignment N-1.1.				
Criteria		Ranking	Comments		
Capital Cost		Red	\$ 21,043,000		
Conduit Length		Yellow	6.5 miles; 34,400 feet		
Easement Difficulty		Yellow	20 parcels crossed, 4 non-perimeter crossings		
Right-of-Way Impact		Yellow	14,000 LF of Highway 14 ROW disturbance		
Land Owner Impact		Yellow	6 driveways crossed, moderate subjective landowner impacts		
Proximity to Occupied Dwellings	ł	Green	Within 100 feet from 2 dwellings		
Environmental Impacts and Floodplain Crossings		Yellow	1,000 LF of wetlands/riparian areas crossed and 1,500 LF of floodplain crossed		
Existing Utilities		Yellow	Medium utility density		
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings expected		
Surface and Street Im	npacts	Yellow	300 LF in gravel roads (CR-56 2x, CR-56E) and 0 LF in paved roads		
Traffic Impacts		Green	1200 LF of low, 300 LF of medium, 0 LF of high, traffic impact score of 1,800		
Water Storage Reser	voirs	Yellow	No impacts expected Alignment does pass through deep connection channel between Kluver Reservoir and Water Supply and Storage Reservoir 4		
Construction Duration Relative Constructabi	n and lity	Red	310 days of construction		
Required Trenchless Crossing		Red	1 RR crossings (UP RR), 1 HW crossing (Highway 14), 3 CR crossings (CR-21C, CR-56 2x), 3 other road crossings (Shields, Travis (2x))and 1200 feet total trenchless		
Development Pressu	re	Green	0 LF of near-term developments	E	
Operation and Maintenance Access		Yellow	Moderate access, both close and far proximity to roadways		
O&M Requirements		Yellow	2 ARV/BO pairs		
Natural Resources Im	pacts	Yellow	700 LF in natural or riprarian areas		



Alternative Name	Projec	ct Area 1 - Align	ment N-1.3		
Alternative Location & Description	Alignment N-1.3begins at the end of the first segment of the Northern Tier Pipeline on the north side of Hwy 14 approximately 1,500 feet northwest of the intersection with CR 54E. Alignment N-1.3 parallels the north side of Hwy 14 until it crosses the highway just west of the intersection with Green Mile Drive. It then parallels the south side of Hwy 14 until it turns east and southeast through rural residential parcels. It crosses a foothill whose elevation would hydraulically limit conveyance from the reservoir unless the foothill was tunneled. The alignment then crosses Hwy 14 again as it passes through the steep ridge along current CR 56E, south of the concrete plant and then continues to the north along the east side of CR 56. It continues east paralleling the north side of the Union Pacific Railroad ROW to Taft Hill Road. From there, it heads north and then east where it ends between Water Supply and Storage Reservoir 3 and Reservoir 4				
Criteria		Ranking	Comments	j	
Capital Cost		Red	\$ 21,958,000		
Conduit Length		Yellow	6.3 miles; 33,300 feet		
Easement Difficulty		Yellow	25 parcels crossed. 5 non-perimeter crossings		
Right-of-Way Impact		Yellow	6,000 LF of Highway 14 ROW disturbance		
Land Owner Impact		Green	1 driveway crossed, minimal subjective landowner impacts		
Proximity to Occupied Dwellings	d	Green	Within 100 feet from 2 dwellings		
Environmental Impacts and Floodplain Crossings		Red	2,000 LF of wetlands/riparian areas crossed and 1,900 LF of floodplain crossed		
Existing Utilities	Existing Utilities		Medium utility density		
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings expected		
Surface and Street In	Surface and Street Impacts		200 LF in gravel roads (CR-56, CR-56E) and 0 LF in paved roads		
Traffic Impacts		Green	1400 LF of low, 200 LF of medium, 0 LF of high, traffic impact score of 1,800		
Water Storage Reser	voirs	Green	No impacts expected. Over 100 feet from toe of WSSC No. 3 dam.		
Construction Duration Relative Constructab	Construction Duration and Relative Constructability		391 days of construction		
Required Trenchless Crossing	Required Trenchless Crossing		2 RR crossings (UP RR 2x), 3 HW crossings (Highway 14 3x), 2 CR crossing (CR-56 2x), 1 other road crossing (Taft Hill) 1 hill crossing and 1900 feet total trenchless		
Development Pressu	re	Green	0 LF of near-term developments	-	
Operation and Maintenance Access		Red	Difficult access. Alignment passes through hard to access areas and is not near roadways for much of the length	FI	
O&M Requirements		Green	1 ARV/BO pair. Extreme elevation change along crest		
Natural Resources Impacts		Yellow	700 LF in natural or riprarian areas		



igure N.6 – Alternative N-1.3

Alternative Name	Projec	Project Area 1 – Alignment N-1.4			
Alternative Location & Description	Alignn Pipelir interse CR 56 south what v paralle betwe	Alignment N-1.4begins at the end of the first segment of the Northern Tier Pipeline on the north side of Hwy 14 approximately 1,500 feet northwest of the intersection with CR 54E. It runs parallel to Hwy 14 until it turns to the east at CR 56E through the steep ridge, south of the concrete plant and then turns south back to Hwy 14. It parallels the north side of Hwy 14 until it reaches what would be an extension of Douglas Road and continues to the east paralleling Douglas Road until it ends at the same location as Alignment N-1.3, between Water Supply and Storage Reservoir 3 and Reservoir 4.			
Criteria		Ranking	Comments		
Capital Cost		Red	\$ 21,416,000		
Conduit Length		Green	6.1 miles; 32,200 feet		
Easement Difficulty		Green	15 parcels crossed, 2 non-perimeter crossings		
Right-of-Way Impact		Red	21,000 LF of Highway 14 and Douglas Road ROW disturbance		
Land Owner Impact		Green	1 driveway crossed, moderate subjective landowner impacts		
Proximity to Occupied Dwellings	b	Red	Within 100 feet from 12 dwellings		
Environmental Impac Floodplain Crossings	ts and	Yellow	900 LF of wetlands/riparian areas crossed and 1,800 LF of floodplain crossed		
Existing Utilities		Red	High utility density		
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings expected		
Surface and Street In	npacts	Red	800 LF in gravel roads (CR-56 2x, CR-56E) and 3000 LF in paved roads (Douglas Road)		
Traffic Impacts		Red	800 LF of low, 800 LF of medium, 3000 LF of high. traffic impact score of 14,400		
Water Storage Reser Impacts	voirs	Green	No impacts expected		
Construction Duratior Relative Constructabi	n and ility	Yellow	275 days of construction		
Required Trenchless Crossing		Yellow	1 RR crossing (UP RR), 1 HW crossing (Highway 14), 1 CR crossing (CR-56), 2 other road crossings (Taft Hill, Shields) and 800 feet total trenchless		
Development Pressu	re	Green	0 LF of near-term developments]	
Operation and Maintenance Access		Yellow	Convenient access. Near roadway for entire length.		
O&M Requirements		Yellow	2 ARV/BO pairs. Extreme elevation change along HW 14	Fig	
Natural Resources Im	npacts	Yellow	700 LF in natural or riprarian areas	1	



Alternative Name	Projec	Project Area 1 – Alignment N-1.5				
Alternative Location & Description	Alignment N-1.5 begins at the end of the first segment of the Northern Tier Pipeline on the north side of Hwy 14 approximately 1,500 feet northwest of the intersection with CR 54E. Alignment N-1.5 parallels the north side of Hwy 14 for a section. It turns to the north and follows the east side of CR 23E before turning to the east through the steep ridge. It continues east through the open space north of Curtis Lake and follows along the north side of Humble Road past Taft Hill Road. About a half mile past Taft Hill Road, the alignment veers north and then northeast to skirt the edges of the property lines surrounding the reservoirs. It ends at the same location as Alignment N-1.3, between Water Supply and Storage Reservoir 3 and Reservoir 4.					
Criteria		Ranking	Comments			
Capital Cost		Red	\$ 20,636,200			
Conduit Length		Red	7.1 miles; 37,400 feet			
Easement Difficulty		Red	30 parcels crossed, 6 non-perimeter crossings. More exist, but follow two track roadway			
Right-of-Way Impact		Yellow	7,000 LF of Highway 14 ROW disturbance			
Land Owner Impact		Green	2 driveways crossed, minimal subjective landowner impacts			
Proximity to Occupied Dwellings	d	Green	Within 100 feet from 3 dwellings			
Environmental Impacts and Floodplain Crossings		Yellow	1,300 LF of wetlands/riparian areas crossed and 1,700 LF of floodplain crossed			
Existing Utilities		Yellow	Medium utility density			
Hazardous/Permitted Crossings	l	Green	No hazardous/permitted crossings expected			
Surface and Street In	npacts	Green	0 LF in gravel roads and 0 LF in paved roads			
Traffic Impacts		Green	300 LF of low, 0 LF of medium, 0 LF of high, traffic impact score of 300			
Water Storage Reser	voirs	Green	No impacts expected			
Construction Duration Relative Constructab	n and ility	Green	203 days of construction			
Required Trenchless Crossing		Green	1 HW crossing (Highway 14), 1 other road crossing (Taft Hill) and 300 feet total trenchless			
Development Pressu	re	Green	0 LF of near-term developments			
Operation and Maintenance Access		Red	Alignment passes through hard to access areas and is not near roadways for much of the length			
O&M Requirements		Red	5 ARV/BO pairs. Large elevation change	F		
Natural Resources In	npacts	Yellow	700 LF in natural or riprarian areas			



Alternative Name	Projec	Project Area 1 – Alignment N-1.6			
Alternative Location & Description	Alignment N-1.6 begins at the end of the first segment of the Northern Tier Pipeline on the north side of Hwy 14 approximately 1,500 feet northwest of the intersection with CR 54E. Alignment N-1.6 begins following the south side of Willow Nook Road then continues to the northeast paralleling the South Poudre Canal to CR 23E. It follows the east side of CR 23 E before turning to the east through the steep ridge. It continues east through open space north of Curtis Lake and follows along the north side of Humble Road to Taft Hill Road. About a half mile past Taft Hill Road, the alignment veers north and then northeast to skirt the edges of the property lines surrounding the reservoirs. It ends at the same location as Alignment N-1.3, between Water Supply and Storage Reservoir 3 and Reservoir 4.				
Criteria		Ranking	Comments		
Capital Cost		Red	\$ 20,436,900		
Conduit Length		Red	7.0 miles; 36,800 feet		
Easement Difficulty		Red	30 parcels crossed, 4 non-perimeter crossings		
Right-of-Way Impact		Green	0 LF in parallel ROW		
Land Owner Impact		Green	1 driveway crossed, minimal subjective landowner impacts		
Proximity to Occupie Dwellings	d	Yellow	Within 100 feet from 5 dwellings		
Environmental Impac Floodplain Crossings	ts and	Green	500 LF of wetlands/riparian areas crossed and 700 LF of floodplain crossed		
Existing Utilities		Green	Low utility density		
Hazardous/Permittec Crossings	l	Green	No hazardous/permitted crossings expected		
Surface and Street Ir	npacts	Yellow	300 LF in gravel roads (CR-23E, CR-21C, Humble Rd) and 0 LF in paved roads		
Traffic Impacts		Green	300 LF of low, 300 LF of medium, 0 LF of high, traffic impact score of 900		
Water Storage Reser	voirs	Green	No impacts expected		
Construction Duration Relative Constructab	n and ility	Green	200 days of construction		
Required Trenchless Crossing		Green	1 HW crossing (Highway 14), 1 other road crossing (Taft Hill) and 300 feet total trenchless		
Development Pressu	re	Green	0 LF of near-term developments		
Operation and Maintenance Access		Red	Difficult access. Alignment passes through hard to access areas and is not near roadways for much of the length		
O&M Requirements		Red	5 ARV/BO pairs. Extreme elevation change at beginning		
Natural Resources In	npacts	Green	100 LF through natural areas		
			a I		



Alternative Name	Projec	Project Area 2 – Alignment N-2.1			
Alternative Location & Description	Alignn Reser and #4 before and ag It turns diagor	ment N-2.1 begins in-between Kulver Reservoir and Water Supply rvoir #4 and then heads northeast in-between Water Supply Reservoir #3 t4 and north of Dixon Reservoir. It turns south east of Dixon Reservoir e heading east at CR 56. It continues southeast through rural residential agricultural properties, adjacent to Annex Reservoir #8 to Grey Rock Drive. se east and parallels Grey Rock Drive until it crosses an open farmland onally, and then follows CR 54 until the intersection with Giddings Rd.			
Criteria		Ranking	Comments		
Capital Cost		Green	\$ 13,533,000		
Conduit Length		Green	4.4 miles; 23,000 feet		
Easement Difficulty		Red	26 parcels crossed, 9 non-perimeter crossings		
Right-of-Way Impact		Green	0 LF in parallel ROW		
Land Owner Impact		Green	1 driveway crossed, minimal subjective landowner impacts		
Proximity to Occupie Dwellings	d	Green	Within 100 feet from 6 dwellings		
Environmental Impac Floodplain Crossings	ts and	Yellow	500 LF of wetlands/riparian areas crossed and 0 LF of floodplain crossed		
Existing Utilities		Yellow	Medium utility density		
Hazardous/Permitted Crossings	1	Green	No hazardous/permitted crossings expected		
Surface and Street Ir	npacts	Green	400 LF in gravel roads (Hood Lane, CR-56, CR-13, Turnberry) and 0 LF in paved roads		
Traffic Impacts		Green	500 LF of low, 400 LF of medium, 0 LF of high, Traffic Impact Score of 1300		
Water Storage Reser	voirs	Green	No impact to water storage reservoir expected. Close to the side of Annex Reservoir 8		
Construction Duratio Relative Constructab	n and ility	Green	160 days of construction		
Required Trenchless Crossing		Yellow	3 CR crossings (CR-15, CR-54 2x) and 2 other road crossings (Eagle Lake, Giddings) and 500 feet total trenchless		
Development Pressure		Green	0 LF of near-term developments		
Operation and Maintenance Access		Green	Best access of alternates identified		
O&M Requirements		Yellow	7 ARV and BO pairs. Some extreme elevation change throughout.		
Natural Resources Impacts		Green	100 LF through natural areas		



Alternative Name	Projec	Project Area 2 – Alignment N-2.2									
Alternative Location & Description	Alignn embai north It turn west s dam a east d	Alignment N-2.2 begins between the toe of Water Supply Reservoir #3 embankment and the north shore of Water Supply Reservoir #4. It then turns north along the east shore of Reservoir #3 and the back of rural residential lots. It turns east beyond the residential lots to Hood Lane and heads south on the west side of Hood Lane. It turns to the east in between Windsor Reservoir #8 dam and the north shore of Annex Reservoir Number 8 to CR 56. It continues east down CR 56 until the intersection with Giddings Road.									
Criteria		Ranking	Comments								
Capital Cost		Green	\$ 13,321,000								
Conduit Length		Green	4.4 miles; 23,000 feet								
Easement Difficulty		Yellow	18 parcels crossed, 5 non-perimeter crossings]							
Right-of-Way Impact		Green	0 LF in parallel ROW								
Land Owner Impact		Green	0 driveways crossed, minimal subjective landowner impacts								
Proximity to Occupied Dwellings	ł	Green	Within 100 feet from 2 dwellings								
Environmental Impac Floodplain Crossings	ts and	Red	1,200 LF of wetlands/riparian areas crossed and 0 LF of floodplain crossed]							
Existing Utilities		Yellow	Medium utility density]							
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings expected								
Surface and Street In	npacts	Green	600 LF in gravel roads (Hood Lane, CR-56 3x, CR-13, CR-11, and 0 LF in paved roads								
Traffic Impacts		Green	300 LF of low, 600 LF of medium, 0 LF of high, Traffic Impact Score of 1500								
Water Storage Reser Impacts	voirs	Red	Will be in conflict with connection pipeline between Annex Reservoir 8, Elder Reservoir and Windsor Reservoir 8. Less than 100 feet from side of Storage Reservoir 3 and Annex Reservoir 8								
Construction Duratior Relative Constructabi	n and lity	Green	140 days of construction								
Required Trenchless Crossing		Green	1 CR crossing (CR-15) and 1 other road crossing (Giddings) and 300 feet total trenchless]							
Development Pressu	re	Green	0 LF of near-term developments	1							
Operation and Maintenance Access		Yellow	Moderate access, both close and far proximity to roadways								
O&M Requirements		Yellow	6 ARV and BO pairs. Some extreme elevation change throughout	F							
Natural Resources Im	pacts	Green	100 LF through natural areas								





Alternative Name	Projec	Project Area 2 – Alignment N-2.3									
Alternative Location & Description	Alignn from F evalua	lignment N-2.3 is very similar to N-2.2 with modifications to the alignment om Hood Lane to Windsor Reservoir to achieve better performance in the valuation criteria.									
Criteria	iteria Ranking Comments										
Capital Cost		Green	\$ 13,327,700								
Conduit Length		Green	4.3 miles; 22,900 feet								
Easement Difficulty		Yellow	18 parcels crossed, 4 non-perimeter crossings								
Right-of-Way Impact		Green	0 LF in parallel ROW								
Land Owner Impact		Green	1 driveway crossed, minimal subjective landowner impacts								
Proximity to Occupied Dwellings	d	Green	Within 100 feet from 2 dwellings								
Environmental Impac Floodplain Crossings	ts and	Yellow	700 LF of wetlands/riparian areas crossed and 0 LF of floodplain crossed								
Existing Utilities		Yellow	Medium utility density								
Hazardous/Permitted Crossings	l	Green	No hazardous/permitted crossings expected								
Surface and Street In	npacts	Green	600 LF in gravel roads (Hood Lane, CR-56 3x, CR-13, CR-11) and 0 LF in paved roads								
Traffic Impacts		Green	300 LF of low, 600 LF of medium, 0 Lf of high, Traffic Impact Score of 1500								
Water Storage Reser Impacts	voirs	Red	Will be in conflict with connection pipeline between Annex Reservoir 8, Elder Reservoir and Windsor Reservoir 8. Less than 100 feet from side of Storage Reservoir 3 and Annex Reservoir 8								
Construction Duration Relative Constructab	n and ility	Green	140 days of construction								
Required Trenchless Crossing		Green	1 CR crossing (CR-15) and 1 other road crossing (Giddings) and 300 feet total trenchless								
Development Pressu	re	Green	0 LF of near-term developments								
Operation and Maintenance Access		Yellow	Moderate access, both close and far proximity to roadways								
O&M Requirements		Yellow	6 ARV and BO pairs. Some extreme elevation change throughout								
Natural Resources In	npacts	Green	100 LF through natural areas								



Alternative Name	Projec	Project Area 2 – Alignment N-2.4								
Alternative Location & Description	Alignn (betwe contin	Alignment N-2.4 begins at the same location as the end of Alignment N-1.4 between Terry Lake and Water Supply Reservoir #4 on Douglass Road). It continues east following Douglas Road to Giddings Road.								
Criteria		Ranking	Comments							
Capital Cost		Yellow	\$ 16,541,100							
Conduit Length		Green	3.4 miles; 18,200 feet							
Easement Difficulty		Green	15 parcels crossed, 0 non-perimeter crossings							
Right-of-Way Impact		Red	11,000 LF in ROW. Major ROW disturbance							
Land Owner Impact		Red	19 driveways crossed, high subjective landowner impacts							
Proximity to Occupied Dwellings	d	Red	Within 100 feet from 24 dwellings							
Environmental Impac Floodplain Crossings	ts and	Yellow	700 LF of wetlands/riparian areas crossed and 0 LF of floodplain crossed							
Existing Utilities		Red	High utility density							
Hazardous/Permitted Crossings	l	Green	No hazardous/permitted crossings expected							
Surface and Street In	npacts	Red	0 LF in gravel roads and 9,000 LF in paved roads (Douglas Road)							
Traffic Impacts		Red	300 LF of low, 0 LF of medium, 9,000 LF of high, Traff Impact Score of 36,300							
Water Storage Reser	voirs	Green	No impacts expected							
Construction Duration Relative Constructab	n and ility	Green	210 days of construction							
Required Trenchless Crossing		Green	1 CR crossing (CR-54) and 1 other road crossing (Giddings) and 300 feet total trenchless							
Development Pressu	re	Green	0 LF of near-term developments							
Operation and Maintenance Access		Red	Inconvenient access due to traffic control and safety from being in/near existing busy roads for majority of length							
O&M Requirements		Green	2 ARV and BO pairs. Some extreme elevation change throughout							
Natural Resources In	npacts	Green	100 LF through natural areas							



Dewberry HX

Alternative Name	Project Area 2 – Alignment N-2.5								
Alternative Location & Description	Alignment N-2.5 begins at the end of Alignment N-1.6, north of Rocky Ridge Lake Reservoir 1 along Weld County Road 60. It then traverses east and southeast around Rocky Ridge Lake through rural residential and agricultural properties to Terry Lake Road. It continues to follow the west side of Terry Lake Road to the south before turning east at CR 58. It continues east down CR 58 and then turns south at CR 11. It continues south down CR 11 and then southeast through agricultural and rural residential properties to Giddings Road.								
Criteria	Ran	king	Comments						
Capital Cost	Red		\$ 23,705,000						
Conduit Length	Red	l	6.5 miles; 34,500 feet						
Easement Difficulty	Yell	ow	20 parcels crossed, 3 non-perimeter crossings						
Right-of-Way Impact	Yell	ow	6,500 LF in ROW. Major ROW disturbance						
Land Owner Impact	Red		13 driveways crossed, high subjective landowner impacts						
Proximity to Occupied Dwellings	Yell	ow	Within 100 feet from 8 dwellings						
Environmental Impact Floodplain Crossings	s and Gree	en	0 LF of wetlands/riparian areas crossed and 0 LF of floodplain crossed						
Existing Utilities	Red		High utility density						
Hazardous/Permitted Crossings	Gree	en	No hazardous/permitted crossings expected						
Surface and Street Im	pacts Yell	ow	5,000 LF in gravel roads (CR-11) and 0 LF in paved roads						
Traffic Impacts	Yell	ow	950 LF of low, 5,000 LF of medium, 0 LF of high, Traffic Impact Score of 10,950						
Water Storage Reserv Impacts	voirs Gree	en	No impacts expected						
Construction Duration Relative Constructabil	and Red		284 days of construction						
Required Trenchless Crossing	Red		4 CR crossings (CR-58 3x, CR-54), 2 other road crossings (Terry Lake, Giddings) and 950 feet total trenchless						
Development Pressur	e Gre	en	0 LF of near-term developments						
Operation and Maintenance Access	Yell	ow	Moderate access, both close and far proximity to roadways						
O&M Requirements	Its Green 2 ARV and BO pairs. Significantly longer length equat to more maintenance								
Natural Resources Im	pacts Gree	en	100 LF through natural areas						



Alternative Name	Projec	Project Area 3 – Alignment N-3.1									
Alternative Location & Description	Alignn 54 inte southe 52, wh	Alignment N-3.1 begins at the end of Alignment N-2.1 (Giddings Road and CR 54 intersection) and continues east following CR 54 for a mile before heading southeast through agricultural property. It then heads south until reaching CR 52, which it follows until the intersection with CR 1.									
Criteria Ranking Comments											
Capital Cost		Green	\$ 15,406,000								
Conduit Length		Green	4.6 miles; 24,500 feet								
Easement Difficulty		Green	11 parcels crossed, 1 non-perimeter crossing								
Right-of-Way Impact		Yellow	1,500 LF in CR-52 ROW to avoid residences								
Land Owner Impact		Green	3 driveways crossed, moderate subjective landowner impacts								
Proximity to Occupie Dwellings	d	Yellow	Within 100 feet from 7 dwellings								
Environmental Impac Floodplain Crossings	ts and	Yellow	0 LF of wetlands/riparian areas crossed and 2,000 LF of floodplain crossed								
Existing Utilities		Yellow	Medium utility density								
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings expected								
Surface and Street In	npacts	Red	1,200 LF in gravel roads (Broadacre Lane, CR-52, CR- 54, CR-3) and 300 LF in paved roads (CR-52)								
Traffic Impacts		Red	800 LF of low,1,200 LF of medium, 300 LF of high, Traffic Impact Score of 4,400								
Water Storage Reser Impacts	voirs	Green	No impacts expected								
Construction Duration Relative Constructab	n and ility	Green	210 days of construction								
Required Trenchless Crossing		Green	1 RR crossing (BNSF), 1 HW crossing (I-25), 1 CR crossings (CR-52), 1 other crossing (Brooklind Estates) and 800 feet total trenchless								
Development Pressu	re	Green	0 LF of near-term developments								
Operation and Maintenance Access Yello			Moderate access, Near roadways for large portions								
O&M Requirements		Yellow	4 ARV and BO pairs. Large elevation increase over alignment								
Natural Resources In	100 LF through natural areas										



Figure N.15 – Alternative N-3.1

Alternative Name	Projec	Project Area 3 – Alignment N-3.2										
Alternative Location & Description	Alignn 56 inte headir It then curren it inter	lignment N-3.2 begins at the End of Alignment N-2.2 (Giddings Road and CR 6 intersection) and continues east following CR 56 for a half mile before leading south and then east through agricultural property toward Cobb Lake. I then heads south and then southeast through rural residential parcels in a surrently expanding development to CR 52. It turns east following CR 52 until I intersects with CR 1.										
Criteria		Ranking	Comments									
Capital Cost		Red	\$ 18,075,000									
Conduit Length		Yellow	5.4 miles; 29,000 feet									
Easement Difficulty		Yellow	15 parcels crossed, 2 non perimeter crossings through development									
Right-of-Way Impact		Yellow	1,500 LF in CR-52 ROW to avoid residences									
Land Owner Impact		Green	3 driveways crossed, moderate subjective landowner impacts									
Proximity to Occupied Dwellings	d	Green	Within 100 feet from 4 dwellings									
Environmental Impac Floodplain Crossings	ts and	Green	0 LF of wetlands/riparian areas crossed and 900 LF of floodplain crossed									
Existing Utilities		Yellow	Medium utility density									
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings expected									
Surface and Street In	npacts	Yellow	1,200 LF in gravel roads (CR-54, CR-52) and 0 LF in paved roads									
Traffic Impacts		Yellow	800 LF of low,1,200 LF of medium, 0 LF of high, Traffic Impact Score of 3,200									
Water Storage Reser Impacts	voirs	Green	No impacts expected									
Construction Duration Relative Constructab	n and ility	Red	237 days of construction									
Required Trenchless Crossing		Green	1 RR crossing (BNSF), 1 HW crossing (I-25), 1 CR crossings (CR 54), 1 other crossing (Taliesin Way) and 800 feet total trenchless									
Development Pressu	re	Red	7000 LF near-term development									
Operation and Maintenance Access		Red	Difficult access.Not near major roadways for large portions									
O&M Requirements		Yellow	4 ARV and BO pairs. Significantly longer length equates to more maintenance. Large elevation increase over alignment									
Natural Resources In	npacts	Green	100 LF through natural areas									



Alternative Name	Projec	Project Area 3 – Alignment N-3.3								
Alternative Location & Description	Alignn Road Cobb prope CR 1.	nent N-3.3 begi and CR 54 inte Lake. It turns s rties to CR 52.	ns at the same location as Alignment N-3.1 (Giddings rsection). It then heads east following CR 54 toward south at Blossom House Lane through agricultural It then heads east following CR 52 to the intersection with							
Criteria		Ranking	Comments							
Capital Cost		Red	\$ 16,339,000							
Conduit Length		Green	4.8 miles; 25,500 feet							
Easement Difficulty		Green	12 parcels crossed, 0 non-perimeter crossings							
Right-of-Way Impact		Yellow	1,500 LF in CR-52 ROW to avoid residences							
Land Owner Impact		Green	3 driveways crossed,moderate subjective landowner impacts							
Proximity to Occupied Dwellings	b	Yellow	Within 100 feet from 7 dwellings							
Environmental Impac Floodplain Crossings	ts and	Yellow	0 LF of wetlands/riparian areas crossed and 1,900 LF of floodplain crossed							
Existing Utilities		Yellow	Medium utility density							
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings expected							
Surface and Street In	npacts	Red	1,200 LF in gravel roads (CR54, Broadacre Lane, CR- 52, CR-3) and 300 LF in paved roads (CR-52)							
Traffic Impacts		Red	1,000 LF of low,1,200 LF of medium, 300 LF of high, Traffic Impact Score of 4600							
Water Storage Reser Impacts	voirs	Green	No impacts expected							
Construction Duration Relative Constructab	n and ility	Red	239 days of construction							
Required Trenchless Crossing		Red	1 RR crossing (BNSF), 1 HW crossing (I-25), 2 CR crossings (CR-54, CR-52), 1 other crossing (Brooklind Estates) and 1,000 feet total trenchless							
Development Pressu	re	Green	0 LF of near-term developments							
Operation and Maintenance Access		Yellow	Moderate access both close and far proximity to roadways							
O&M Requirements		Yellow	4 ARV and BO pairs. Large elevation increase over alignment							
Natural Resources In	npacts	Green	100 LF through natural areas							



Figure N.17 – Alternative N-3.3

Alternative Name Project Area 3 – Alignment N-3.4									
Alternative Location & Description Alternative clocation and continues east through agricultural properties toward Continues and the south and the south east through agricultural properties to CR 50. It turns east at CR 50 through State of Colorado property to CR1. From there, it heads north to end at the same intersection as the previous alignments, the intersection of CR 1 and CR 52.									
Criteria		Ranking	Comments						
Capital Cost		Red	\$ 18,176,000						
Conduit Length		Red	5.9 miles; 31,100 feet						
Easement Difficulty		Green	11 parcels crossed, 1 non-perimeter crossing						
Right-of-Way Impact		Green	0 LF in parallel ROW						
Land Owner Impact		Green	3 driveways crossed,moderate subjective landowner impacts						
Proximity to Occupied Dwellings	ł	Green	Within 100 feet from 3 dwellings						
Environmental Impac Floodplain Crossings	ts and	Red	300 LF of wetlands/riparian areas crossed and 2,400 LF of floodplain crossed						
Existing Utilities		Yellow	Medium utility density						
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings expected						
Surface and Street In	npacts	Green	100 LF in gravel roads (CR 3) and 0 LF in paved road						
Traffic Impacts		Green	800 LF of low,100 LF of medium, 0 LF of high, Traffic Impact Score of 1,000						
Water Storage Reser Impacts	voirs	Green	No impacts expected						
Construction Duration Relative Constructabi	n and lity	Yellow	235 days of construction						
Required Trenchless Crossing		Green	1 RR crossing (BNSF), 1 HW crossing (I-25), 1 CR crossings (CR-52) and 800 feet total trenchless						
Development Pressu	re	Green	0 LF of near-term developments						
Operation and Maintenance Access		Red	Difficult access. Not near major roadways						
O&M Requirements		Yellow	4 ARV and BO pairs. Significantly longer length equates to more maintenance. Large elevation increase over alignment						
Natural Resources Im	pacts	Green	100 LF through natural areas						



EVALUATION RESULTS

Table N.1 below provides a visual summary of the evaluation results and criteria ranking given to each alternative. **Table N.2** tabulates the number of greens, yellows, and reds given to each alternative.

Table N.1 – Visual Summary of Alternative Scoring

Evaluation Criteria	N-1.1	N-1.2	N-1.3	N-1.4	N-1.5	N-1.6	N-2.1	N-2.2	N-2.3	N-2.4	N-2.5	N-3.1	N-3.2	N-3.3	N-3.4
Capital Cost															
Conduit Length															
Easement Difficulty/Cost															
Use of Right-of-Way															
Land Owner Impact															
Proximity to Occupied Dwelling															
Environmental Impacts and Floodplain Crossings															
Existing Utilities															
Hazardous/Permitted Crossings															
Surface and Street Impacts															
Traffic Impacts															
Impacts to Water Storage Reservoirs															
Construction Duration and Relative Constructability															
Required Trenchless Crossings															
Development Pressure															
Operation and Maintenance (O&M) Access															
O&M Requirements															
Natural Area Impacts															



Evaluation Criteria	N-1.1	N-1.2	N-1.3	N-1.4	N-1.5	N-1.6	N-2.1	N-2.2	N-2.3	N-2.4	N-2.5	N-3.1	N-3.2	N-3.3	N-3.4
Red	0	3	5	6	5	5	1	2	1	7	6	2	4	5	4
Yellow	10	11	6	6	4	2	4	4	5	2	6	6	7	6	3
Green	8	4	7	6	9	11	13	12	12	9	6	10	7	7	11

Table N.2 – Numeric Summary of Alternative Scoring

PREFERRED ALIGNMENT

As stated previously, the alternate with the best overall performance (least reds, most greens) is to be the preferred alternate. In the case of a tie, alternates were to have been reviewed and the preferred alignment selected based upon prioritization of factors, mainly conduit length, constructability and land-owner/environmental impacts. In the case of the Northern Tier evaluations tie breakers were not needed. The preferred alignment consists of a combination of Alternate N-0.1, N-1.1, N-2.1 and N-3.1 plus the Glade Release/Poudre Release Pipeline. The preferred alignment is depicted in **Figure N.19** and generally described as follows:

The preferred alignment for the Glade Release/Poudre Release Pipeline begins at the south end of the first segment of the Northern Tier pipeline (approximately 250 feet west of the intersection of Highway 14 and Highway 287). It goes generally west, following the north side of Highway 14 for about a mile, before crossing to the south side of the highway. It continues to traverse westerly along the south side of Highway 14 for about 1,000 feet until turning southwest and terminating at the Poudre River.

The preferred alignment for Project Area o begins at the proposed Glade Reservoir Dam Outlet Works, about 6,500 feet north of the intersection of Highway 14 and Highway 287. From the dam, it traverses generally south until encountering Highway 287, then follows the Highway 287 right-of-way across the Poudre Valley Canal and across Highway 14. It then follows the south side west property lines of two parcels before converging with the south ROW of Highway 14.

From the end of the first segment in the Northern Tier Pipeline (N-o.1), the Northern Tier Pipeline follows the south ROW of Highway 14 for about 1,000 feet before crossing to the north side of the highway. The alignment then parallels the north side of Hwy 14 until diverging from the highway to turn to the southeast over a ridge and pass through the concrete plant. The alignment then follows the proposed ROW of the Hwy 287 relocation. It continues east, crossing Weld County Road 56, until reaching the back of Homes of Distinction development where it turns briefly to the north and then back to the east to parallel County Road 56. The alignment then parallels County Road 56 for approximately 1,500 feet before turning north to cross the road and the railroad spur, the line traverses northeasterly towards the feed lot at North Taft Hill Road. After crossing North Taft Hill Road, the lines traverses easterly to the west shore of Water Supply and Storage Reservoir 3 to intersect with Travis Road. At Travis Road, the line turns south for approximately 1,700 feet before turning east to pass between of Water Supply and Storage Reservoirs #3 and #4.

After passing between the two Water Supply Reservoirs, the Northern Tier line then heads northeast in-between Water Supply Reservoir #3 and #4 and north of Dixon Reservoir. It then turns south east of Dixon Reservoir before heading east at CR 56. It continues southeast through rural residential and agricultural properties, adjacent to Annex Reservoir #8 to Grey Rock Drive. It turns east and parallels Grey Rock Drive until it crosses an open farmland diagonally, and then follows CR 54 until the intersection with Giddings Rd.

At the intersection of Giddings Road and County Road the line continues east following CR 54 for a mile before heading southeast through agricultural property. It then heads south until reaching CR 52, which it follows until the intersection with County Road 1 where it connects to the County Line Road Pipeline



Some of the benefits of this alignment combination include:

- Limited traffic impacts
- Comparatively low construction duration
- Comparatively low landowner impacts
- Lower capital cost

Table N.3 below summarizes the estimated features of the overall preferred alignment, broken down by Project Area segments.

Table N.3 – Preferred Alignment Characteristics

Characteristic	N-0.1	Glade Release/Poudre Release	N-1.1	N-2.1	N-3.1	TOTAL
Pipe Diameter (inches)	54	54	54	54	54	54
Pipe Material	Mortar Lined Steel	Mortar Lined Steel	Mortar Lined Steel	Mortar Lined Steel	Mortar Lined Steel	Mortar Lined Steel
Total Distance (miles)	2.1	1.3	5.9 4.4		4.6	18.3
Approximate Pipe Cost	\$6,242,000	\$3,978,000	\$18,544,000	\$13,533,000	\$15,406,000	\$57,703,000
Length Tunnel (feet)	150	150	800	500	800	2400
Estimated Number of Landowners	10	7	18	26	11	72
LF of Wetland Crossings	200	150	1,100	500	0	1,950




Figure N.19 – Northern Tier Preferred Alignment



Construction Approach for Pipeline Segment between Travis Road and Highway 1

In performing the route analysis the engineering team noted the gated entrances to the Eagle Lake Subdivision. The presence of these restricted entrances spurred the team to develop a preliminary approach to construction access and estimated construction duration so that the impacts to these gated entrances could be better understood. The limits of the preliminary plan are depicted in figure P-7 below.



Figure P.9 Construction Access and Duration.

Segment 1 – Highway 1 to Hood Lane. Construction and material delivery vehicles will access the alignment via the alignment as it connects to Highway 1 and Hood Lane. In most cases entering via Highway one and exiting via Hood Lane. This segment is approximately 800 feet in length and is estimated to require approximately 5 to 8 work days for active excavation/pipe installation with activity beginning approximately 1 month prior for clearing, grubbing and site preparation. Following pipe installation, restoration of the disturbed area is anticipated to require approximately another 6 weeks. In total it is anticipated that this area will be impacted for approximately 12 weeks. The pipeline across Highway 1 will be crossed using trenchless methods so traffic on that roadway will not be restricted by construction activity.

Segment 2 – Wetlands North of Dixon Reservoir. Construction and material delivery vehicles will access the alignment via Hood Lane and Eagle Lake Drive. In most cases entering via Hood Lane and Exiting via Eagle Lake Drive. This will require access to the Eagle Lake Subdivision via the gated entrance at Eagle Lake Drive and Highway 1. This segment is approximately 1,100 feet in length and is estimated to require approximately 7 to 11 working days for active excavation/pipe installation with activity beginning approximately 1 month prior to that for clearing, grubbing and site preparation. Following pipe installation, restoration of the disturbed area is anticipated to require approximately another 6 weeks. In total it is anticipated that this area will be impacted for approximately 13 weeks. Because of the presence of wetlands in this segment, construction traffic will not access the alignment via Hood Lane once construction and restoration of this segment is completed. Unless otherwise requested by the County, it is proposed that the contractor not be allowed to use Eagle Lake Court for construction access.



Segment 3 – Private Property East of Eagle Lake Drive (TIPS COREY ALLEN/KAREN KRISTIN). Construction and material delivery vehicles will access the alignment via the Eagle Lake Drive both for construction traffic entering and exiting the site. This will require access to the Eagle Lake Subdivision via the gated entrance at Eagle Lake Drive and Highway 1. It is anticipated that sufficient temporary easement will be obtained from TIPS COREY ALLEN/KAREN KRISTIN to allow construction vehicles to turn around at the eastern end of this segment and exit the same way they came in. This segment is approximately 1,400 feet in length and is estimated to require approximately 9 to 14 working days for active excavation/pipe installation with activity beginning approximately six weeks prior for clearing, grubbing and site preparation. Following pipe installation, restoration of the disturbed area is anticipated to require approximately another 8 weeks. In total it is anticipated that this area will be impacted for approximately 17 weeks. Unless otherwise requested by the County, it is proposed that the contractor not be allowed to use Eagle Lake Court for construction access. The pipeline across Eagle Lake Drive will be crossed using trenchless methods so residential traffic using Eagle Lake Drive will not be restricted.

Segment 4 – Private Property west of Eagle Lake Drive to drainage between Water Supply and Storage Reservoirs 3 and 4. Construction and material delivery vehicles will access the alignment via the Eagle Lake Drive both for construction traffic entering and exiting the site. This will require access to the Eagle Lake Subdivision via the gated entrance at Eagle Lake Drive and Highway 1. It is anticipated that sufficient temporary easement will be obtained from the Water Supply and Storage Company to allow construction vehicles to turn around at the eastern end of the wetland that connects the two reservoirs. This segment is approximately 1,500 feet in length and is estimated to require approximately 9 to 14 working days for active excavation/pipe installation with activity beginning approximately six weeks prior for clearing, grubbing and site preparation. Following pipe installation, restoration of the disturbed area is anticipated to require approximately another 8 weeks. In total it is anticipated that this area will be impacted for approximately 17 weeks. Unless otherwise requested by the County, it is proposed that the contractor not be allowed to use Eagle Lake Court for construction access. Because of the presence of wetlands in this segment, construction traffic will not access the alignment via Eagle Lake Drive once construction and restoration of this segment is completed.

Segment 5 – Private Property east of Travis Road to drainage between Water Supply and Storage Reservoirs 3 and 4. Construction and material delivery vehicles will access the alignment via Travis Road both for construction traffic entering and exiting the site. It is anticipated that sufficient temporary easement will be obtained from the Water Supply and Storage Company to allow construction vehicles to turn around at the western end of the wetland that connects the two reservoirs. This segment is approximately 1,100 feet in length and is estimated to require approximately 8 to 12 working days for active excavation/pipe installation with activity beginning approximately six weeks prior for clearing, grubbing and site preparation. Following pipe installation, restoration of the disturbed area is anticipated to require approximately another 7 weeks. In total it is anticipated that this area will be impacted for approximately 16 weeks.

Space Availability for Other Pipeline in Preferred Corridor.

NISP WAE has not identified a need for an additional pipe in this corridor for its conveyance needs. Should another entity petition the County for a permit to construct a pipeline in parallel to NISP WAE's pipeline, adequate space exists to accommodate that pipeline. NISP WAE will acquire 40 feet of permanent easement plus an additional 60 feet of temporary easement for this project. If another pipeline were to be approved by the County, its permanent easement could abut NISP WAE's easement any they could use NISP WAE's permanent easement as their temporary easement.

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Northern Integrated Supply Project

Poudre Intake Pipeline Alternatives Analysis

February 2020

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ROUTE COMPARISONS

Each of the alternatives developed for the Poudre Intake segment were subjected to the evaluation criteria and metrics described in **Table 1** in the Introduction Section. The Poudre Intake segment was assessed as a single project area. This was due to the shorter overall length of the pipeline combined with the limited availability of viable alignments on the eastern half of the segment. Breaking up the Poudre Intake Pipeline into project areas did not enhance the evaluation, so the pipeline alternatives were evaluated over the entirety of the alignment. However, the section of the Poudre Intake Pipeline that connects the Poudre River Diversion Structure with the rest of the Poudre Intake Pipeline at the Poudre Pump Station location was assessed in another memo titled Poudre Intake West Pipeline Alternatives Analysis.

An overview of all of the identified alternative alignments is provided in **Figure P.1**. The overview page is followed by detailed fact sheets for each alternative alignment that describe the alignment and its performance against the evaluation criteria. Each fact sheet is accompanied by a figure illustrating the proposed routing and pertinent features in the area. The ranking column on the fact sheet provides the summary performance results of that alignment relative to other alternatives (green = good performance, yellow = fair performance, red = poor performance). In the end, the alternate with the best overall performance (least reds, most greens) was chosen to be the Preferred Alternate. This Preferred Poudre Intake Alignment can be seen in **Figure P.7** at the end of this document.

In the original evaluation a total, five (5) alignment alternatives were fully assessed for the Poudre Delivery segment. Since this TM was originally issued in October of 2019, the design team became aware of a new School planned for construction near Prospect Road and McLaughlin Lane. The new school and associated development resulted in challenges to alignments in that area. The design team met with the Town of Timnath to better understand those challenges. As a result of the meeting with the town and the design team's research for alternative alignments that mitigated the challenges presented by the school, a new alternative alignment was developed. The new alternative alignment was evaluated against the previously evaluated alignments using the same criteria. Including the new alignment, a total of six (6) alignment alternatives were fully assessed for the Poudre Intake segment.



Figure P.1 – Poudre Intake Alignment Alternates Overview

Dewberry HX

Alternative Name	ternative Name Alignment P-0			
Alternative Location & Description	Alternative Location & Description Performation Alternative Location Section 2012 Alternative Location & Description Alternative Location & Description & Description & Description & Descripti		ive P-0 begins at the Poudre Diversion Pump Station t of the Timnath Canal. The alignment then stays north asses through the garden center property before d. From there, it follows the curve between the backs of nds in the Fort Collins Natural Areas. The alignment then of the Cache la Poudre Inlet canal until it crosses to the prior to crossing I-25. After crossing I-25, the alternative rosses the canal again, and follows the south side of the rospect Road. From there, it continues along McLaughlin ist and continues to follow another canal until intersecting ecting at CR-5, the alignment heads due east, following easement before intersecting with County Line Road, e proposed County Line Alignment.	
Criteria		Ranking	Comments	
Capital Cost		Green	\$ 11,464,000.00	
Conduit Length		Yellow	6.2 miles; 32,736 feet	
Easement Difficulty		Yellow	33 parcels crossed, 7 non-perimeter crossings	
Right-of-Way Impact		Green	400 LF in ROW	
Land Owner Impact		Green	2 driveways crossed, minimal subjective landowner impacts due to paralleling existing powerline easement south of Prospect	
Proximity to Occupied Dwellings	b	Red	Within 100-feet of 51 dwellings	
Environmental Impac Floodplain Crossings	ts and	Green	550 LF of wetlands/riparian areas crossed and 8,900 LF of floodplain crossed	
Existing Utilities		Green	Low utility density	
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings known	
Surface and Street In	npacts	Green	100 LF in gravel roads (CR 3e) and 400 LF in paved roads (Cherly St)	
Traffic Impacts		Green	1,000 LF of low, 100 LF of medium, 400 LF of high, traffic impact score of 2800	
Water Storage Reser Impacts	voirs	Green	No impacts expected	
Construction Duration Relative Constructab	n and ility	Green	253 days of construction	
Required Trenchless Crossing		Green	1 HW crossing (I-25), 1 CR crossing (CR 5), 3 other road crossings (Summit View,Timberline, Prospect) and 1,000 feet total trenchless	
Development Pressu	re	Green	5000 LF of near term developments	
Operation and Maintenance Access		Green	Convenient access with trail system and ditch road west of I-25. East of I-25, proximity to existing powerline easement makes for especially convenient access.	
O&M Requirements		Yellow	6 ARV and BO pairs	
Natural Resources In	npacts	Yellow	5,700 LF in Fort Collins Natural Areas, 350 LF in riparian corridor	



Figure P.2 – Alternative P-0

Alternative Name	Alignn	nent P-1		
Alternative Location & Description	Poudr and fo Altern the no of Eas getting reside Road,	e Intake Alternat Illows the same p ative P-1 stays c rth side of East the Prospect Roac p past the lake, t nces before end where it ties in t	tive P-1 begins at the same located as Alternative P-0 boath until just east of the I-25 crossing. From this point, on the north side of the Cache la Poudre Inlet canal and Prospect Road. Traversing Easterly along the north side I, the alignment diverts around Deadman Lake. After he alignment crosses Prospect Rd twice to avoid ing at the intersection of Prospect Rd and County Line with the proposed County Line Alignment.	
Criteria		Ranking	Comments	
Capital Cost		Green	\$ 11,749,000	
Conduit Length		Green	5.9 miles; 31,100 feet	
Easement Difficulty		Green	32 parcels crossed, 5 non-perimeter crossings	
Right-of-Way Impact		Green	400 LF in ROW	
Land Owner Impact		Yellow 1	3 driveways crossed,moderate subjective landowner impacts	
Proximity to Occupied Dwellings	d	Red	Within 100-feet of 48 dwellings	
Environmental Impac Floodplain Crossings	ts and	Yellow	1,000 LF of wetlands/riparian areas crossed and 8,900 LF of floodplain crossed	
Existing Utilities		Green	Low utility density	
Hazardous/Permitted Crossings	l	Green	No hazardous/permitted crossings known	
Surface and Street In	npacts	Green	0 LF in gravel roads and 400 LF in paved roads (Cherly St)	
Traffic Impacts		Green	1,400 LF of low, 0 LF of medium, 400 LF of high, traffic impact score of 3,000	
Water Storage Reser	voirs	Green	No impacts expected	
Construction Duration Relative Constructab	n and ility	Yellow 1	298 days of construction	
Required Trenchless Crossing		Yellow	1 HW crossing (I-25), 2 CR crossings (CR-5, CR-3), 4 other road crossings (Timberline, Summit View, Prospect 2x) and 1,400 feet total trenchless	
Development Pressu	re	Yellow	7500 LF of near-term developments	
Operation and Maintenance Access		Yellow 1	Convenient access with trail system and ditch road west of I-25. East of I-25, proximity to Prospect makes for relatively easy acces.	
O&M Requirements		Yellow	6 ARV and BO pairs	Fig
Natural Resources In	npacts	Yellow 1	5,700 LF ₂ in Fort Collins Natural Areas, 450 LF in riparian corridor	
 Score was change Length was adjust 	ed relativ	ve to the newly a previous submi	issessed alternative ttal due to additional information acquired	



Alternative Name	Alignn	nent P-2		
Alternative Location & Description	Poudre Intake Alternative P-2 begins at the same location as Alternative P-1. From the pump station, the alignment traverses south and crosses the Poudre River then turns south east and continues through Fort Collins Natural Areas, crossing South Timberline Road and then crossing the Poudre River again. After the second river crossing, the alignment continues through the Natural Areas, until it crosses Summit View Drive. From there, the alignment generall follows property lines before crossing I-25 The alignment then follows the sam path east of I-25 as Alignment P-1.		tive P-2 begins at the same location as Alternative P-1. h, the alignment traverses south and crosses the Poudre east and continues through Fort Collins Natural Areas, rline Road and then crossing the Poudre River again. crossing, the alignment continues through the Natural Summit View Drive. From there, the alignment generally before crossing I-25 The alignment then follows the same ignment P-1.	
Criteria		Ranking	Comments	
Capital Cost		Green	\$ 12,881,000	
Conduit Length		Green	6.0 miles; 31,700 feet	
Easement Difficulty		Yellow	38 parcels crossed, 3 non-perimeter crossings	
Right-of-Way Impact		Green	0 LF in ROW	
Land Owner Impact		Yellow 1	3 driveways crossed,moderate subjective landowner impacts	
Proximity to Occupied Dwellings	b	Green	Within 100 feet of 15 dwellings	
Environmental Impac Floodplain Crossings	ts and	Yellow	1,500 LF wetlands/riparian areas crossed and 8,500 LF of floodplain crossed	
Existing Utilities		Green	Low utility density	
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings known	
Surface and Street In	npacts	Green	0 LF in gravel roads and 0 LF in paved roads	
Traffic Impacts		Green	1,400 LF of low, 0 LF of medium, 0 LF of high, traffic impact score of 1,400	
Water Storage Reser Impacts	voirs	Green	No impacts expected	
Construction Duration Relative Constructable	n and ility	Yellow 1	312 days of construction	
Required Trenchless Crossing		Yellow	1 HW crossing (I-25), 2 CR crossings (CR-5, CR-3), 4 other road crossings (Timberline, Summit View, Prospect 2x) and 1,400 feet total trenchless	
Development Pressu	re	Green	5000 LF of near-term developments	
Operation and Maintenance Access		Yellow	Moderate access with trail system and ditch road west of I-25. East of I-25, proximity to Prospect makes for relatively easy acces.	
O&M Requirements		Yellow	6 ARV and BO pairs	Fig
Natural Resources In	pacts	Red	8,000 LF in Fort Collins Natural Areas.Crosses the Poudre River twice. 350 LF in riparian corridor,	
1 Score was change 2 Length was adjust	ed relativied from	ve to the newly a previous submi	assessed alternative ttal due to additional information acquired	



Alternative Name	Alignm	nent P-3	
Alternative Location & Description	Alternative Location & Description P-3 the same path as Alignment P-1 until it turns south to cross the Poudre River proceed south along the west side of Timberline Rd. Alternative P-3 then turns east, crosses Timberline and goes through the parking lot of medical offices before following Prospect Rd to the east. The alignment traverses east along Prospect before crossing I-25 and its on/off ramps. The alignment then follows the same path east of I-25 as Alignment 1.		ative P-3 begins at the same location as Alternative P-1. s the same path as Alignment P-1 until it turns south to er proceed south along the west side of Timberline Rd. urns east, crosses Timberline and goes through the offices before following Prospect Rd to the east. The east along Prospect before crossing I-25 and its on/off t then follows the same path east of I-25 as Alignment P-
Criteria		Ranking	Comments
Capital Cost		Yellow	\$ 14,022,400
Conduit Length		Red	6.4 miles; 33,700 feet
Easement Difficulty		Red	44 parcels crossed, 7 non-perimeter crossings
Right-of-Way Impact		Yellow	4,000 LF in ROW.
Land Owner Impact		Yellow	5 driveways crossed, significant subjective landowner impacts
Proximity to Occupied Dwellings	ł	Green	Within 100 feet of 8 dwellings
Environmental Impac Floodplain Crossings	ts and	Red	1,000 LF wetlands/riparian areas crossed and 12,000 LF of floodplain crossed
Existing Utilities		Red	High utility density
Hazardous/Permitted Crossings		Red	1 hazardous/permitted crossing known
Surface and Street Im	npacts	Green	0 LF in gravel roads and 0 LF in paved roads
Traffic Impacts		Green	1,900 LF of low, 0 LF of medium, 0 LF of high, traffic impact score of 1,900
Water Storage Reser	voirs	Green	No impacts expected
Construction Duration Relative Constructabi	n and llity	Red	384 days of construction
Required Trenchless Crossing		Yellow	1 HW crossing (I-25), 2 CR crossings (CR-5, CR-3), 6 other road crossings (Timberline, Summit View, Frontage Road 2x, Prospect 2x) and 1,900 feet total trenchless
Development Pressu	re	Green	5000 LF of near-term developments
Operation and Maintenance Access		Red	Inconvenient access due to traffic control and safety from being in/near existing busy roads for majority of length
		Green	4 ARV and BO pairs
O&M Requirements		Oleen	····· ··· ····· ···· ···· ·····



2 Length was adjusted from previous submittal due to additional information acquired

Alternative Name	Alignn	nent P-4		
Alternative Location & Description	Poudr This a of turr contin Areas to the south Alignn	re Intake Alterna lignment follow ning back to the ues to traverse until intersectir south side of P of its on/off ram nent P-1.	ative P-4 begins at the same location as Alternative P-1. s the same pathway as Alignment P-2 except that instead north after the second river crossing, this alignment south easterly through the City of Fort Collins Natural ng with East Prospect Road. The alignment then crosses rospect and traverses easterly until crossing under I-25 nps. The alignment then follows the same path east of I-25	
Criteria		Ranking	Comments	
Capital Cost		Yellow	\$ 14,065,800	
Conduit Length		Red	6.5 miles; 34,400 feet	
Easement Difficulty		Red	44 parcels crossed, 4 non-perimeter crossings	
Right-of-Way Impact		Green	0 LF in ROW	
Land Owner Impact		Yellow	5 driveways crossed,moderate subjective landowner impacts	
Proximity to Occupie Dwellings	d	Green	Within 100 feet of 5 dwellings	
Environmental Impac Floodplain Crossings	ts and	Red	1,500 LF wetlands/riparian areas crossed and 9,500 LF of floodplain crossed	
Existing Utilities		Green	Low utility density	
Hazardous/Permittec Crossings	I	Green	No hazardous/permitted crossings known	
Surface and Street Ir	npacts	Green	0 LF in gravel roads and 0 LF in paved roads	
Traffic Impacts		Green	1,550 LF of low, 0 LF of medium, 0 LF of high, traffic impact score of 1,550	
Water Storage Reser	rvoirs	Green	No impacts expected	
Construction Duration Relative Constructab	n and ility	Yellow	347 days of construction	
Required Trenchless Crossing		Yellow	1 HW crossing (I-25), 2 CR crossings (CR-5, CR-3), 5 other road crossings (Timberline, Prospect 4x) and 1,550 feet total trenchless	
Development Pressu	re	Green	5000 LF of near-term developments	
Operation and Maintenance Access		Yellow	Moderate access with trail system and ditch road west of I-25. East of I-25, proximity to Prospect makes for relatively convenient access	
O&M Requirements		Green	4 ARV and BO pairs	Fig
Natural Resources In	npacts	Red	10,500 LF ₂ in Fort Collins Natural Areas.Crosses the Poudre River twice. 350 LF in riparian corridor	
 Score was change Length was adjust 	ed relati ted from	ve to the newly previous subm	assessed alternative hittal due to additional information acquired	



Alternative Location & Description	Poudre Intake This follows th to cross the P to intersect wi traverses to th near the Fron becoming the south before of 25 Alternative	Alternative e same gel oudre River th the East e east alon age Road a 125 frontag rrossing 125 P-1.	P-5 begins at the same location as Alternative P-1. heral route as Alignment P-3 up until P-3 turned south . Instead of turning south, this alternative turns north Mulberry Street frontage road. The alignment then g the frontage road. The alignment continues in or as it curves to the south, following the curve south e road. The alignment follows the I-25 frontage road . The alignment then follows the same path east of I-
Criteria	Rank	ng Co	omments
Capital Cost	Red	\$	20,472,700
Conduit Length	Yellow	6.3	3 miles; 33, 000 feet
Easement Difficulty	Green	29	parcels crossed, 3 non-perimeter crossings
Right-of-Way Impact	Red	12	2,000 LF in ROW.
Land Owner Impact	Red	9 c im	driveways crossed,significant subjective landowner pacts
Proximity to Occupied Dwellings	d Red	W	ithin 100 feet of 33 dwellings
Environmental Impac Floodplain Crossings	ts and Greer	40 of	0 LF wetlands/riparian areas crossed and 2,100 LF floodplain crossed
Existing Utilities	Red	Hi	gh utility density
Hazardous/Permitted Crossings	Red	11	nazardous/permitted crossing known
Surface and Street In	npacts Red	0 I (Fi	_F in gravel roads and 10,000 LF in paved roads rontage Road S)
Traffic Impacts	Red	1,2 tra	250 LF of low, 0 LF of medium, 10,000 LF of high, iffic impact score of 41,250
Water Storage Reser Impacts	voirs Greer	No	impacts expected
Construction Duration Relative Constructab	n and ility Red	39	2 days of construction
Required Trenchless Crossing	Greer	1 H oth 1,2	HW crossing (I-25), 2 CR crossings (CR-5, CR-3), 3 her road crossings and (Timberline, Prospect 2x) 250 feet total trenchless
Development Pressu	re Greer	50	00 LF of near-term developments
Operation and Maintenance Access	Red	Ind fro ler	convenient access due to traffic control and safety om being in/near existing busy roads for majority of ngth
O&M Requirements	Red	3 / hiç	ARV and BO pairs. Mutiple foreign pipeline crossings, gh CP O&M requirements.
Natural Resources Im	npacts Green	2.0	000 LF ₂ in Fort Collins Natural Areas



EVALUATION RESULTS

Table P.1 below provides a visual summary of the evaluation results and criteria ranking given to each alternative. **Table P.2** tabulates the number of greens, yellows, and reds given to each alternative. Detailed scoring tables of each alternative is provided in **Appendix A-3**.

Evaluation Criteria	P-0	P-1	P-2	P-3	P-4	P-5
Capital Cost						
Conduit Length						
Easement Difficulty						
Right-of-Way Impact						
Land Owner Impact						
Proximity to Occupied Dwellings						
Environmental Impacts and Floodplain Crossings						
Existing Utilities						
Hazardous/Permitted Crossings						
Surface and Street Impacts						
Traffic Impacts						
Water Storage Reservoirs Impacts						
Construction Duration and Relative Constructability						
Required Trenchless Crossings						
Development Pressure						
Operation and Maintenance (O&M) Access						
O&M Requirements						
Natural Resources Impacts						

Table P.1 – Visual Summary of Alternative Scoring



Evaluation Criteria	P-0	P-1	P-2	P-3	P-4	P-5
Red	1	1	1	7	4	11
Yellow	4	8	7	4	5	1
Green	13	9	10	7	9	6

Table P.2 – Numeric Summary of Alternative Scoring

PREFERRED ALIGNMENT

As stated previously, the alternate with the best overall performance (least reds, most greens) is to be the preferred alternate. In the case of a tie, alternates were to have been reviewed and the preferred alignment selected based upon prioritization of factors, mainly conduit length, constructability and land-owner/environmental impacts. In this case **Alignment P-o**, was clearly preferred and tie breakers were not needed.

The preferred alignment is depicted in Figure P.9 and generally described as follows:

Poudre Intake Alternative P-o begins at the Poudre Diversion Pump Station location, just southeast of the Timnath Canal. The alignment then stays north of the Poudre River, passes through the garden center property before crossing Timberline Road. From there, it follows the curve between the backs of residences and the ponds in the Fort Collins Natural Areas. The alignment then follows the south side of the Cache la Poudre Inlet canal until it crosses to the north side of the canal prior to crossing I-25. After crossing I-25, the alternative veers south where it crosses the canal again, and follows the south side of the canal until it crosses Prospect Road. From there, it continues along McLaughlin Lane before it turns east and continues to follow another canal until intersecting with CR 5. After intersecting at CR-5, the alignment heads due east, following an existing powerline easement before intersecting with County Line Road, where it ties in with the proposed County Line alignment.

Some benefits this alignment feature over other alignments include:

• Least landowner impacts

Shortest expected construction duration

- Comparatively low environmental and floodplain impacts
- Convenient access for O&M
- Relatively low impact to public ROW
- Least expensive



Table **P.3** below summarizes the characteristics of the preferred alignment.

Characteristic	P-0
Pipe Diameter (inches)	32
Pipe Material	Mortar Lined Steel
Total Distance (miles)	6.2
Approximate Cost	\$11,464,000
Length Tunnel (feet)	1,000
Number of Landowners	33
LF of Wetland Crossings	550

Table P.3 – Preferred Alignment Characteristics





Figure P.8 – Poudre Intake Pipeline Preferred Alignment

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Fort Collins City Boundary

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Northern Integrated Supply Project

Poudre Intake West Pipeline Alternatives Analysis

February 2020

Prepared by:

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ROUTE COMPARISONS

Each of the alternatives developed was subjected to the evaluation criteria and metrics described in **Table 1** in the introduction. The Poudre Intake West Pipeline segment was assessed as a single project area. This was due to the fact that the alignment is relatively short compared to other pipeline segments, allowing for easy readability/resolution with just one project area. This pipeline is the westernmost portion of the Poudre Intake Pipeline, which connects the Poudre River Diversion Structure with the rest of the Poudre Intake Pipeline at the Poudre Pump Station location. The rest of the Poudre Intake Pipeline at the Poudre Pipeline Alternatives Analysis.

An overview of the Project Area and the alternative options can be seen in **Figure PW.1**. Detailed fact sheets for each alternative alignment compare its performance against the evaluation criteria and figures illustrating each individual alignment alternative are provided on the following pages. Included on the fact sheet for each alternate is a table demonstrating the ranking assigned for each criterion. In the end, the alternative with the best overall performance (least reds, most greens) was selected to be the preferred alternative. This preferred Poudre Intake West Pipeline Alignment can be seen in **Figure PW.4** at the end of this document.

In total, two (2) alternatives were assessed for the Poudre Intake West Pipeline segment all within a single project area.

MULBERRY WASTEWATER FACTILITY HWY 14	SLEMATARE SLEMATARE	
POUDRE INTAKE WEST ALIGN	MENT ALTERNATIVES	
Poudre Intake West PW-1.1 PW-1.2	Cities Fort Collins	

Figure PW.1 – Poudre Intake West Pipeline Alternatives



Alternative Name	Poudr	e Intake West	- 1.1	
Alternative Location & Description	Alignn northe northe Poudr Lemay From Timna Sedim	nent Alternativ east of the City east away from e River, until r y Ave., and co this point the a th Reservoir lu- ent Pond.	re PW-1.1 begins at the proposed diversion structure just of Fort Collins Mulberry wastewater facility and routes in the Poudre River. It turns southeast, paralleling the eaching E. Mulberry Street. It then turns east, crosses S. ntinues along Frontage Road N. until reaching Air Park Dr. alignment turns south across E. Mulberry Street and the nlet Canal, to its termination point at the Poudre Diversion	
Criteria		Ranking	Comments	
Capital Cost		Yellow	\$ 2,588,000	
Conduit Length		Yellow	4,540 feet	
Easement Difficulty		Yellow	6 parcels crossed, 1 non-perimeter crossings	
Right-of-Way Impact		Green	2,900 LF in ROW	
Land Owner Impact		Green	0 businesses impacted with one access point, 12 businesses impacted with two access points	
Proximity to Occupie Dwellings	d	Yellow	Within 100-feet of 10 occupied businesses	
Environmental Impac	ts	Green	No wetlands/riparian areas crossed	
Existing Utilities		Red	High density of existing utilities	
Hazardous/Permittec Crossings	l	Green	No hazardous/permitted crossings known	
Surface and Street Ir	npacts	Yellow	0 LF of open-cut in gravel roads, 2,380 LF of open-cut in paved roads	
Traffic Impacts		Yellow	0 LF of low, 600 LF of medium, 2,380 LF of high traffic impacts, traffic impact score of 10120	
Water Storage Reser	rvoirs	Green	No impacts expected	
Construction Duration Relative Constructab	n and ility	Yellow	130 days of construction	
Required Trenchless Crossing		Yellow	1 HWY (HWY 14), 2 Paved Roadways (Lemay Ave, 12th Street), 600 LF total trenchless	
Development Pressu	re	Green	Some development pressure possible at northwest corner of HWY 14 and Lemay Ave, no other new developments known/expected	F
Operation and Maintenance Access		Green	Similar access due to proximity to roadways	
O&M Requirements		Green	3 ARV and BO pairs	
Natural Resources In	npacts	Green	0 LF in natural areas	



Alternative Name	Poudre Intake We	est-1.2
Alternative Location & Description	Alignment Alterna northeast of the C northeast away fr Poudre River, unt 150 feet, it then tu alignment turns e Road S. for appro Reservoir Inlet Ca Pond.	tive PW-1.2 begins at the proposed diversion structure just ity of Fort Collins Mulberry wastewater facility and routes om the Poudre River. It turns southeast, paralleling the il reaching E. Mulberry Street. It then turns east for roughly trns south crossing E. Mulberry Street. From this point the ast, crosses S. Lemay Ave., and continues along Frontage ximately 2,600 feet before turning south crossing the Timnath anal, finally terminating at the Poudre Diversion Sediment
Criteria	Ranking	Comments
Capital Cost	Green	\$ 2,290,000
Conduit Length	Green	4,410 feet
Easement Difficulty	Green	5 parcels crossed, 1 non-perimeter crossings
Right-of-Way Impact	Yellow	3,200 LF in ROW
Land Owner Impact	Yellow	5 businesses impacted with one access point, 7 businesses impacted with two access points
Proximity to Occupied Dwellings	Yellow	Within 100-feet of 9 occupied businesses
Environmental Impact	ts Green	No wetlands crossed
Existing Utilities	Red	High density of existing utilities
Hazardous/Permitted Crossings	Green	No hazardous/permitted crossings known
Surface and Street Im	npacts Red	0 LF of open-cut in gravel roads, 2600 LF of open-cut in paved roads
Traffic Impacts	Red	0 LF of low, 455 LF of medium, 2,600 LF of high traffic impacts, traffic impact score of 10,855
Water Storage Reserv Impacts	voirs Green	No impacts expected
Construction Duration Relative Constructabil	and Green	110 days of construction
Required Trenchless Crossing	Green	1 HWY (HWY 14), 1 Paved Roadways (Lemay Ave), 455 LF total trenchless
Development Pressur	e Green	Some development pressure possible at northwest corner of HWY 14 and Lemay Ave, no other new developments known/expected
Operation and Maintenance Access	Green	Similar access due to proximity to roadways
O&M Requirements	Green	3 ARV and BO pairs
Natural Resources Im	pacts Green	0 LF in natural areas



Table PW.1 is a visual summary of the score given to the two alternatives for each criteria. **Table PW.2** tabulates the number of greens, yellows, and reds given to each alternative. Detailed scoring tables of each alternative is provided in **Appendix A-4**.

Evaluation Criteria	PW-1.1	PW-1.2
Capital Cost		
Conduit Length		
Easement Difficulty		
Right-of-Way Impact		
Land Owner Impact		
Proximity to Occupied Dwellings		
Environmental Impacts		
Existing Utilities		
Hazardous/Permitted Crossings		
Surface and Street Impacts		
Traffic Impacts		
Water Storage Reservoirs Impacts		
Construction Duration and Relative Constructability		
Required Trenchless Crossings		
Development Pressure		
Operation and Maintenance (O&M) Access		
O&M Requirements		
Natural Resources Impacts		

Table PW.1 – Visual Summary of Alternative Scoring



Table PW.2 - Numeric Summary of Alternative Scoring

Evaluation Criteria	PW-1.1	PW-1.2
Red	1	3
Yellow	8	3
Green	9	12

PREFERRED ALIGNMENT

From analysis, it can be determined that the optimal/preferred alignment is alternative PW-1.2. The alignment begins at the proposed diversion structure just northeast of the City of Fort Collins Mulberry wastewater facility and routes northeast away from the Poudre River. It turns southeast, paralleling the Poudre River, until reaching E. Mulberry Street. It then turns east for roughly 150 feet, it then turns south crossing East Mulberry Street. From this point the alignment turns east, crosses South Lemay Ave., and continues along South Frontage Road for approximately 2,600 feet before turning south crossing the Timnath Reservoir Inlet Canal, finally terminating at the Poudre Diversion Sediment Pond located at the Poudre Pump Station. Some of the benefits of this alignment include a comparatively lower overall length, construction duration, trenchless crossings and lower capital costs.

Table PW.3 below summarizes the estimated features of the overall preferred alignment. In the case of a tie, alternates were evaluated and the preferred alignment was selected based upon prioritization of factors, mainly conduit length, constructability and land-owner/environmental impacts. Preferred alignment PW-1.2 can be seen in Figure PW.4 on the following page.

Characteristic	PW-1.2
Pipe Diameter (inches)	32
Pipe Material	Mortar Lined Steel
Total Distance (feet)	4,410
Pipe Cost	\$2,290,000
Length Tunnel (feet)	455
Number of Landowners	5

Table PW.3 – Preferred Alignment Characteristics

Table PW.3 – Preferred Alignment Characteristics

Characteristic	PW-1.2
Wetland Crossings (feet)	0



MULBERRY WASTEWATER FACTULITY HWY 14			
POUDRE INTAKE WEST	PREFERRED ALIGNMENT		
Poudre Intake West	<u>Cities</u>		
PW-1.2	Fort Collins		
NWI Wetlands			
Larimer County Parcels			

Figure PW.4 – Poudre Intake West Pipeline Preferred Alignment





Northern Integrated Supply Project

County Line Road Delivery Pipeline Alternatives Analysis

February 2020

Prepared by:

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ROUTE COMPARISONS

Each of the alternatives developed was subjected to the evaluation criteria and metrics described in **Table 1** in the introduction. The County Line segment was broken into 5 Project Areas, which made for easier comparison of alternatives. The Project Areas also enabled the project team to look at combinations of alternatives for each Project Area and facilitated a thorough analysis for the final Preferred Alignment.

An overview of all of the Project Areas and the alternative options can be seen in **Figure C.1**. Detailed fact sheets for each alternative alignment compare its performance against the evaluation criteria and figures illustrating each individual alignment alternative are provided on the following pages. Included on the fact sheet for each alternate is a table demonstrating the ranking assigned for each criterion. In the end, the alternate with the best overall performance (least reds, most greens) was chosen to be the preferred alternate. This preferred County Line alignment can be seen in **Figure C.20** at the end of this document.

In total, five (5) alternates were assessed for Project Area 1, three (3) alignment alternates were assessed for Project Area 2, two (2) alignment alternates were assessed for Project Area 3, four (4) alignment alternates were assessed for Project Area 4, and four (4) alignment alternates were assessed for Project Area 5.



Figure C.1 – County Line Road Delivery Pipeline Project Areas and Alternatives

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Alternative Name	C-1.1		
Alternative Location & Description	County Line Alternative C-1.1 begins at the intersection of CR 52 and CR 13 and heads south paralleling the west side of CR 13. It traverses through a combination of agricultural, rural residential, and subdivision properties, crossing CR 13 several times throughout this reach. Moving south the alignment crosses Hwy 14, passes Timnath Reservoir, and ends at the intersection of CR 13 and CR 40.		
Criteria		Ranking	Comments
Capital Cost		Green	\$ 17,557,000
Conduit Length		Green	6.1 miles, 32,200 feet
Easement Difficulty		Yellow	27 parcels crossed, 0 non-perimeter crossings
Right-of-Way Impact		Yellow	810 LF in ROW
Land Owner Impact		Green	6 driveway crossings, minor subjective landowner impacts
Proximity to Occupied Dwellings	ţ	Green	Within 100-feet of 2 occupied dwellings
Environmental Impac Floodplain Crossings	ts and	Red	2460 LF of wetlands/riparian areas crossed and 0 LF of floodplain crossed
Existing Utilities		Yellow	Moderate density of existing utilities
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings known
Surface and Street Impacts		Green	40 LF of open-cut in gravel roads (CR-78), and 0 LF of open-cut in paved roads
Traffic Impacts		Green	360 LF of low, 40 LF of medium, 0 LF of high traffic impacts, traffic impact score of 440
Water Storage Reservoirs Impacts		Yellow	Possible impacts to Timnath Reservoir outfall infrastructure
Construction Duration and Relative Constructability		Green	180 days of construction
Required Trenchless Crossing		Yellow	1 HWY (HWY 14), 6 County Roads (CR-13(x3), CR-48, CR-80, Wildwing Dr.), 720 LF total trenchless
Development Pressure		Yellow	5260 LF of near-term developments
Operation and Maintenance Access		Green	Convenient access due to proximity to roads
O&M Requirements		Green	8 ARVs; 7 BOs
Natural Resources Impacts		Yellow	410 LF in natural areas



Alternative Name	C-1.2			
Alternative Location & Description	County Line Alternative C-1.2 begins at the intersection of CR 52 and CR 13 and runs east paralleling the south side of CR 52 for about 2,500 feet before heading south through agricultural fields along parcel boundaries. Continuing south the alignment runs into a canal near Smith Reservoir, it parallels the canal until it approaches CR 78 where it crosses to the south side and continues through more agricultural fields until it meets CR 40. The alignment then turns west paralleling the north side of CR 40 until ending at the intersection of CR 13 and CR 40.			
Criteria		Ranking	Comments	
Capital Cost		Yellow	\$ 19,152,000	
Conduit Length		Yellow	7.4 miles, 38,900 feet	
Easement Difficulty		Green	20 parcels crossed, 0 non-perimeter crossings	
Right-of-Way Impact		Green	360 LF in ROW	
Land Owner Impact		Green	2 driveway crossings, minor subjective landowner impacts	
Proximity to Occupie Dwellings	d	Green	Within 100-feet of 2 occupied dwellings	
Environmental Impac Floodplain Crossings	ts and	Yellow	1565 LF of wetlands/riparian areas crossed and 0 LF of floodplain crossed	
Existing Utilities		Green	Low density of existing utilities	
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings known	
Surface and Street In	npacts	Green	40 LF of open-cut in gravel roads (CR-78), and 0 LF of open-cut in paved roads	
Traffic Impacts		Green	300 LF of low, 80 LF of medium, 0 LF of high traffic impacts, traffic impact score of 460	
Water Storage Reservoirs Impacts		Green	No impacts expected	
Construction Duration and Relative Constructability		Green	190 days of construction	
Required Trenchless Crossing		Green	1 HWY (HWY 14), 5 County Roads (CR-13, CR-86, CR- 84, CR-80), 620 LF total trenchless	
Development Pressu	re	Red	8740 LF of near-term developments	F
Operation and Maintenance Access		Red	Difficult access, does not parallel roads.	
O&M Requirements		Red	10 ARV and BO pairs	
Natural Resources Impacts		Red	550 LF in natural areas	



Alternative Name	C-1.3			
Alternative Location & Description	County Line Alt and runs east p 13 on the south to the intersecti parallels CR 15 and CR 78. The Approximately southwest and between CR 78 and CR 40.	ernative C-1.3 begins at the intersection of CR 52 and CR 13 aralleling the south side of CR 52. The alignment crosses CR side of CR 88 and parallels the south side of CR 88 eastward on of CR 88 and CR 15. The alignment turns south and until reaching the northwest corner of the intersection of CR 15 alignment then turns west along the south side of CR 78. ,440 feet west of the intersection the alignment turns isects a parcel east of CR 13 until approximately halfway and CR 76 along CR 13, ending at the intersection of CR 13		
Criteria	Rankin	Comments		
Capital Cost	Red	\$ 22,054,000		
Conduit Length	Red	7.6 miles, 40,200 feet		
Easement Difficulty	Red	35 parcels crossed, 1 non-perimeter crossings		
Right-of-Way Impact	Red	1200 LF in ROW		
Land Owner Impact	Red	17 driveway crossings, moderate subjective landowner impacts		
Proximity to Occupied Dwellings	Red	Within 100-feet of 5 occupied dwellings		
Environmental Impacts and Floodplain Crossings Green		900 LF of wetlands/riparian areas crossed and 0 LF of floodplain crossed		
Existing Utilities Yellow		Moderate density of existing utilities	Moderate density of existing utilities	
Hazardous/Permitted Crossings Green		No hazardous/permitted crossings known		
Surface and Street Impacts Red		40 LF of open-cut in gravel roads (CR-78), and 385 LF of open-cut in paved roads (CR-15)		
Traffic Impacts Red		640 LF of low, 40 LF of medium, 385 LF of high traffic impacts, traffic impact score of 2160	C1.1	
Water Storage Reservoirs Impacts Green		No impacts expected	C.1.2 C.1.3 C.1.4	
Construction Duration and Relative Constructability Red		230 days of construction	C-1.5 C-1.3 Road Xings Will Wetlands Severance	
Required Trenchless Crossing Red		1 HWY (HWY 14), 9 County Roads (CR-13, CR-15(x5), CR-86,Sage Hill Rd., CR-80), 1220 LF total trenchless	Riparian Corridor Parcels Fort Collins Timnath	
Development Pressure Green		1050 LF of near-term developments	Figure C.4 – Alternative C-1.3	
Operation and Maintenance Access Green		Convenient access due to proximity to roads		
O&M Requirements Yellow		9 ARVs; 8 BOs		
Natural Resources Impacts Green		0 LF in natural areas		



Alternative Name	C-1.4			
Alternative Location & Description	County Lin intersectio several co CR 3 and and paralle Prospect F 44 to the in finally endi This alignr proposed I intersectio treatment pipeline wo systems at alignment alternative	ne Alterna n of CR 5. unty roads E. Prospe els E. Pros Road turns ntersection ing at the nent was NISP Part n of inters plant addi ould be ne nd signific less favor s.	tive C-1.4 It begins at the southwest corner of the 2 and CR 3 and traverses south parallel to CR 3, across s until reaching the northwest corner of the intersection of ct Road, north of Deadman Lake. The alignment turns east spect Road, around a small portion of the lake. As E. s into CR 44, the alignment continues east paralleling CR n of CR 44 and CR 13. The alignment continues south intersection of CR 13 and CR 40. removed in the initial screening process due to the icipant water treatment plant being located north of the section of CR 52/CR 88 and CR 13. To connect to the water tional pipeline parallel to the proposed Northern Tier seded creating complications in coordinating the pipeline cantly increasing the length of the pipeline, making the rable and hydraulically inferior than other viable	
Criteria	Ra	inking	Comments	
Capital Cost				
Conduit Length				
Easement Difficulty				
Right-of-Way Impact				
Land Owner Impact				
Proximity to Occupied Dwellings	d			
Environmental Impac Floodplain Crossings	cts and			
Existing Utilities				
Hazardous/Permitted Crossings	1			C1.1
Surface and Street In	npacts			c.1.2 c.1.3
Traffic Impacts				C1.5 Windsor NWI Wetlands Severance
Water Storage Reser	rvoirs			Riparian Corridor Parcels Timnath
Construction Duration Relative Constructab	n and ility			Figure C.5 – Alternative C-1.4
Required Trenchless Crossing				
Development Pressu	ire			
Operation and Maintenance Access				
O&M Requirements				
Natural Resources In	npacts			



Alternative Name	C-1.5	C-1.5		
Alternative Location & Description	County Line Alternative C-1.5 begins at the southwest corner CR 88 and CR 13. The alignment crosses CR 13 on the south side of CR 88 and parallels the south side of CR 88 eastward to the intersection of CR 88 and CR 15 roads. The alignment turns south and parallels CR 15, crossing several county road until reaching the northwest corner of the intersection of CR 15 and CR 78. The alignment then turns east along the south side of CR 78. Approximately 2,750 feet west of CR 17 the alignment turns south along a parcel boundary for 2,750 feet before turning east to CR 17. The alignment turns south at CR 17 until ending at the CR 76.			
Criteria		Ranking	Comments	
Capital Cost		Red	\$ 23,124,000	
Conduit Length		Red	8.1 miles, 42,500 feet	
Easement Difficulty		Red	40 parcels crossed, 0 non-perimeter crossings	
Right-of-Way Impact		Red	1100 LF in ROW	
Land Owner Impact		Red	17 driveway crossings, moderate subjective landowner impacts	
Proximity to Occupied Dwellings		Red	Within 100-feet of 5 occupied dwellings	
Environmental Impac Floodplain Crossings	ts and	Green	870 LF of wetlands/riparian areas crossed and 0 LF of floodplain crossed	
Existing Utilities		Yellow	Moderate density of existing utilities	
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings known	
Surface and Street Impacts		Red	40 LF of open-cut in gravel roads (CR-78), and 385 LF of open-cut in paved roads (CR-15)	
Traffic Impacts		Red	640 LF of low, 40 LF of medium, 385 LF of high traffic impacts, traffic impact score of 2160	
Water Storage Reservoirs Impacts		Green	No impacts expected	
Construction Duration and Relative Constructability		Red	240 days of construction	
Required Trenchless Crossing		Red	1 HWY (HWY 14), 9 County Roads (CR-13, CR-15(x5), CR-86,Sage Hill Rd., CR-80), 1220 LF total trenchless	
Development Pressure		Green	1050 LF of near-term developments	
Operation and Maintenance Access		Green	Convenient access due to proximity to roads	
O&M Requirements		Red	10 ARVs; 9 BOs	
Natural Resources Impacts		Green	0 LF in natural areas	



Alternative Name	C-2.1		
Alternative Location & Description	County Line Alternative C-2.1 begins at the intersection of CR 40 and CR 13 and runs south paralleling CR 13 beginning on the west side. It travels in a southerly direction crossing CR 13 several times throughout this reach. It traverses through a combination of agricultural, rural residential, and subdivision properties. Headed south the alignment changes direction to the southeast around a parcel, near the Timnath Ranch subdivision, before turning west again to CR 13. Near Hwy 392 it enters a constrained area where the alignment traverses passed three reservoirs and the Poudre River. Continuing south the alignment ends roughly 5,600 feet south of the Poudre River on the east side of CR 13 near the Raindance Subdivision.		
Criteria		Ranking	Comments
Capital Cost		Green	\$16,275,000
Conduit Length		Green	5.7 miles, 30,100 feet
Easement Difficulty		Green	19 parcels crossed, 1 non-perimeter crossings
Right-of-Way Impact		Yellow	650 LF in ROW
Land Owner Impact		Green	3 driveway crossings, minor subjective landowner impacts
Proximity to Occupied Dwellings		Green	Within 100-feet of 3 occupied dwellings
Environmental Impacts and Floodplain Crossings		Green	1410 LF of wetlands/riparian areas crossed and 5200 LF of floodplain crossed
Existing Utilities		Red	High density of existing utilities
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossing known
Surface and Street In	npacts	Green	No open trench construction across roadways
Traffic Impacts		Green	460 LF of low, 0 LF of medium, 0 LF of high traffic impacts, traffic impact score of 460
Water Storage Reser	voirs	Green	No impacts expected
Construction Duration and Relative Constructability		Green	180 days of construction
Required Trenchless Crossing		Green	1 HWY (HWY 392), 1 Railroad, 5 County Roads (CR-76, CR-74, CR-13(x2), CR 68.5), 720 LF total trenchless
Development Pressure		Red	7290 LF of near-term developments
Operation and Maintenance Access		Green	Convenient access due to proximity to roads
O&M Requirements		Green	8 ARVs; 7 BOs
Natural Resources Impacts		Green	200 LF in natural areas


Alternative Name	C-2.2			
Alternative Location & Description		y Line Alterna ne alignment p 2. The alignme h agricultural lignment turns the alignment huing south the on the east sid	tive C-2.2 begins at the northwest corner of CR 76 and CR arallels CR 17 south, crossing CR 74, until turning west at nt parallels the road, crossing CR 15, and continuing west fields to the north side of Lake Canal Reservoir Number 1. south at CR 13. Near Hwy 392 it enters a constrained area t traverses passed three reservoirs and the Poudre River. e alignment ends roughly 5,600 feet south of the Poudre de of CR 13 near the Raindance Subdivision.	
Criteria		Ranking	Comments	
Capital Cost		Red	\$ 21,111,000	
Conduit Length		Red	7.4 miles, 39,200 feet	
Easement Difficulty		Red	34 parcels crossed, 1 non-perimeter crossings	
Right-of-Way Impact		Red	780 LF in ROW	
Land Owner Impact		Red	16 driveway crossings, moderate subjective landowner impacts	
Proximity to Occupied Dwellings		Green	Within 100-feet of 3 occupied dwellings	
Environmental Impacts and Floodplain Crossings		Red	3125 LF of wetlands/riparian areas crossed and 5250 LF of floodplain crossed	
Existing Utilities		Yellow	Medium density of existing utilities	
Hazardous/Permitted Crossings	l	Green	No hazardous/permitted crossings known	
Surface and Street Impacts		Red	40 LF of open-cut in gravel roads (Valleyview Terrace), and 0 LF of open-cut in paved roads	
Traffic Impacts		Red	520 LF of low, 0 LF of medium, 40 LF of high traffic impacts, traffic impact score of 600	
Water Storage Reser	voirs	Green	No impacts expected	
Construction Duration and Relative Constructability		Red	230 days of construction	
Required Trenchless Crossing		Red	1 HWY (HWY 392), 1 Railroad, 7 County Roads (CR-76, CR-74, CR-72, CR-15, CR-13(x2), CR-68.5), 920 LF total trenchless	
Development Pressu	re	Yellow	5500 LF of near-term developments	Fi
Operation and Maintenance Access		Green	Convenient access due to proximity to roads	
O&M Requirements		Yellow	13 ARV and BO pairs	
Natural Resources In	npacts	Green	200 LF in natural areas	



Criteria Ranking Comments	
Capital Cost Red \$21,932,000	
Conduit Length Red 7.8 miles, 40,900 feet	
Easement Difficulty Red 35 parcels crossed, 1 non-perimeter crossin	ngs
Right-of-Way Impact Green 600 LF in ROW	
Land Owner Impact Green 4 driveway crossings, minor subjective land impacts	iowner
Proximity to Occupied Green Within 100-feet of 3 occupied dwellings	
Environmental Impacts and Floodplain CrossingsGreen1630 LF of wetlands/riparian areas crossed of floodplain crossed	and 6150 LF
Existing Utilities Yellow Medium density of existing utilities	
Hazardous/Permitted Green No hazardous/permitted crossings known	
Surface and Street Impacts Green No open trench construction across roadway	iys
Traffic Impacts Green 460 LF of low, 0 LF of medium, 0 LF of high impacts, traffic impact score of 460	1 traffic
Water Storage Reservoirs Impacts Green No impacts expected	
Construction Duration and Relative Constructability Red 230 days of construction	
Required Trenchless CrossingRed1 HWY (HWY 392), 1 Railroad, 7 County R CR-74, CR-13(x2), CR-68.5, CR-3(x2)), 940 trenchless	Roads (CR-76, D LF total
Development Pressure Green 1790 LF of near-term developments	
Operation and Maintenance Access Yellow Moderate access convenience due to proxim the majority of alignment	mity to road
O&M Requirements Red 16 ARVs; 15 BOs	
Natural Resources Impacts Red 600 LF in natural areas	

County Line Alternative C-2.3 begins at the intersection of CR 40 and CR 13

C-2.3

Alternative Name



Figure C.9 – Alternative C-2.3

Alternative Name	C-3.1		
Alternative Location & Description	County Line Alternative C-3.1 begins along the east side of CR 13 roughly 2,600 feet north of CR 64, near the Raindance subdivision. It travels south paralleling the east side of CR 13 and crossing it several imes throughout th reach. It traverses through a combination of agricultural, rural residential, an subdivision properties. Heading south it crosses Hwy 34, traverses west around a parcel, crosses three railroad tracks, and finally the Big Thompson River. South of the railroad tracks the line continues ending at the intersection of CR 54 and CR 13.		tive C-3.1 begins along the east side of CR 13 roughly CR 64, near the Raindance subdivision. It travels south side of CR 13 and crossing it several imes throughout this arough a combination of agricultural, rural residential, and es. Heading south it crosses Hwy 34, traverses west sses three railroad tracks, and finally the Big Thompson ailroad tracks the line continues ending at the intersection
Criteria		Ranking	Comments
Capital Cost		Green	\$ 16,998,000
Conduit Length		Green	5.7 miles, 30,100 feet
Easement Difficulty		Red	29 parcels crossed, 1 non-perimeter crossing
Right-of-Way Impact		Green	900 LF in ROW
Land Owner Impact		Yellow	6 driveway crossings, minor subjective landowner impacts
Proximity to Occupied Dwellings	b	Green	Within 100-feet of 2 occupied dwellings
Environmental Impac Floodplain Crossings	ts and	Red	740 LF of wetlands/riparian areas crossed and 2250 LF of floodplain crossed
Existing Utilities		Yellow	Medium density of existing utilities
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossing known
Surface and Street In	npacts	Green	120 LF of open-cut in gravel roads (CR-64, CR-60), and 0 LF of open-cut in paved roads
Traffic Impacts		Red	460 LF of low, 120 LF of medium, 0 LF of high traffic impacts, traffic impact score of 700
Water Storage Reser Impacts	voirs	Green	No impacts expected
Construction Duration and Relative Constructability		Green	180 days of construction
Required Trenchless Crossing		Red	1 HWY (HWY 34), 3 Railroads, 6 County Roads (Steeplechase Dr., CR-62, CR-13(x4)), 1020 LF total trenchless
Development Pressu	re	Yellow	10370 LF of near-term developments
Operation and Maintenance Access		Green	Convenient access due to proximity to roads
O&M Requirements		Green	6 ARV and BO pairs
Natural Resources In	npacts	Red	280 LF in natural areas



Bewberry HC

Alternative Name	C-3.2			
Alternative Location & Description	County Line Alternative C-3.2 begins along the east side of CR 13 roughly 2,600 feet north of CR 64, near the Raindance subdivision. The alignment runs south and turns east at CR 62 for approximately 4,630 feet until reaching a parcel boundary where it turns south. The alignment turns south and follows the parcel boundary until reaching CR 15. It then runs south and parallels the road, crossing Hwy 34, until ending at the intersection of CR 54 and CR 15.		tive C-3.2 begins along the east side of CR 13 roughly CR 64, near the Raindance subdivision. The alignment runs t at CR 62 for approximately 4,630 feet until reaching a ere it turns south. The alignment turns south and follows r until reaching CR 15. It then runs south and parallels the 34, until ending at the intersection of CR 54 and CR 15.	
Criteria		Ranking	Comments	
Capital Cost		Red	\$ 18,922,000	
Conduit Length		Red	6.5 miles, 34,100 feet	- Filmandal
Easement Difficulty		Green	24 parcels crossed, 1 non-perimeter crossing	
Right-of-Way Impact		Red	1020 LF in ROW	
Land Owner Impact		Green	4 driveway crossings, minor subjective landowner impacts	
Proximity to Occupied Dwellings	d	Green	Within 100-feet of 1 occupied dwellings	
Environmental Impac Floodplain Crossings	ts and	Green	500 LF of wetlands/riparian areas crossed and 0 LF of floodplain crossed	
Existing Utilities		Green	Low density of existing utilities	
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings known	
Surface and Street In	npacts	Red	160 LF of open-cut in gravel roads (CR-64, CR-60, CR- 56), and 0 LF of open-cut in paved roads	
Traffic Impacts		Green	400 LF of low, 160 LF of medium, 0 LF of high traffic impacts, traffic impact score of 560	
Water Storage Reser	voirs	Green	No impacts expected	
Construction Duration Relative Constructab	n and ility	Red	200 days of construction	
Required Trenchless Crossing		Green	1 HWY (HWY 34), 3 Railroads, 5 County Roads (Steeplechase Dr., CR-62, CR-15(x3)), 920 LF total trenchless	
Development Pressu	re	Yellow	10370 LF of near-term developments	== C-3.1
Operation and Maintenance Access		Green	Convenient access due to proximity to roads	C-3.2 C-3.2 Road Xings NWI Wetlands Greeley
O&M Requirements		Green	6 ARV and BO pairs	Riparian Corridor Parcels Dohnstown
Natural Resources In	npacts	Green	0 LF in natural areas	Figure C.11 – Alternative C-3.2



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Alternative Name	C-4.1		
Alternative Location & Description	County Line Alternative C-4.1 begins at the intersection of CR 13 and CR 54 and runs south paralleling the west side of CR 13. It travels in a southerly direction crossing CR 13 several times throughout this reach. It traverses through a combination of agricultural, rural residential, and subdivision properties. Headed south the alignment crosses CR 14, follows a parcel boundary, and then continues paralleling CR 13 to the south. The line continues passing through the Town of Johnstown, crossing Hwy 60, a railroad track, the Little Thompson River, and finally ending on the west side of the intersection of CR 13 and CR 42.		
Criteria		Ranking	Comments
Capital Cost		Green	\$ 17,913,000
Conduit Length		Green	6.2 miles, 32,500 feet
Easement Difficulty		Green	23 parcels crossed, 0 non-perimeter crossings
Right-of-Way Impac	:t	Red	760 LF in ROW
Land Owner Impact		Red	5 driveway crossings, moderate subjective landowner impacts
Proximity to Occupie Dwellings	ed	Green	Within 100-feet of 5 occupied dwellings
Environmental Impac Floodplain Crossings	ts and	Green	90 LF of wetlands/riparian areas crossed and 490 LF of floodplain crossed
Existing Utilities		Red	High density of existing utilities
Hazardous/Permitte Crossings	d	Green	No hazardous/permitted crossing known
Surface and Street Impacts		Yellow	120 LF of open-cut in gravel roads (CR-46, CR-44), and 0 LF of open-cut in paved roads
Traffic Impacts		Red	580 LF of low, 240 LF of medium, 0 LF of high traffic impacts, traffic impact score of 820
Water Storage Reservoirs Impacts		Green	No impacts expected
Construction Duration and Relative Constructability		Green	190 days of construction
Required Trenchless Crossing		Red	1 HWY (HWY 60), 1 Railroad, 8 County Roads (CR-54, CR-52, CR-13(x5), CR-50), 1020 LF total trenchless
Development Press	ure	Red	5250 LF of near-term developments
Operation and Maintenance Acces	s	Green	Convenient access due to proximity to roads
O&M Requirements		Green	5 ARVs; 4 BOs
Natural Resources Impacts		Green	350 LF in natural areas



Alternative Name	C-4.2			
Alternative Location & Description	Count and ru turning along Johns turns paralle before Thom agricu	y Line Alterna ins west parall g south throug parcel bounda town. The alig south crossing eling the south e continuing so pson River, ar iltural fields as	tive C-4.2 begins at the intersection of CR 13 and CR 54 eling the north side of CR 54 for about 2,800 feet before h an agricultural field. It travels in a southerly direction rries until reaching existing subdivisions in the Town of nment turns west until reaching High Plains Blvd. where it Hwy 60 followed by a railroad track. It then turns east side of the railroad tracks for approximately 5,200 feet with through more agricultural fields, crossing the Little d finally ending at CR 42. The alignment traverses well as existing and planned developments.	
Criteria		Ranking	Comments	
Capital Cost		Red	\$ 21,565,000	
Conduit Length		Red	8.3 miles, 43,800 feet	
Easement Difficulty		Red	33 parcels crossed, 0 non-perimeter crossings	
Right-of-Way Impact		Green	480 LF in ROW	
Land Owner Impact		Green	4 driveway crossings, minor subjective landowner impacts	
Proximity to Occupied Dwellings		Red	Within 100-feet of 19 occupied dwellings	
Environmental Impac Floodplain Crossings	ts and	Yellow	310 LF of wetlands/riparian areas crossed and 980 LF of floodplain crossed	
Existing Utilities		Green	Low density of existing utilities	
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossing known	
Surface and Street Impacts		Green	80 LF of open-cut in gravel roads (CR-14, CR-46), and 0 LF of open-cut in paved roads	
Traffic Impacts		Green	460 LF of low, 160 LF of medium, 0 LF of high traffic impacts, traffic impact score of 620	
Water Storage Reservoirs Impacts		Green	No impacts expected	
Construction Duration and Relative Constructability		Yellow	210 days of construction	
Required Trenchless Crossing		Green	1 HWY (HWY 60), 1 Railroad, 4 County Roads (CR-13, CR-18, CR-16, CR-44), 620 LF total trenchless	F
Development Pressu	re	Green	0 LF of near-term developments	
Operation and Maintenance Access		Red	Difficult access, does not parallel roads	
O&M Requirements		Red	9 ARV and BO pairs]
Natural Resources In	npacts	Green	410 LF in natural areas	



Remain in the control of CR 13 and CR 3. The alignment the interaction of CR 13 and CR 3. The alignment there are placed by solutions in a souther by solution of CR 13 and CR 3. The alignment there are placed by solutions in a souther by solution of CR 13 and CR 3. The alignment there are placed by solutions in a souther by solution of CR 13 and CR 3. The alignment there are placed by solutions in a souther by solution of CR 13 and CR 13. The alignment there are placed by solutions in a souther by solution of CR 13 and CR 4. Iteraction all place boundaries unit reacting solutions with of CR 15 at the set and of the the two initial screening porces. Iteracting a sportward (CR 13 and CR 13 and CR 13 and CR 13 and CR 12	Alternative Name	C-4.3		
Criteria Ranking Comments Aprital Cost Image: Comments of the second of th	Alternative Location & Description	County Line Alter and runs west par intersection of CF direction along par Johnstown. The ar Johnstown Reser Little Thompson and CR 42. This alignment w corridor east of J amounts of burie Johnstown Reser initial screening p	mative C-4.3 begins at the intersection of CR 13 and CR 18 ralleling CR 18 to a parcel boundary south of CR 18 at the R 18 and CR 3. The alignment traverses in a southerly arcel boundaries until reaching existing subdivisions in alignment turns south and traverses passed the east end of rvoir, across Hwy 60, followed by a railroad track, and the River, until ending approximately 5,400 feet west of CR 13 as removed in the initial screening process because the ohnstown Reservoir is not a constructible corridor. Large d debris have been indicated within the corridor near rvoir. Therefore the alternative was not moved beyond the process.	3 F
kapital Cost	Criteria	Ranking	Comments	
Canduit Length assement Difficulty Right-of-Way Impact and Owner Impact and Owner Impact 'rowimpertal Impacts and incompertal Impacts and incompertal Impacts adaradous/Pomitted Scosing indicultor Duration and typerformand incomment Pressure Query Constructability incomment Pressure incomment Pressure incomment Pressure incomment Pressure incomment Pressure incomment Pressure incomment Pressure <td>Capital Cost</td> <td></td> <td></td> <td></td>	Capital Cost			
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Right-of-Way Impact and Owner Impact rowinity to Occupied revice Impacts raffic Impacts romitruction Duration and required Trenchiess rowing rowing revice Impacts revice Impacts </td <td>Easement Difficulty</td> <td></td> <td></td> <td></td>	Easement Difficulty			
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Invironmental Impacts and Nordicplain Crossings Atzardous/Permitted Prossings tazardous/Permitted Prossings Surface and Street Impacts Yater Storage Reservoirs mpacts Vater Storage Reservoirs mpacts Onstruction Duration and tealuive Constructability tequired Trenchless Poeration and Attartenence Access Attarte Resources Impacts Attarte Resources Impacts	Proximity to Occupied Dwellings	t		
Existing Utilities Lazardous/Permitted crossings surface and Street Impacts raffic Impacts Vater Storage Reservoirs pacts construction Duration and tealtive Constructability tealtive Constructability tealtive Constructability tealtive Constructability peration and faintenance Access 3M Requirements latural Resources Impacts	Environmental Impact Floodplain Crossings	ts and		
Hazardous/Permitted Crossings Surface and Street Impacts 'raffic Impacts Vater Storage Reservoirs mpacts Construction Duration and kelative Constructability bevelopment Pressure Deration and Aintenance Access NaM Requirements latural Resources Impacts	Existing Utilities			
Surface and Street Impacts 'raffic Impacts Vater Storage Reservoirs mpacts Construction Duration and kelative Constructability kequired Trenchless Zrossing bevelopment Pressure >poeration and daintenance Access 128M Requirements latural Resources Impacts	Hazardous/Permitted Crossings			
Traffic Impacts Image: Construction puration and belative Constructability Image: Constructability <th< td=""><td>Surface and Street Im</td><td>npacts</td><td></td><td></td></th<>	Surface and Street Im	npacts		
Water Storage Reservoirs Impacts Construction Duration and Relative Constructability Impacts Required Trenchless Impacts Crossing Impacts Development Pressure Impacts Deperation and Raintenance Access Impacts Natural Resources Impacts Impacts	Traffic Impacts			
Construction Duration and Relative Constructability Required Trenchless Crossing Development Pressure Development Pressure Developments Alatrenance Access N&M Requirements latural Resources Impacts	Water Storage Reserving	voirs		
Required Trenchless Crossing Development Pressure Development Pressure Operation and Aaintenance Access D&M Requirements latural Resources Impacts	Construction Duration Relative Constructabi	n and ility		NWI Wetlands Riparian Corridor Parcels Berthoud
Development Pressure Development Pressure Departion and Maintenance Access Developments D&M Requirements Developments Iatural Resources Impacts Developments	Required Trenchless Crossing			Figure C.14 – Alternative C-4.3
Deration and Aaintenance Access D&M Requirements latural Resources Impacts	Development Pressur	re		
D&M Requirements	Operation and Maintenance Access			
latural Resources Impacts	O&M Requirements			
	Natural Resources Im	npacts		



Alternative Name	C-4.4			
Alternative Location & Description	Count and ru River south before contin track, interse	County Line Alternative C-4.4 begins at the intersection of CR 15 and CR 54 and runs south paralleling CR 15. It heads south crossing the Big Thompson River until turning west at CR 52 for approximately 2,565 feet where it turns south through agricultural fields along parcel boundaries. It continues south before turning west at CR 50, and then south again at CR 13. The line continues passing through the Town of Johnstown, crossing Hwy 60, a railroad track, The Little Thompson River, and finally ending on the west side of the intersection of CR 13 and CR 42.		
Criteria		Ranking	Comments	
Capital Cost		Yellow	\$ 19,646,000	
Conduit Length		Yellow	7.0 miles, 36,900 feet	
Easement Difficulty		Green	23 parcels crossed, 0 non-perimeter crossings	
Right-of-Way Impact		Yellow	660 LF in ROW	
Land Owner Impact		Red	5 driveway crossings, moderate subjective landowner impacts	
Proximity to Occupied Dwellings	d	Green	Within 100-feet of 3 occupied dwellings	
Environmental Impac Floodplain Crossings	ts and	Red	410 LF of wetlands/riparian areas crossed and 2710 LF of floodplain crossed	
Existing Utilities		Yellow	Medium density of existing utilities	
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings known	
Surface and Street In	npacts	Red	160 LF of open-cut in gravel roads (CR-52.25, CR-52, CR-46,CR-44), and 0 LF of open-cut in paved roads	
Traffic Impacts		Yellow	400 LF of low, 320 LF of medium, 0 LF of high traffic impacts, traffic impact score of 720	
Water Storage Reser Impacts	voirs	Green	No impacts expected	
Construction Duration Relative Constructab	n and ility	Red	220 days of construction	
Required Trenchless Crossing		Yellow	1 HWY (HWY 60), 1 Railroad, 5 County Roads (CR-54, CR-50, CR-13(x3)), 720 LF total trenchless	
Development Pressu	re	Red	5250 LF of near-term developments	
Operation and Maintenance Access		Yellow	Moderate access convenience due to proximity to road the majority of alignment	
O&M Requirements		Green	6 ARV and 5 BO pairs	
Natural Resources In	npacts	Red	750 LF in natural areas	



Alternative Name	C-5.1		
Alternative Location & Description	County Line Alternative C-5.1 begins at the intersection of CR 13 and CR 42 and runs south paralleling the west side of CR 13. It travels in a southerly direction crossing CR 13 several times throughout this reach. It traverses through a combination of agricultural, rural residential, and subdivision properties. Headed south the alignment runs adjacent to Lake Thomas Dam on the east side of CR 13, and continues until ending about 2,600 feet south of CR 32 where it ties in to the Fort Lupton/Hudson Pipeline.		
Criteria		Ranking	Comments
Capital Cost		Green	\$ 15,493,000
Conduit Length		Green	5.6 miles, 29,400 feet
Easement Difficulty		Green	23 parcels crossed, 0 non-perimeter crossings
Right-of-Way Impact		Red	540 LF in ROW
Land Owner Impact		Red	12 driveway crossings, minor subjective landowner impacts
Proximity to Occupied Dwellings		Red	Within 100-feet of 9 occupied dwellings
Environmental Impac Floodplain Crossings	ts and	Green	600 LF of wetlands/riparian areas crossed and 455 LF of floodplain crossed
Existing Utilities		Yellow	High density of existing utilities
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossing known
Surface and Street Impacts Gre		Green	80 LF of open-cut in gravel roads (CR-40, CR-36, CR- 32), and 0 LF of open-cut in paved roads
Traffic Impacts		Green	240 LF of low, 80 LF of medium, 0 LF of high traffic impacts, traffic impact score of 400
Water Storage Reser Impacts	voirs	Green	Toe of Lake Thomas Dam greater than 100-feet from alignment; no impacts expected
Construction Duration and Relative Constructability		Red	180 days of construction
Required Trenchless Crossing		Red	1 Railroad, 4 County Roads (CR-42, CR-13, CR-38, CR- 34), 500 LF total trenchless
Development Pressure Green		Green	0 LF of near-term developments
Operation and Maintenance Access		Green	Convenient access due to proximity to roads
O&M Requirements		Green	6 ARVs; 5 BOs
Natural Resources In	pacts	Green	0 LF in natural areas



Aternative Location S CR 42 and CR 13. It ravels south through agricultural fields. Approaching LAR Thomas it jogs pain south through-turns west at CR 40 for approximately 2.000 feet, and then again south through-turns west at CR 40 for approximately 2.000 feet, and then again south through-turns west at CR 40 for approximately 2.000 feet, and then again south through-turns west at CR 40 for approximately 2.000 feet, and then again south through-turns west and three continues south anding approximately 2.000 feet, and then again south through-turns west and three continues south anding approximately 2.000 feet, and then again south through-turns west and three continues south anding approximately 2.000 feet, and then again south through-turns west and three continues south anding approximately 2.000 feet, and then again south through-turns west at CR 40 for approximately 2.000 feet, and then again south through-turns west and three continues south anding approximately 2.000 feet, and then again south through-turns west at CR 40 for approximately 2.000 feet west of the intersection of CR 42 and CR 13. It ravels south anding approximately 2.000 feet and then again south through-turns west and three continues south anding approximately 2.000 feet and then again south through-turns west and three continues south anding approximately 2.000 feet and 0.0000 feetConduit LengthKedGreent0 driveways crossed, 1 non-perimeter crossingsProximity to OccupidGreentIn070 LF of wetlands/riparian areas crossed and 575 LF floodplain crossingProximity to OccupidGreentIn020 LF of open-cut in gravel roads (CR-40, CR-36, CR-36, CR-36), CR-36), and 0 LF of open-cut in paved roadsSurface and Street TwrYellow120 LF of open-cut in gravel roads (CR-40, CR-36, CR-36), CR-36), and 0 LF of open-cut in paved ro	Alternative Name	C-5.2			
CriteriaRankingCommentsCapital CostYellow\$ 16,275,000Conduit LengthRed6.3 miles, 33,000 feetEasement DifficultyGreen22 parcels crossed, 1 non-perimeter crossingsRight-of-Way ImpactYellow470 LF in ROWLand Owner ImpactGreen0 driveways crossed, no subjective landowner impactsProximity to Occupied DwellingsGreen0 driveways crossed, no subjective landowner impactsProximity to Occupied DwellingsGreen1070 LF of wetlands/riparian areas crossed and 575 LF of floodplain crossedEnvironmental Impacts and Floodplain CrossingsGreenLow density of existing utilitiesHazardous/Permitted CrossingsGreenLow density of existing utilitiesHazardous/Permitted CrossingsGreenNo hazardous/permitted crossing knownSurface and Street ImpactsYellow120 LF of open-cut in gravel roads (CR-40, CR-38, CR-36), and 0 LF of open-cut in paved roadsTraffic ImpactsGreen180 LF of low, 120 LF of medium, 0 LF of high traffic impacts, traffic impact score of 420Water Storage Reservoirs ImpactsGreen170 days of constructionRequired Trenchless CrossingGreen1 Railroad, 3 County Roads (CR-42, CR-34, CR-32), 400 LF total trenchlessDevelopment PressureGreen0 LF of near-term developmentsOperation and Maintenance AccessRedDifficult access, does not parallel roadsO&M RequirementsRed8 ARV and BO pairsNatural Resources ImpactsGreen0 LF in natural areas	Alternative Location & Description	Count of CR bound again to the CR 32	County Line Alternative C-5.2 begins roughly 2,600 feet west of the intersection of CR 42 and CR 13. It travels south through agricultural fields along parcel boundaries until it turns west at CR 40 for approximately 2,700 feet, and then again south through more agricultural fields. Approaching Lake Thomas it jogs to the west, and then continues south ending approximately 2,600 feet south of CR 32 where it ties in to the Fort Lupton/Hudson Pipeline.		
Capital CostYellow\$ 16,275,000Conduit LengthRed6.3 miles, 33,000 feetEasement DifficultyGreen22 parcels crossed, 1 non-perimeter crossingsRight-of-Way ImpactYellow470 LF in ROWLand Owner ImpactGreen0 driveways crossed, no subjective landowner impactsProximity to Occupied DwellingsGreenWithin 100-feet of 2 occupied dwellingsEnvironmental Impacts and Floodplain CrossingsRed1070 LF of wetlands/riparian areas crossed and 575 LF of floodplain crossedExisting UtilitiesGreenLow density of existing utilitiesHazardous/Permitted CrossingsGreenNo hazardous/permitted crossing knownSurface and Street ImpactsYellow120 LF of open-cut in gravel roads (CR-40, CR-38, CR-36), and 0 LF of open-cut in paved roadsTraffic ImpactsGreen180 LF of low, 120 LF of medium, 0 LF of high traffic impacts, traffic impact score of 420Water Storage Reservoirs ImpactsGreenNo impacts expectedConstruction Duration and Required TrenchlessGreen170 days of constructionRequired Trenchless CrossingGreen0 LF of near-term developmentsOperation and Maintenance AccessRedDifficult access, does not parallel roadsO&M RequirementsRed8 ARV and BO pairsNatural Resources ImpactsGreen0 LF in natural areas	Criteria		Ranking	Comments	
Conduit LengthRed6.3 miles, 33,000 feetEasement DifficultyGreen22 parcels crossed, 1 non-perimeter crossingsRight-of-Way ImpactYellow470 LF in ROWLand Owner ImpactGreen0 driveways crossed, no subjective landowner impactsProximity to Occupied DwellingsGreenWithin 100-feet of 2 occupied dwellingsEnvironmental Impacts and Floodplain CrossingsRed1070 LF of wetlands/riparian areas crossed and 575 LF of floodplain crossedExisting UtilitiesGreenLow density of existing utilitiesHazardous/Permitted CrossingsGreen120 LF of open-cut in gravel roads (CR-40, CR-38, CR- 36), and 0 LF of open-cut in paved roadsSurface and Street Impacts mpactsYellow120 LF of open-cut in pavel roads (CR-40, CR-38, CR- 36), and 0 LF of open-cut in pavel roadsWater Storage Reservoirs mpactsGreen180 LF of low, 120 LF of medium, 0 LF of high traffic impacts, traffic impact score of 420Required TrenchlessGreen170 days of constructionRequired TrenchlessGreen0 LF of near-term developmentsOperation and Maintenance AccessRed0 LF of near-term developmentsOkam RequirementsRed8 ARV and BO pairsNatural Resources ImpactsGreen0 LF in natural areas	Capital Cost		Yellow	\$ 16,275,000	
Easement DifficultyGreen22 parcels crossed, 1 non-perimeter crossingsRight-of-Way ImpactYellow470 LF in ROWLand Owner ImpactGreen0 driveways crossed, no subjective landowner impactsProximity to Occupied DwellingsGreenWithin 100-feet of 2 occupied dwellingsEnvironmental Impacts and Floodplain CrossingsRed1070 LF of wetlands/riparian areas crossed and 575 LFExisting UtilitiesGreenLow density of existing utilitiesHazardous/PermittedGreenLow density of existing utilitiesHazardous/PermittedGreen120 LF of open-cut in gravel roads (CR-40, CR-38, CR-36), and 0 LF of open-cut in paved roadsSurface and Street ImpactsYellow120 LF of low, 120 LF of medium, 0 LF of high traffic impacts, traffic impact score of 420Water Storage Reservoirs ImpactsGreen180 LF of low, 120 LF of medium, 0 LF of high traffic impacts, traffic impact score of 420Required TrenchlessGreen170 days of constructionRequired TrenchlessGreen0 LF of near-term developmentsOperation and Maintenance AccessRed0 LF of near-term developmentsOkam RequirementsRed8 ARV and BO pairsNatural Resources ImpactsGreen0 LF in natural areas	Conduit Length		Red	6.3 miles, 33,000 feet	
Right-of-Way ImpactYellow470 LF in ROWLand Owner ImpactGreen0 driveways crossed, no subjective landowner impactsProximity to Occupied DwellingsGreenWithin 100-feet of 2 occupied dwellingsEnvironmental Impacts and Floodplain CrossingsRed1070 LF of wetlands/riparian areas crossed and 575 LF of floodplain crossedExisting UtilitiesGreenLow density of existing utilitiesHazardous/PermittedGreenNo hazardous/permitted crossing knownSurface and Street ImpactsYellow120 LF of open-cut in gravel roads (CR-40, CR-38, CR- 36), and 0 LF of open-cut in paved roadsTraffic ImpactsGreen180 LF of low, 120 LF of medium, 0 LF of high traffic impacts, traffic impact score of 420Water Storage Reservoirs ImpactsGreen170 days of constructionRequired TrenchlessGreen1 Railroad, 3 County Roads (CR-42, CR-34, CR-32), 400 LF total trenchlessDevelopment PressureGreen0 LF of near-term developmentsOperation and Maintenance AccessRedDifficult access, does not parallel roadsO&M RequirementsGreen0 LF in natural areas	Easement Difficulty		Green	22 parcels crossed, 1 non-perimeter crossings	
Land Owner ImpactGreen0 driveways crossed, no subjective landowner impactsProximity to Occupied DwellingsGreenWithin 100-feet of 2 occupied dwellingsEnvironmental Impacts and Floodplain CrossingsRed1070 LF of wetlands/riparian areas crossed and 575 LFExisting UtilitiesGreenLow density of existing utilitiesHazardous/Permitted CrossingsGreenNo hazardous/permitted crossing knownSurface and Street ImpactsYellow120 LF of open-cut in gravel roads (CR-40, CR-38, CR-36), and 0 LF of open-cut in paved roadsTraffic ImpactsGreen180 LF of low, 120 LF of medium, 0 LF of high traffic impacts, traffic impact score of 420Water Storage Reservoirs MpactsGreen170 days of constructionRequired Trenchless CrossingGreen1 Railroad, 3 County Roads (CR-42, CR-34, CR-32), 400 LF total trenchlessDevelopment PressureGreen0 LF of near-term developmentsOperation and Maintenance AccessRed0 Ifficult access, does not parallel roadsO&M RequirementsRed0 LF in natural areas	Right-of-Way Impact		Yellow	470 LF in ROW	
Proximity to Occupied DwellingsGreenWithin 100-feet of 2 occupied dwellingsEnvironmental Impacts and Floodplain CrossingsRed1070 LF of wetlands/riparian areas crossed and 575 LF of floodplain crossedExisting UtilitiesGreenLow density of existing utilitiesHazardous/Permitted CrossingsGreenNo hazardous/permitted crossing knownSurface and Street ImpactsYellow120 LF of open-cut in gravel roads (CR-40, CR-38, CR-36), and 0 LF of open-cut in paved roadsTraffic ImpactsGreen180 LF of low, 120 LF of medium, 0 LF of high traffic impacts, traffic impact score of 420Water Storage Reservoirs ImpactsGreenNo impacts expectedConstruction Duration and Required TrenchlessGreen170 days of constructionDevelopment PressureGreen0 LF of near-term developmentsOperation and Maintenance AccessRedDifficult access, does not parallel roadsO&M RequirementsRed0 LF in natural areas	Land Owner Impact		Green	0 driveways crossed, no subjective landowner impacts	
Environmental Impacts and Floodplain CrossingsRed1070 LF of wetlands/riparian areas crossed and 575 LF of floodplain crossedExisting UtilitiesGreenLow density of existing utilitiesHazardous/Permitted CrossingsGreenNo hazardous/permitted crossing knownSurface and Street ImpactsYellow120 LF of open-cut in gravel roads (CR-40, CR-38, CR-36), and 0 LF of open-cut in paved roadsTraffic ImpactsGreen180 LF of low, 120 LF of medium, 0 LF of high traffic impacts, traffic impact score of 420Water Storage Reservoirs ImpactsGreen170 days of constructionRequired Trenchless CrossingGreen1 Railroad, 3 County Roads (CR-42, CR-34, CR-32), 400 LF ot al trenchlessDevelopment PressureGreen0 LF of near-term developmentsOperation and Maintenance AccessRed8 ARV and BO pairsNatural Resources ImpactsGreen0 LF in natural areas	Proximity to Occupied Dwellings		Green	Within 100-feet of 2 occupied dwellings	
Existing UtilitiesGreenLow density of existing utilitiesHazardous/Permitted CrossingsGreenNo hazardous/permitted crossing knownSurface and Street ImpactsYellow120 LF of open-cut in gravel roads (CR-40, CR-38, CR-36), and 0 LF of open-cut in paved roadsTraffic ImpactsGreen180 LF of low, 120 LF of medium, 0 LF of high traffic impacts, traffic impact score of 420Water Storage Reservoirs ImpactsGreenNo impacts expectedConstruction Duration and 	Environmental Impacts and Floodplain Crossings		Red	1070 LF of wetlands/riparian areas crossed and 575 LF of floodplain crossed	
Hazardous/Permitted CrossingsGreenNo hazardous/permitted crossing knownSurface and Street ImpactsYellow120 LF of open-cut in gravel roads (CR-40, CR-38, CR-36), and 0 LF of open-cut in paved roadsTraffic ImpactsGreen180 LF of low, 120 LF of medium, 0 LF of high traffic impacts, traffic impact score of 420Water Storage Reservoirs ImpactsGreenNo impacts expectedConstruction Duration and 	Existing Utilities		Green	Low density of existing utilities	
Surface and Street ImpactsYellow120 LF of open-cut in gravel roads (CR-40, CR-38, CR-36), and 0 LF of open-cut in paved roadsTraffic ImpactsGreen180 LF of low, 120 LF of medium, 0 LF of high traffic impacts, traffic impact score of 420Water Storage Reservoirs ImpactsGreenNo impacts expectedConstruction Duration and Relative ConstructabilityGreen170 days of constructionRequired Trenchless CrossingGreen1 Railroad, 3 County Roads (CR-42, CR-34, CR-32), 400 LF total trenchlessDevelopment PressureGreen0 LF of near-term developmentsOperation and Maintenance AccessRedDifficult access, does not parallel roadsO&M RequirementsRed8 ARV and BO pairsNatural Resources ImpactsGreen0 LF in natural areas	Hazardous/Permitted Crossings	I	Green	No hazardous/permitted crossing known	
Traffic ImpactsGreen180 LF of low, 120 LF of medium, 0 LF of high traffic impacts, traffic impact score of 420Water Storage Reservoirs ImpactsGreenNo impacts expectedConstruction Duration and Relative ConstructabilityGreen170 days of constructionRequired Trenchless 	Surface and Street Ir	npacts	Yellow	120 LF of open-cut in gravel roads (CR-40, CR-38, CR- 36), and 0 LF of open-cut in paved roads	
Water Storage Reservoirs ImpactsGreenNo impacts expectedConstruction Duration and Relative ConstructabilityGreen170 days of constructionRequired Trenchless CrossingGreen1 Railroad, 3 County Roads (CR-42, CR-34, CR-32), 400 	Traffic Impacts		Green	180 LF of low, 120 LF of medium, 0 LF of high traffic impacts, traffic impact score of 420	
Construction Duration and Relative ConstructabilityGreen170 days of constructionRequired Trenchless CrossingGreen1 Railroad, 3 County Roads (CR-42, CR-34, CR-32), 400 LF total trenchlessDevelopment PressureGreen0 LF of near-term developmentsOperation and Maintenance AccessRedDifficult access, does not parallel roadsO&M RequirementsRed8 ARV and BO pairsNatural Resources ImpactsGreen0 LF in natural areas	Water Storage Reservoirs Impacts		Green	No impacts expected	
Required Trenchless CrossingGreen1 Railroad, 3 County Roads (CR-42, CR-34, CR-32), 400 LF total trenchlessDevelopment PressureGreen0 LF of near-term developmentsOperation and Maintenance AccessRedDifficult access, does not parallel roadsO&M RequirementsRed8 ARV and BO pairsNatural Resources ImpactsGreen0 LF in natural areas	Construction Duratio Relative Constructab	n and ility	Green	170 days of construction	
Development Pressure Green 0 LF of near-term developments Operation and Maintenance Access Red Difficult access, does not parallel roads O&M Requirements Red 8 ARV and BO pairs Natural Resources Impacts Green 0 LF in natural areas	Required Trenchless Crossing		Green	1 Railroad, 3 County Roads (CR-42, CR-34, CR-32), 400 LF total trenchless	
Operation and Maintenance AccessRedDifficult access, does not parallel roadsO&M RequirementsRed8 ARV and BO pairsNatural Resources ImpactsGreen0 LF in natural areas	Development Pressu	re	Green	0 LF of near-term developments	
O&M Requirements Red 8 ARV and BO pairs Natural Resources Impacts Green 0 LF in natural areas	Operation and Red		Red	Difficult access, does not parallel roads	
Natural Resources Impacts Green 0 LF in natural areas	O&M Requirements		Red	8 ARV and BO pairs	
	Natural Resources Ir	npacts	Green	0 LF in natural areas	



Alternative Name	C-5.3			
Alternative Location & Description	County of CR 4 bounda Davis F south c southe Thoma 2,600 f	V Line Alterna 42 and CR 13 aries passed Reservoir and of CR 34 the a ast to CR 13. Is Dam on the reet south of 0	tive C-5.2 begins roughly 2,600 feet west of the intersection 8. It travels south through agricultural fields along parcel CR 40. It continues in a southerly direction just east of 4 west of Little Gem Reservoir. At approximately 1,370 feet alignment turns east for roughly 800 feet and then Headed south the alignment runs adjacent to Lake a east side of CR 13, and continues until ending about CR 32 where it ties in to the Fort Lupton/Hudson Pipeline.	
Criteria		Ranking	Comments	
Capital Cost		Yellow	\$ 15,827,000	
Conduit Length		Yellow	6.0 miles, 31,600 feet	
Easement Difficulty		Red	34 parcels crossed, 1 non-perimeter crossings	
Right-of-Way Impact		Yellow	420 LF in ROW	
Land Owner Impact		Yellow	5 driveway crossings, minor subjective landowner impacts	
Proximity to Occupied Dwellings	I	Yellow	Within 100-feet of 6 occupied dwellings	
Environmental Impact Floodplain Crossings	s and	Red	1290 LF of wetlands/riparian areas crossed and 455 LF of floodplain crossed	
Existing Utilities		Green	Low density of existing utilities	
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings known	
Surface and Street Im	pacts	Red	240 LF of open-cut in gravel roads (CR-40, CR-38, CR- 36,CR-32), and 0 LF of open-cut in paved roads	at the second second
Traffic Impacts		Red	240 LF of low, 240 LF of medium, 0 LF of high traffic impacts, traffic impact score of 720	The state of the s
Water Storage Reserv Impacts	/oirs	Green	No impacts expected	- C-5.1 - C-5.2 - C-5.3
Construction Duration Relative Constructabil	and lity	Green	170 days of construction	C-5.3 Road Xings NWI Wetlands NWI Wetlands
Required Trenchless Crossing		Green	1 Railroad, 3 County Roads (CR-42, CR-34, CR-13), 400 LF total trenchless	Riparian Corridor Parcels Berthoud
Development Pressure	e	Green	0 LF of near-term developments	Figure C.18 - Alternative C-5.3
Operation and Maintenance Access		Red	Difficult access, does not parallel roads	
O&M Requirements		Yellow	8 ARVs; 7 BOs	
Natural Resources Im	pacts	Red	900 LF in natural areas	



Alternative Name	C-5.4			
Alternative Location & Description	County Line Alternative C-5.2 begins roughly 2,600 feet west of the intersection of CR 42 and CR 13. The alignment traverses west for approximately 2,780 feet and then heads south through agricultural fields along parcel boundaries. Approaching Lake Thomas it jogs to the west, and then continues south ending approximately 2,600 feet south of CR 32 where it ties in to the Fort Lupton/Hudson Pipeline.			
Criteria		Ranking	Comments	
Capital Cost		Red	\$ 16,544,000	
Conduit Length		Red	6.4 miles, 33,700 feet	
Easement Difficulty		Yellow	26 parcels crossed, 1 non-perimeter crossings	
Right-of-Way Impact		Green	300 LF in ROW	
Land Owner Impact		Green	0 driveways crossed, no subjective landowner impacts	
Proximity to Occupied Dwellings	b	Green	Within 100-feet of 2 occupied dwellings	
Environmental Impacts and Floodplain Crossings		Red	1070 LF of wetlands/riparian areas crossed and 575 LF of floodplain crossed	
Existing Utilities		Green	Low density of existing utilities	
Hazardous/Permitted Crossings		Green	No hazardous/permitted crossings known	
Surface and Street In	npacts	Yellow	120 LF of open-cut in gravel roads (CR-40, CR-38, CR- 36), and 0 LF of open-cut in paved roads	
Traffic Impacts		Green	180 LF of low, 120 LF of medium, 0 LF of high traffic impacts, traffic impact score of 420	
Water Storage Reservoirs Impacts		Green	No impacts expected	
Construction Duration and Relative Constructability		Green	170 days of construction	
Required Trenchless Crossing		Green	1 Railroad, 3 County Roads (CR-42, CR-34, CR-32), 400 LF total trenchless	
Development Pressu	re	Red	8100 LF of near-term developments	1
Operation and Maintenance Access		Red	Difficult access, does not parallel roads	F
O&M Requirements		Red	9 ARVs; 8 BOs	
Natural Resources In	npacts	Green	0 LF in natural areas	



Table C.1 is a visual summary of the score given to every alternative for each criteria. Table C.2 tabulates the number of greens, yellows, and reds given to each alternative.

Table C.1 – Visual Summary of Alternative Scoring

Evaluation Criteria	C-1.1	C-1.2	C-1.3	C-1.4	C-1.5	C-2.1	C-2.2	C-2.3	C-3.1	C-3.2	C-4.1	C-4.2	C-4.3	C-4.4	C-5.1	C-5.2	C-5.3	C-5.4
Capital Cost																		
Conduit Length																		
Easement Difficulty																		
Right-of-Way Impact																		
Land Owner Impact																		
Proximity to Occupied Dwellings																		
Environmental Impacts and Floodplain Crossings																		
Existing Utilities																		
Hazardous/Permitted Crossings																		
Surface and Street Impacts																		
Traffic Impacts																		
Water Storage Reservoirs Impacts																		
Construction Duration and Relative Constructability																		
Required Trenchless Crossings																		
Development Pressure																		
Operation and Maintenance (O&M) Access																		
O&M Requirements																		
Natural Resources Impacts																		

Table C.2 – Numeric Summary of Alternative Scoring

Evaluation Criteria	C-1.1	C-1.2	C-1.3	C-1.4	C-1.5	C-2.1	C-2.2	C-2.3	C-3.1	C-3.2	C-4.1	C-4.2	C-4.3	C-4.4	C-5.1	C-5.2	C-5.3	C-5.4
Red	1	4	10	-	11	2	10	7	5	5	6	6	-	6	5	4	6	6
Yellow	7	3	2	-	1	1	3	2	3	1	1	2	-	7	1	3	6	2
Green	10	11	6	-	6	15	5	9	10	12	11	10	-	5	12	11	6	10

Project Area 1 scoring indicates that Alternatives C-1.1 and C-1.2 are comparably ranked in the numerical analysis. NISP WAE continues to investigate both routes in coordination with local jurisdictions and known development activities in the area. Alternative C-1.2 is located entirely within Timnath, Severance, and Weld County. For the purposes of this Larimer County route analysis, Alternative C-1.1 is shown to quantify the greatest potential impacts within Larimer County.

Project Area 3 scoring indicates Alternative C-3.2 as the better performing route over Alternative C-3.1. However, the two alignments do not have the same endpoints and would necessarily have to connect to Project Area 4 alignments. As stated in the introduction, this can be resolved by combining each Project Area 3 alternative with its respective Project Area 4 alternative continuation and creating a combined scoring comparison. This combined scoring is summarized in **Table C.3** below:

Poting	Alternative Combinations						
Rating	3.1 + 4.1	3.2 + 4.4					
Red	11	11					
Yellow	4	8					
Green	21	17					

Table C.3 – Combined Scoring, Project Areas 3 and 4

The combined alternatives 3.1 + 4.1 score as the better performing alternatives than 3.2 + 4.4. The 3.1 alternative is, therefore, the preferred route.

PREFERRED ALIGNMENT

The preferred alignment consists of a combination of Alternative C-1.1, C-2.1, C-3.2, C-4.1 and C-5.2 and is presented in **Figure C.20**. The alignment begins at the intersection of CR 52 and CR 13 and generally follows County Line Road (outside of current ROW) south to approximately 2,600 feet south of CR 32 where it ties into the existing Fort Lupton Pipeline. The alignment generally has lower landowner impact and less proximity to occupied dwellings than the other alternative routes. Because of existing dense development in Timnath, Windsor, and Johnstown, east and west of County Line, it provides the best continuous corridor for a new large conveyance pipeline. It also parallels a corridor that will eventually become a major arterial roadway and will be coordinated in a way to leverage off of this future planning while minimizing ultimate loss of productive land use. **Table C.4** below summarizes the estimated features of the overall preferred alignment, broken down by Project Area segments. In the case of a tie, alternates were evaluated and the preferred alignment was selected based upon prioritization of factors, mainly cost and length.

Characteristic	C-1.1	C-2.1	C-3.1	C-4.1	C-5.1	TOTAL
Pipe Diameter (inches)	48	48	48	48	48	48
Pipe Material	Mortar Lined Steel					
Total Distance (miles)	6.1	5.7	5.7	6.2	5.6	29.3
Pipe Cost	\$17,557,000	\$16,275,000	\$16,998,000	\$17,913,000	\$15,493,000	\$84,236,000
Length Tunnel (feet)	720	720	1,020	1,020	500	3,980
Number of Landowners	27	19	29	23	23	121
Wetland Crossings (feet)	2460	1,410	740	90	600	5,300

Table C.4 – Preferred Alignment Characteristics



Figure C.20 – County Line Road Delivery Pipeline Preferred Alignment