

6.0 Route Selection Process

6.1 Line 3 Route Development Process

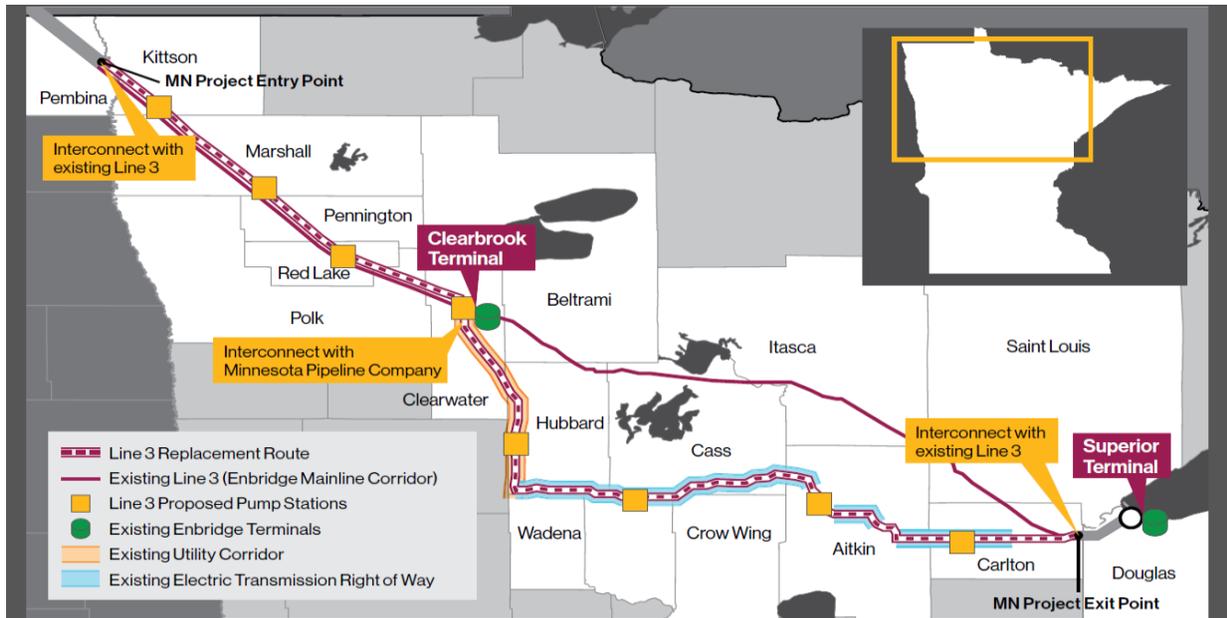
Through years of expanding its crude oil pipeline system, Enbridge has developed professionals with decades of experience in safely constructing and operating thousands of miles of continuous pipeline facilities across North America. This knowledge has enabled Enbridge to develop a rigorous route selection process, which includes state and federal criteria where applicable, such as Minn. R. 7852.1900, as well as overall environmental, engineering, and economic factors. Each project's route must meet the project's objective and is then evaluated based on geographic requirements, stakeholder input, and other routing criteria that ultimately results in a reasonable and financially viable route with the least impacts to the environment and human settlement. The following sections more fully describe the route selection process that was employed for the Project.

6.2 Development and Application of Routing Criteria

Geographic Requirements

The initial step in establishing Line 3's routing criteria is its geographic location. The Project must enter, deliver within, and exit Minnesota at the locations identified in Figure 6.2-1 to interconnect with other replaced portions of Line 3 at the North Dakota and Wisconsin borders, and to continue deliveries to Minnesota Pipe Line Company at the Clearbrook Terminal.

Figure 6.2-1: Project Geographic Requirements



Enbridge concluded that any route alternative that does not meet the three geographic requirements, as described more fully below, would not meet the purpose or objective of the Project, and therefore such routes were not considered by Enbridge in the development of the Project's Preferred Route.

- **The Project must cross into Minnesota in Kittson County.** The Project must cross into Minnesota in Kittson County, Minnesota, and connect with the segment of Line 3 being replaced in North Dakota, which ultimately connects to the Canadian portion of the Replacement Program.
- **The Project must interconnect with other Enbridge and third-party pipelines at and make deliveries to Clearbrook.** The Project must connect to the existing Enbridge Clearbrook Terminal in Clearbrook, Minnesota. This enables Line 3 to interconnect with Minnesota Pipe Line Company's system at Clearbrook for further delivery of crude supplies to Minnesota refineries and to interconnect with other Enbridge pipelines at Clearbrook.
- **The Project must exit Minnesota in Carlton County and connect to the Superior Terminal.** The Project must exit Minnesota in Carlton County, Minnesota, and connect with the 14-mile segment of Line 3 being replaced in Wisconsin, which connects to existing Enbridge facilities at Superior, Wisconsin. Continued delivery to the Enbridge facilities in Superior is essential so that volumes transported on the Project can be

injected into the Enbridge Mainline System for delivery to refineries in Wisconsin, elsewhere in PADD II, and beyond.

Other Routing Criteria Considered

After identifying the Project's geographic route requirements, Enbridge considered other routing criteria, including constraints, opportunities, and technical guidelines, as detailed below.

- **Constraints** – Constraints are features or conditions that could limit or prevent pipeline development. Enbridge works diligently to avoid these features and conditions if at all possible in the siting of its pipeline facilities. Constraints include areas where access or construction is restricted by regulations, and areas where impacts on resources would be difficult to mitigate. For instance, Enbridge generally tries to avoid: dense population centers; homes; and places of public assembly, such as churches, businesses, playgrounds, parks, and schools; federal, state, and locally-designated environmental protection areas; sensitive habitats; areas with special legal status or where permanent right-of-way cannot be acquired and eminent domain may not be exercised, such as tribal lands; cultural resources; and public infrastructure. It is important to note that constraints are often unique and project-specific, and are, therefore, evaluated on an individual project basis during the route selection process.
- **Opportunities** – Opportunities are features or conditions that could facilitate project development and avoid or mitigate impacts on human and environmental features. For instance, the ability to parallel existing infrastructure (including existing pipelines and associated facilities, transmission lines, and transportation corridors) was a key consideration in Enbridge's route selection.
- **Technical Guidelines** – Technical guidelines are the specific engineering requirements and objectives associated with the construction of the Project. For example, one engineering preference is to maintain approximately 25 feet of separation between centerlines when paralleling existing Enbridge pipelines and 50 feet or more of separation between centerlines when parallel to third-party electric transmission and transportation corridors. Technical guidelines also include federal/state regulatory requirements and guidelines, applicable federal and/or state safety codes and best industry practices. While not always the case, technical guidelines can be unique and project-specific, and are, therefore, evaluated on an individual project basis during the route selection process.

Enbridge generally avoided constraints and sought out opportunities, while also applying technical guidelines where necessary in the development and selection process of the Project's Preferred Route.

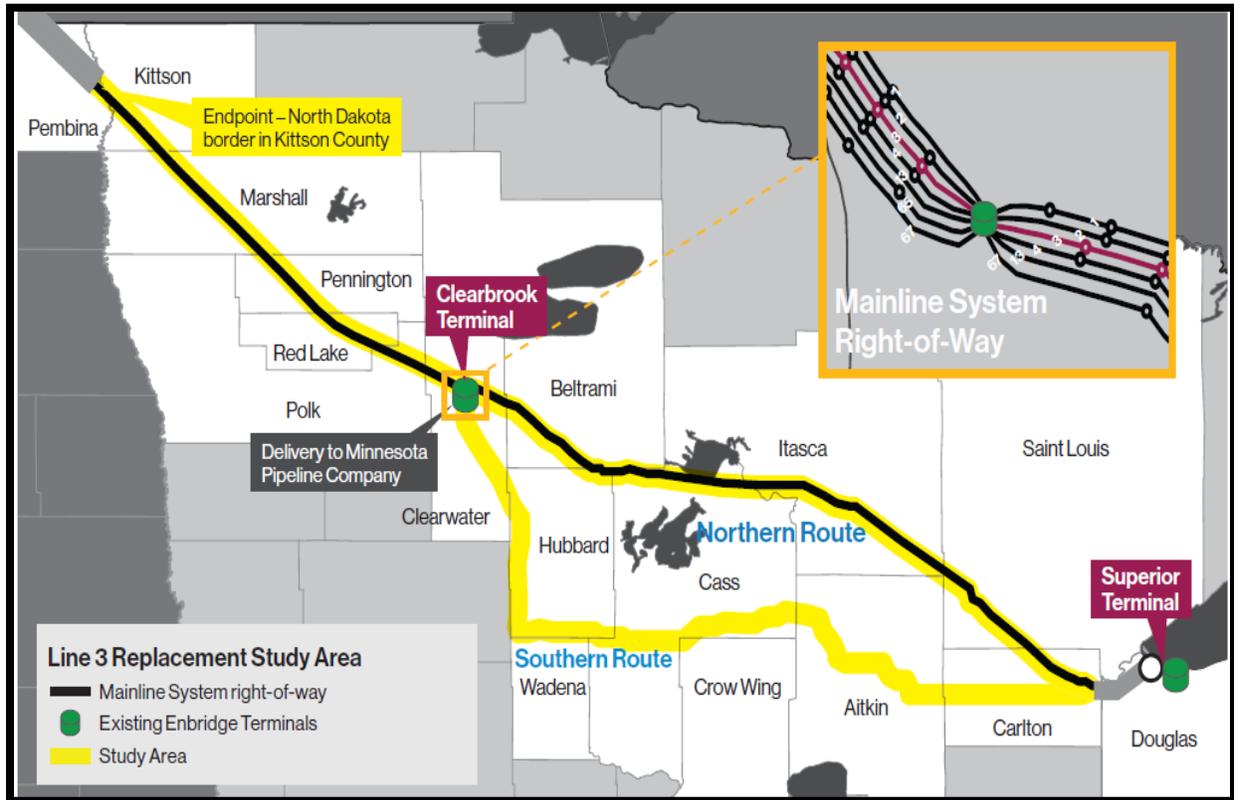
6.3 Data Collection

Enbridge began its route selection process in the 4th Quarter 2013 by collecting and analyzing publicly-available environmental data to identify routing constraints and opportunities within the applicable geographic area. The data collection continued throughout the route development process and continues as new routing information is discovered through various meetings with interested parties and/or consultation with permitting agencies. Such data primarily consists of Geographic Information System digital information layers from the following sources: U.S. Geological Survey (USGS) topographic maps land use database; U.S. Department of Agriculture (USDA) Farm Services aerial photography and GIS data; National Wetlands Inventory (NWI) maps; Minnesota Department of Natural Resources (MNDNR) National Heritage Information System data; Minnesota Department of Transportation (MNDOT) highway maps; USDA state soil geographic databases; and other natural feature databases obtained from state and federal sources. Enbridge also worked diligently to identify existing Enbridge and third-party rights-of-way for use in potential sharing of right-of-way and paralleling of existing pipelines routes, electric transmission and transportation corridors. All technical guidelines were gathered during the initial engineering design and development phases, and were then incorporated as part of the overall project scope and continue to be updated as the final engineering design is completed for the proposed Project.

6.4 Study Area Identification

Within the geographic location requirements discussed in Section 6.2 above, Enbridge identified a two mile-wide Study Area centered over the existing Line 3 for both west of Clearbrook and east of Clearbrook (see yellow highlighted route on Figure 6.4-1). Enbridge also identified a second Study Area east of Clearbrook between Clearbrook Terminal in Clearwater County and the Wisconsin border in Carlton County (see yellow highlighted route on Figure 6.4-1).

Figure 6.4-1: Study Areas



The two identified Study Areas are defined as follows:

6.4.1 West of Clearbrook Study Area (WCSA)

WCSA satisfies the geographic limitations of the Project, which begins at the North Dakota border in Kittson County and ends at the existing Enbridge Clearbrook Terminal. The WCSA is located within the geographic end points and follows the existing Line 3 along the Enbridge Mainline System right-of-way as it traverses the counties of Marshall, Pennington, Red Lake, and Polk, where it ends at the existing Enbridge Clearbrook Terminal for deliveries to Minnesota Pipe Line Company.

6.4.2 East of Clearbrook Study Area (ECSA)

ECSA satisfies the geographic limitations of the Project, which begins at the existing Enbridge Clearbrook Terminal in Clearwater County and ends at the Wisconsin border in Carlton County. Between these two end points, Enbridge also identified two route variations commonly referred to as “the Northern Route Alternative” and the “Southern Route Alternative,” as defined below:

- The Northern Route Alternative Study Area (Northern Route) begins at the existing Clearbrook Terminal in Clearwater County and extends to the southeast to follow the existing Line 3 pipeline route along the Enbridge Mainline System right-of-way to the Wisconsin border in Carlton County. The Northern Route Study Area traverses the counties of Clearwater, Beltrami, Hubbard, Cass, Itasca, Aitkin, St. Louis, and Carlton, as shown on Figure 6.4-1.
- The Southern Route Alternative Study Area (Southern Route) departs from the existing Line 3 pipeline route and extends south to follow an existing third-party pipeline from the Enbridge Clearbrook Terminal in Clearwater County to the southern portion of Hubbard County near Hubbard, Minnesota. From that point, the Southern Route turns east, and generally follows and runs parallel to existing electrical transmission and transportation corridors as it traverses the counties of Wadena, Cass, Crow Wing, and Aitkin. The Southern Route then enters Carlton County where it rejoins the existing Enbridge Mainline right-of-way and runs parallel to the existing Line 3 pipeline to end at the Wisconsin border, as shown on Figure 6.4-1.

6.5 Study Corridor Identification

Once Enbridge collected data, obtained stakeholder input, and engaged in early agency consultations regarding the Study Areas identified above, Enbridge was able to narrow or refine its Study Area to a Study Corridor, which is approximately one mile-wide centered over the existing Line 3 pipeline within the Enbridge pipeline right-of-way, which includes WCSA and the Northern Route. In certain areas where potential routing and/or environmental features were identified early on during the route selection process, Enbridge expanded the one mile Study Corridor. This approach provided the most flexibility in selecting route opportunities, while also avoiding constraints where at all possible. For the Study Area referred to as the Southern Route, Enbridge started with the existing survey work and detailed routing analysis prepared for the Sandpiper Pipeline Project.

Based on the opportunities, constraints, and technical guidelines, the Study Areas were thoroughly evaluated to select the Preferred Route for the proposed Project as described more fully below.

6.6 Evaluation of Replacement Options and Route Variations

As part of the route selection process, Enbridge also studied a variety of replacement alternatives before selecting its Preferred Route for this Project. These alternatives consisted of replacement options and route variations that satisfied the geographic limitations of this Project. During its assessment, Enbridge evaluated and compared several factors, while ensuring that it still met the Project's objective in selecting its Preferred Route, including:

- The ability to meet project objectives;
- Constraints;
- Opportunities;
- Technical guidelines;
- Potential environmental impacts.; and
- Economic feasibility.

Replacement Options Considered:

Listed below are the replacement options considered and further evaluated in the Project's route selection process:

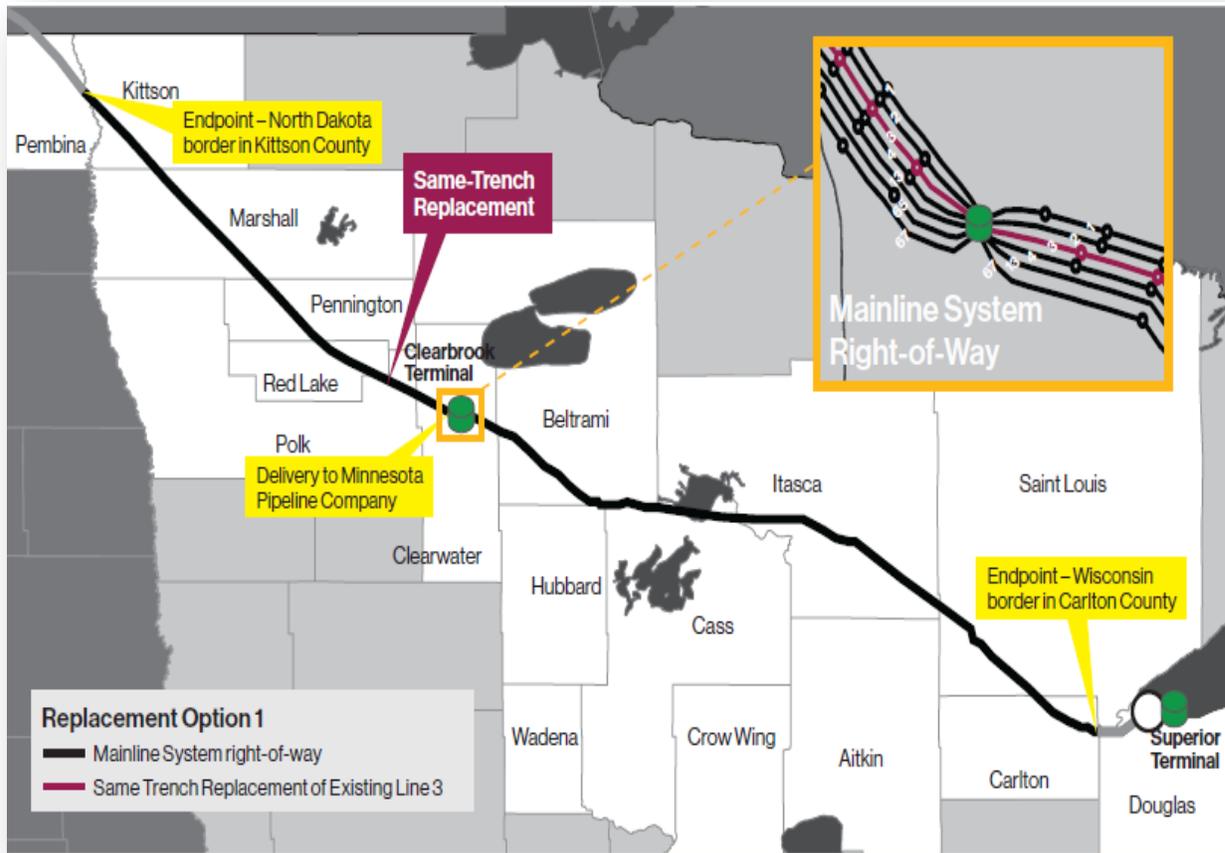
- **Option 1** - Replace Line 3 in its same trench (see Figure 6.6.1-1);
- **Option 2** - Replace Line 3 parallel to the existing Enbridge Mainline System west of Clearbrook and follow Northern Route east of Clearbrook (see Figure 6.6.2-1); and
- **Option 3** - Replace Line 3 parallel to the existing Enbridge Mainline System west of Clearbrook, and follow Southern Route Alternative east of Clearbrook (see Figure 6.6.3-1).

6.6.1 Option 1 - Replace Line 3 in its same trench:

The scope of this replacement option involves the removal of Line 3 followed by the installation of a new 36-inch pipe in the same pipeline trench (same trench replacement) (see Figure 6.6.1-1 below for general location). Line 3 is positioned in the middle of the Enbridge Mainline System right-of-way, which is a multi-pipeline corridor containing seven crude oil pipelines west of Clearbrook and six crude oil pipelines east of Clearbrook, as shown on Figures 6.6.1-2, 6.6.1-5 through 6.6.1-8 below. As a result, this pipeline right-of-way is very congested, and spacing

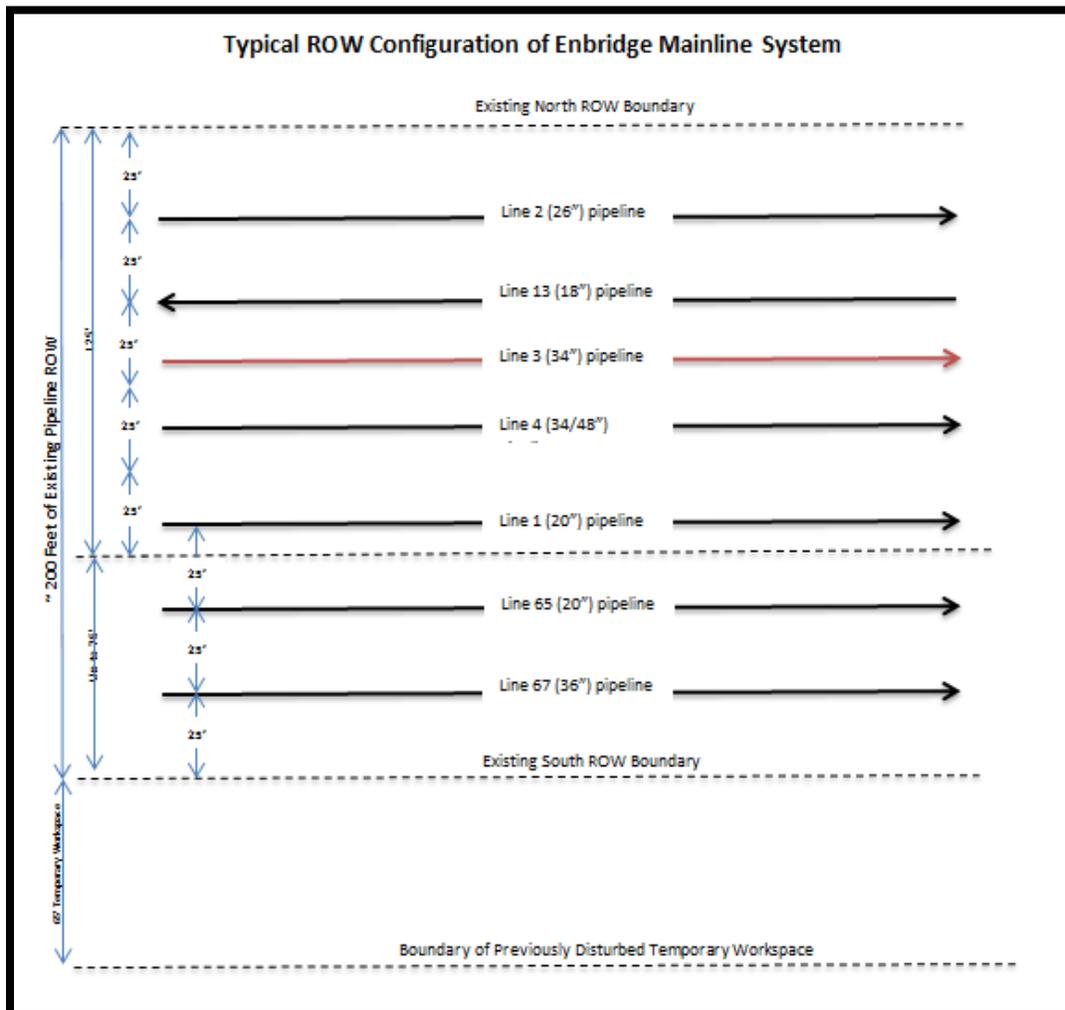
between pipelines typically ranges between 10-foot to 15-foot on the north side of Line 3, and between 15-foot to 20-foot on the south side of Line 3.¹

Figure 6.6.1-1: Same Trench Replacement



¹ The pipeline spacing may be slightly different in regions of heavily saturated soils.

Figure 6.6.1-2: Typical ROW Configuration



This replacement option does provide an opportunity for Enbridge to use Line 3's existing pipeline right-of-way. However, Enbridge has concluded that this alternative is not a viable replacement option due to 1) increased human and environmental impacts; 2) requiring additional workspace; 3) increased wetlands and waterbody impacts; 4) extended open trenches; 5) increased safety risks and construction challenges; and 6) increased operational impacts, as detailed below.

1) Same Trench Replacement Creates Increased Human and Environmental Impacts

Same trench replacement has a significant adverse impact on human and environmental factors. First, much of the preparation and travel work associated with pipeline construction occurs in the right-of-way along the pipeline trench. The additional right-of-way along the

trench in this scenario would occur over active pipelines; therefore, significant additional workspace (similar to that currently planned for the Project) outside of the Enbridge Mainline Corridor would be needed for equipment travel, and soil storage. In addition, landowners along the Line 3 right-of-way would be impacted by the prolonged presence of construction crews and construction activity, and would have limited or no access to the construction right-of-way for the duration of construction. The length of the construction process may result in multiple years of crop loss in agricultural areas, and the presence of an open trench would impact the ability to move farming equipment and livestock across the construction right-of-way. The extended construction operation would also result in more road use and increased traffic throughout the construction process.

2) Same Trench Replacement Requires Additional Workspace

Even though the new construction impacts may be reduced due to working within an existing right-of-way that was previously disturbed, the overall workspace area would be increased for several reasons. In particular, operating heavy equipment over in-service high pressure pipelines is hazardous and would need to be avoided if at all possible. Depending on the engineering specifications and environmental factors associated with the adjacent pipelines, such as depth of cover, pipe design, operating pressure, soil types, and ground conditions, the operating pipelines would need to be protected from damage through bridging, additional fill, and hardwood mats. The mitigation measures will require transportation and staging of additional matting or spoil. They will also increase the activity and necessity for workspace in both the interior of the multi-line corridor and outside the active corridor boundaries. Compliance with this guideline would require acquiring 200 feet of temporary workspace along the entire right-of-way, in which to conduct construction activities.

3) Same Trench Replacement is More Difficult in Wetlands and Waterbodies

Same trench replacement poses greater environmental impacts at wetlands and waterbodies. With same trench construction, it would take an extended period of time to remove existing pipe at waterbody and wetland crossings because specialized construction techniques would need to be used in a limited workspace. In addition, installing a new pipeline at these same crossings would further increase the duration of waterbody and wetland impacts and disturbance for each crossing.

4) Same Trench Replacement Will Require Extended Open Trenches

Same trench replacement poses additional environment, safety, and operational risks. A trench open for protracted periods of time increases construction risks due to the additional work that would likely be necessary to maintain a clear trench. The environmental management plan normally restricts having an open trench to the equivalent of three days of welding production. Replacement of Line 3 in its current location may result in the trench being open for protracted

periods, significantly longer than three days, as Enbridge would remove a section of the pipe and then replace it. During that time, changing weather conditions, such as frost and rain, can severely weaken the trench wall, contributing to trench cave-in. Rain will also fill the trench with water. Both circumstances prevent pipe installation. Trench cave-ins result in more time and activity to reconstruct the trench so that pipe may be installed. Likewise, the amount of groundwater that would need to be discharged out of the trench throughout the construction process would increase.

5) Same Trench Replacement Will Create Increased Safety Risks and Construction Challenges

Safety is Enbridge's first and foremost consideration. Within the Enbridge Mainline Corridor, Line 3 is located in the middle of the multi-pipeline right-of-way with actively operating pipelines located on both sides (see Figures 6.6.1-5 through 6.6.1-8). As seen in Figure 6.6.1-2, this is a highly congested pipeline right-of-way where spacing typically ranges between 10-feet and 15-feet on the north side of Line 3, and typically ranges between 15-feet and 20-feet on the south side of Line 3 as it traverses the state of Minnesota.² To replace Line 3 in the same trench, excavation, exposing, cutting, handling, removing, and replacing the existing pipeline would be required. Because this process would take place between and near multiple operating pipelines, and within a very restricted workspace, there is an increased risk of damaging an operating pipeline through accidental contact with equipment, overloads on the surface above the pipelines, cave-ins and adjacent pipe movement due to the varying depths of cover, among other risks.

In addition, due to the limited workspace and the number of existing lines, heavy equipment would need to be placed directly on top of operating pipelines during construction. As discussed above, some of these construction impacts could be mitigated by conducting them off the right-of-way, but this only shifts the impacts to a location outside the pipeline right-of-way. Also, some impacts cannot be moved off the right-of-way, and must be conducted along the pipeline trench, which creates the risk of overstressing the operating pipelines or posing the threat of accidental strikes from backfilling equipment. To mitigate this risk, in upland areas, Enbridge would need to use mat decking or bridging along the entire right-of-way. This matting would be used for travel lanes along the Project work site or to shuttle the spoil over and across operating pipelines to a designated storage area within the temporary workspace as shown on Figures 6.6.1-3 and 6.6.1-4.

² The pipeline spacing may be slightly different in regions where there are heavily saturated soils.

Figure 6.6.1-3: Typical Profile of the Construction Footprint for Same Trench Removal

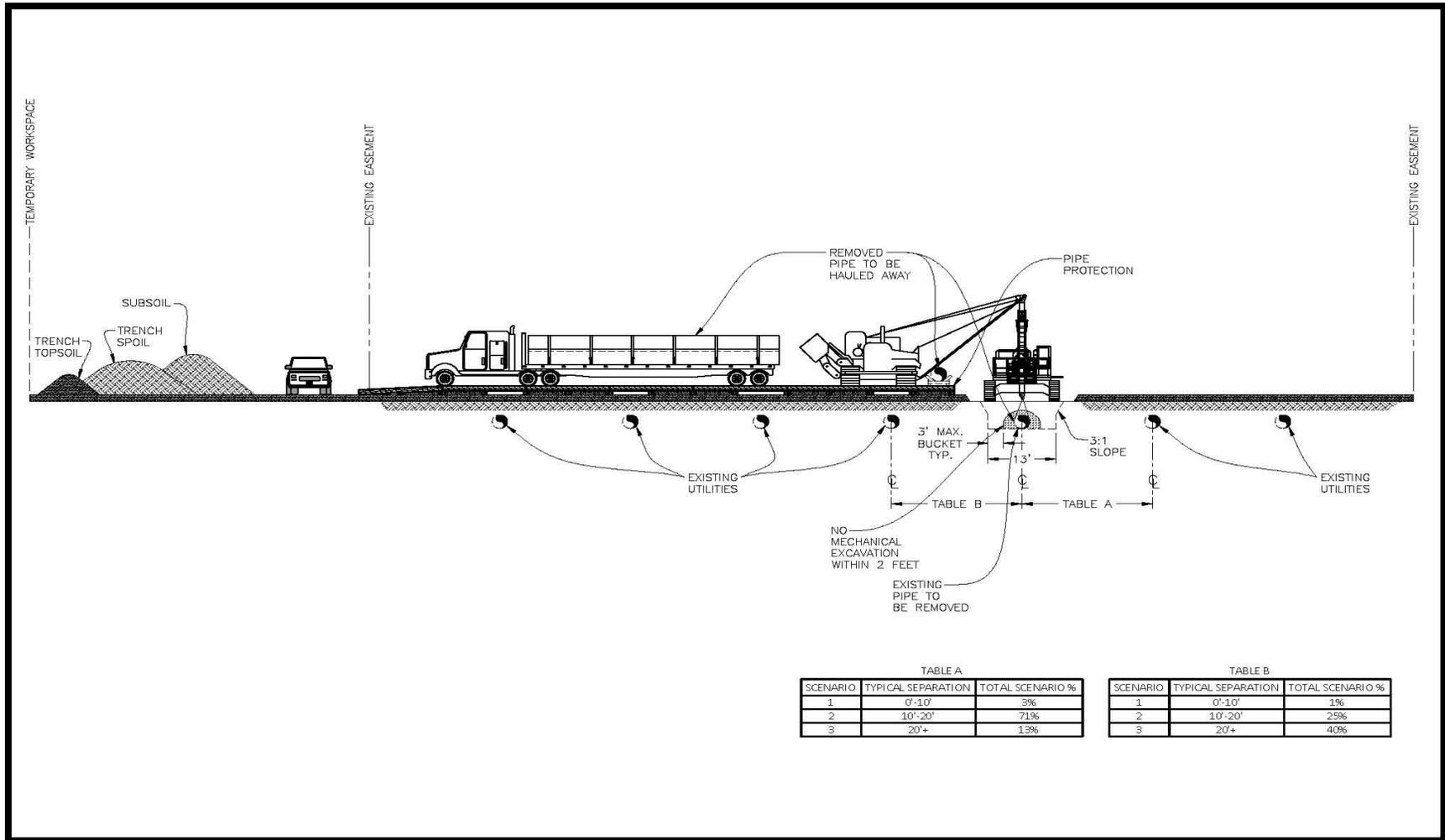
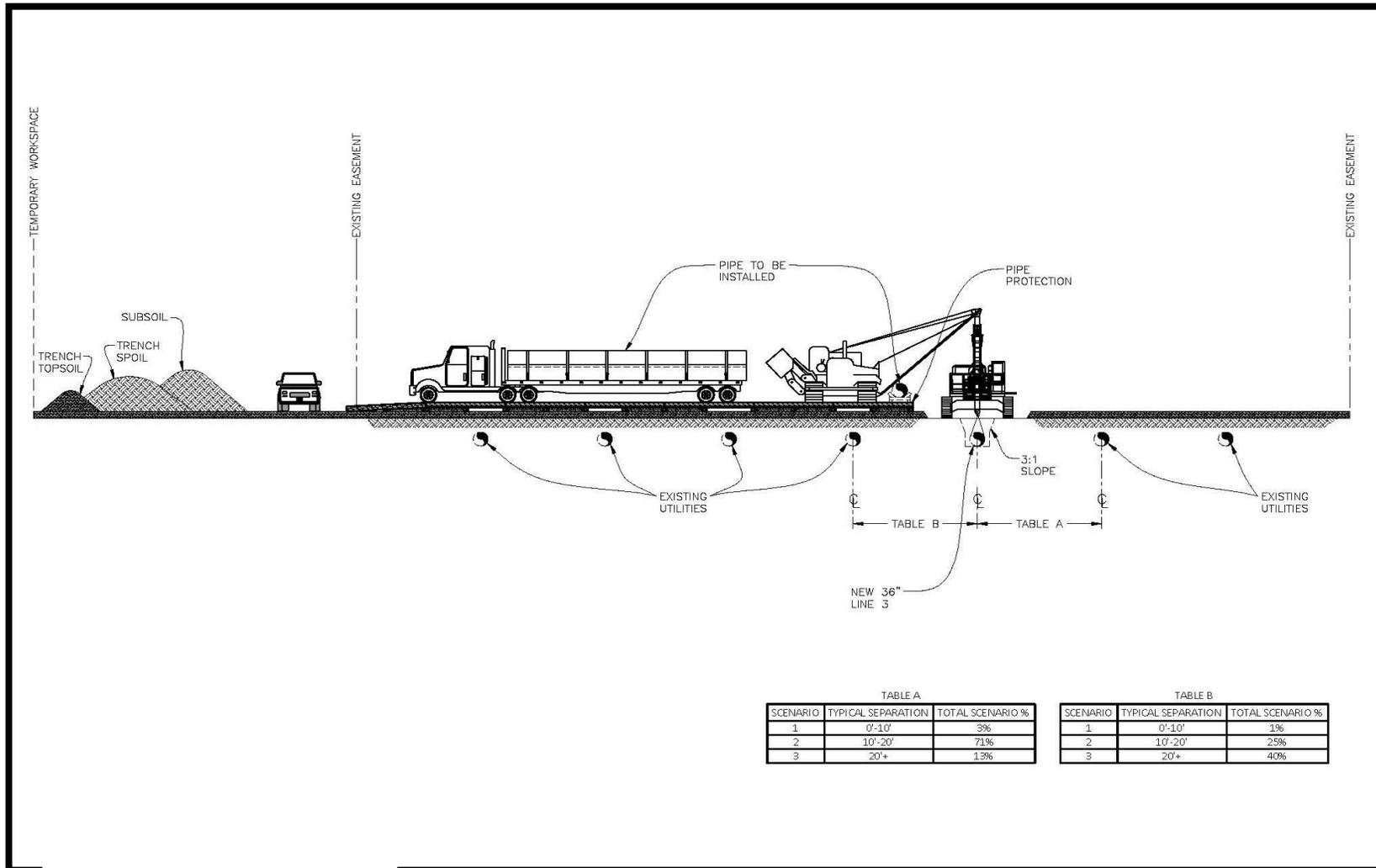


Figure 6.6.1-4: Typical Profile of the Construction Footprint for Same Trench Installation



Figures 6.6.1-5 and 6.6.1-6 below show the typical construction footprint for west of Clearbrook, depicting the location of Line 3 within the congested seven-pipeline right-of-way of the Enbridge Mainline System. These drawings show the limited spacing between each pipeline on either side of Line 3, as indicated on Tables A and B within the figures. These limitations also create construction challenges and safety risks as described above in Section 6.6.1 of this Application.

Figure 6.6.1-5: Typical Construction Workspace West of Clearbrook – Scenario 1 Same Trench Replacement (North Side Workspace)

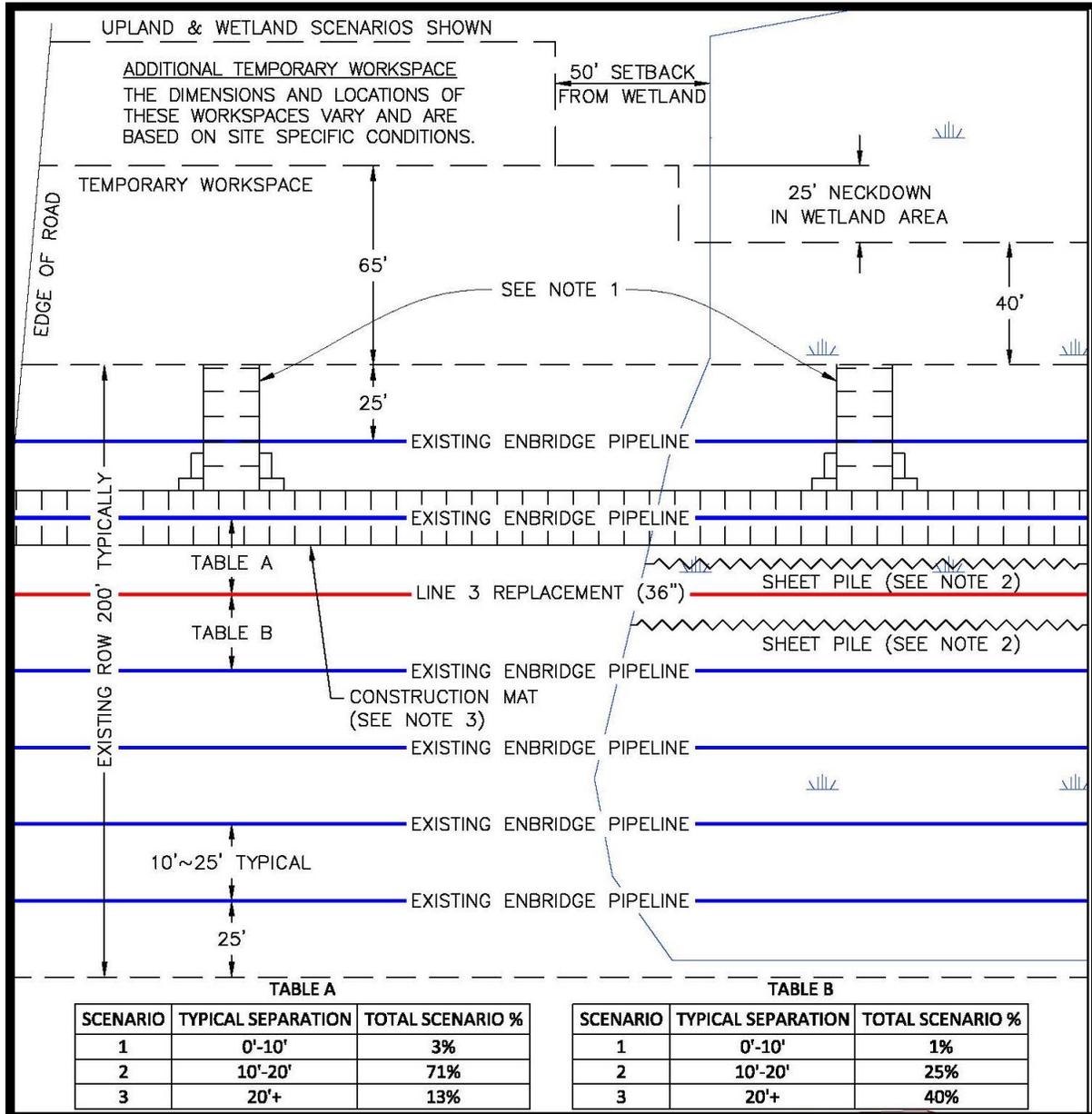


Figure 6.6.1-5 shows the typical construction footprint where the construction work activities would be located on the north side of the Enbridge Mainline right-of-way west of Clearbrook. The land requirements would be: Uplands: 265 feet in total, using 200 feet of existing permanent right-of-way and 65 of temporary workspace area; and Wetlands: 240 feet in total, using 200 feet of existing permanent right-of-way and 40 feet of temporary workspace area. (See Appendix I.1.)

Figure 6.6.1-6: Typical Construction Workspace West of Clearbrook – Scenario 2 Same Trench Installation (South Side Workspace)

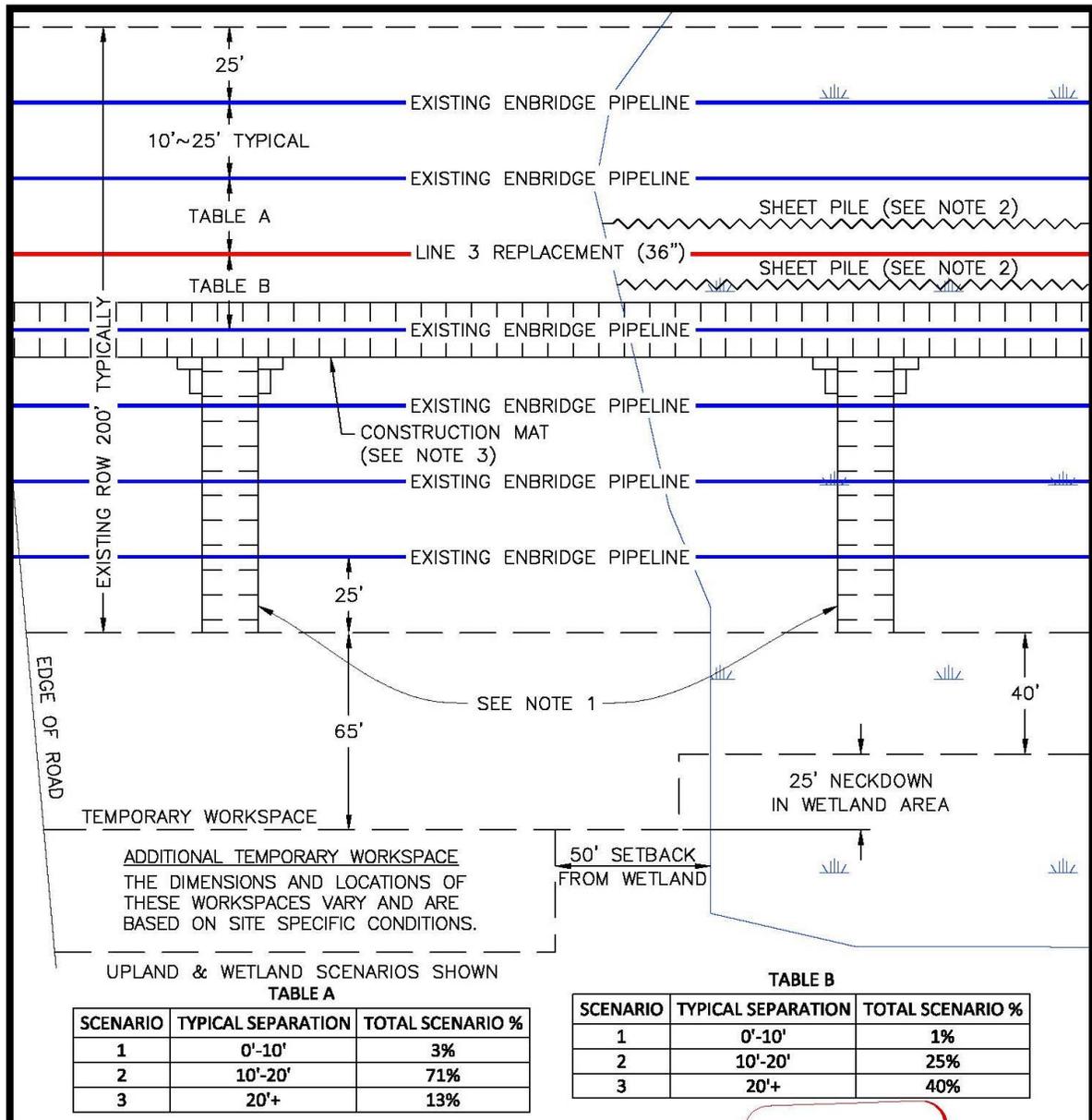


Figure 6.6.1-6 shows the typical construction footprint west of Clearbrook, where the construction work activities would be located on the south side of the Enbridge Mainline right-of-way. The land requirements would be as follows: Uplands: 265 feet in total, using 200 feet of existing permanent right-of-way and 65 of temporary workspace area; and Wetlands: 240 feet in total, using 200 feet of existing permanent right-of-way and 40 feet of temporary workspace area. (See Appendix I.2.)

Figures 6.6.1-7 and 6.6.1-8 below show the typical construction footprint for east of Clearbrook, depicting the location of Line 3 within the congested six pipeline right-of-way of the Enbridge Mainline System. These drawings show the limited spacing between each pipeline on either side of Line 3 as indicated on Tables A and B. These limitations also create construction challenges and safety risks as described above in Section 6.6.1 of this Application.

Figure 6.6.1-8: Typical Construction Workspace East of Clearbrook – Scenario 2 Same Trench Installation (South Side Workspace)

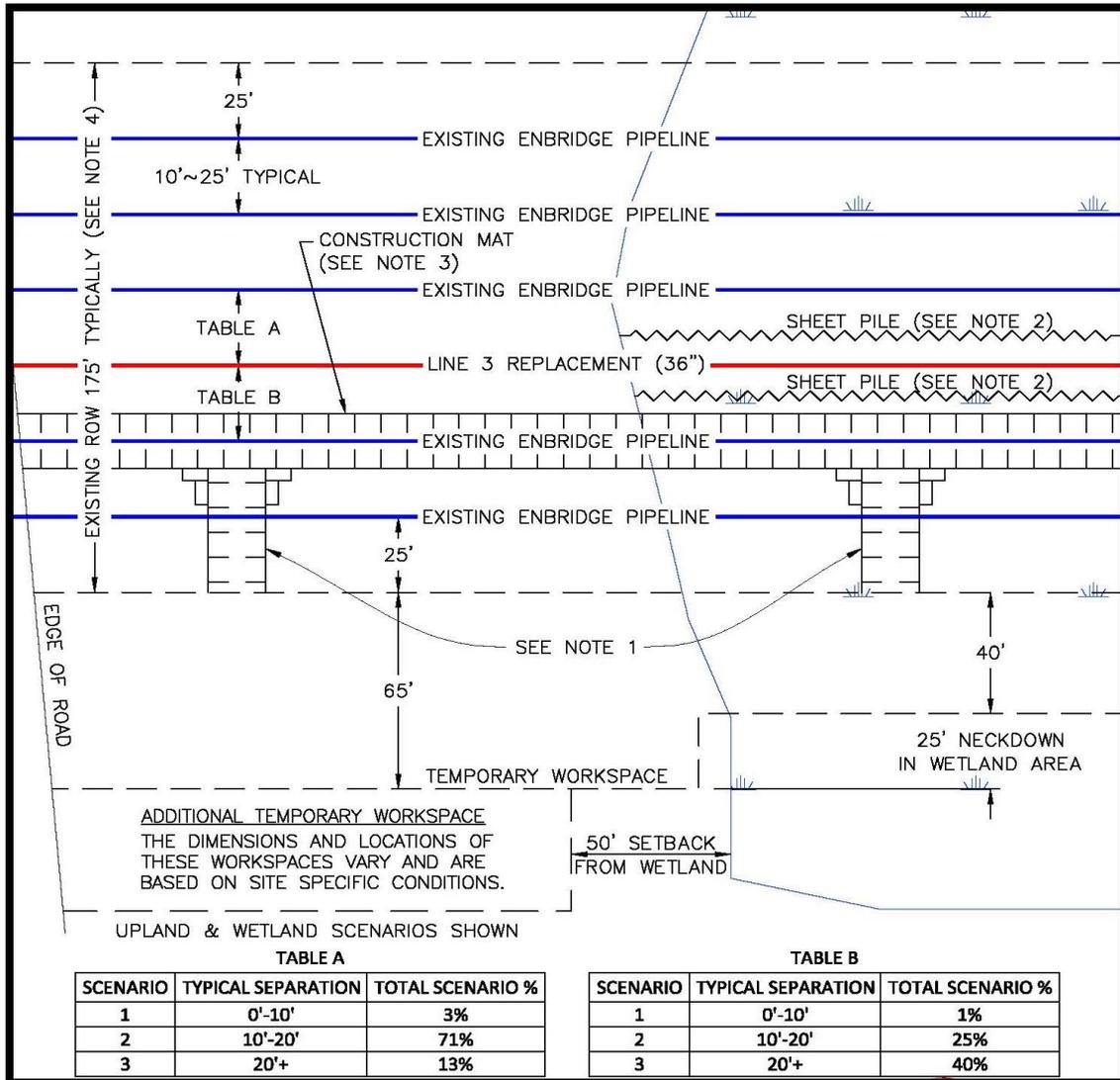


Figure 6.6.1-8 shows the typical construction footprint where the construction work activities would be located on the south side of the Enbridge Mainline right-of-way. The land requirements would be as follows: Uplands: 240 feet in total, using 175 feet of existing permanent right-of-way and 65 of temporary workspace area; and Wetlands: 215 feet in total, using 175 feet of existing permanent right-of-way and 40 feet of temporary workspace area. (See Appendix I.4.)

In addition to the construction issues discussed above, it is important to note that mitigation measures for removing pipeline in wetland areas may not be as effective, causing larger and unnecessary impacts. As discussed above, replacing in the same trench would prolong the amount of time the trench is open, increasing environmental risks and construction impacts to landowners, livestock, and wildlife. Further, with parallel pipelines on either side of Line 3, rerouting around any features, such as waterbodies, would be nearly impossible, and doing so would require pipe installation outside of the existing Line 3 trench.

Enbridge has a strong and mature safety program and strict work rules when conducting operations near or in and around its pipelines. However, it is an unavoidable reality that conducting heavy construction inside and over a multi-line pipeline corridor exposes the pipelines to risk that would otherwise not be present, thereby increasing the probability of damage. The risk to the environment and human population is further increased because there are a number of locations west of Clearbrook where Line 67 and Line 65 cross back and forth under Line 3 to avoid special environmental features and minimize impacts to human settlements. Likewise, the same situation occurs east of Clearbrook where Line 67 and Line 13 cross back and forth under Line 3 to avoid similar environmental and human impacts. In total, the back and forth crossing of Line 3 occurs 12 times west of Clearbrook and 20 times east of Clearbrook. This also exposes the personnel performing the construction to dangers and the environment to potential impacts that are otherwise avoided in large part by constructing the replacement pipeline in a new location.³

6) Same Trench Replacement Creates Increased Operational Impacts

As noted above, utilizing the same trench would require taking the existing Line 3 out of service during removal of the existing Line 3 and construction of the new pipeline. This means that Line 3 could be out of service for up to two years, which is not feasible from an Enbridge operational standpoint. Taking Line 3 out of service would significantly reduce the capacity available on the Enbridge Mainline System to meet the needs of shippers transporting crude oil from Western Canada, resulting in increased levels of apportionment for refineries served by Line 3, including Minnesota and Wisconsin refineries.

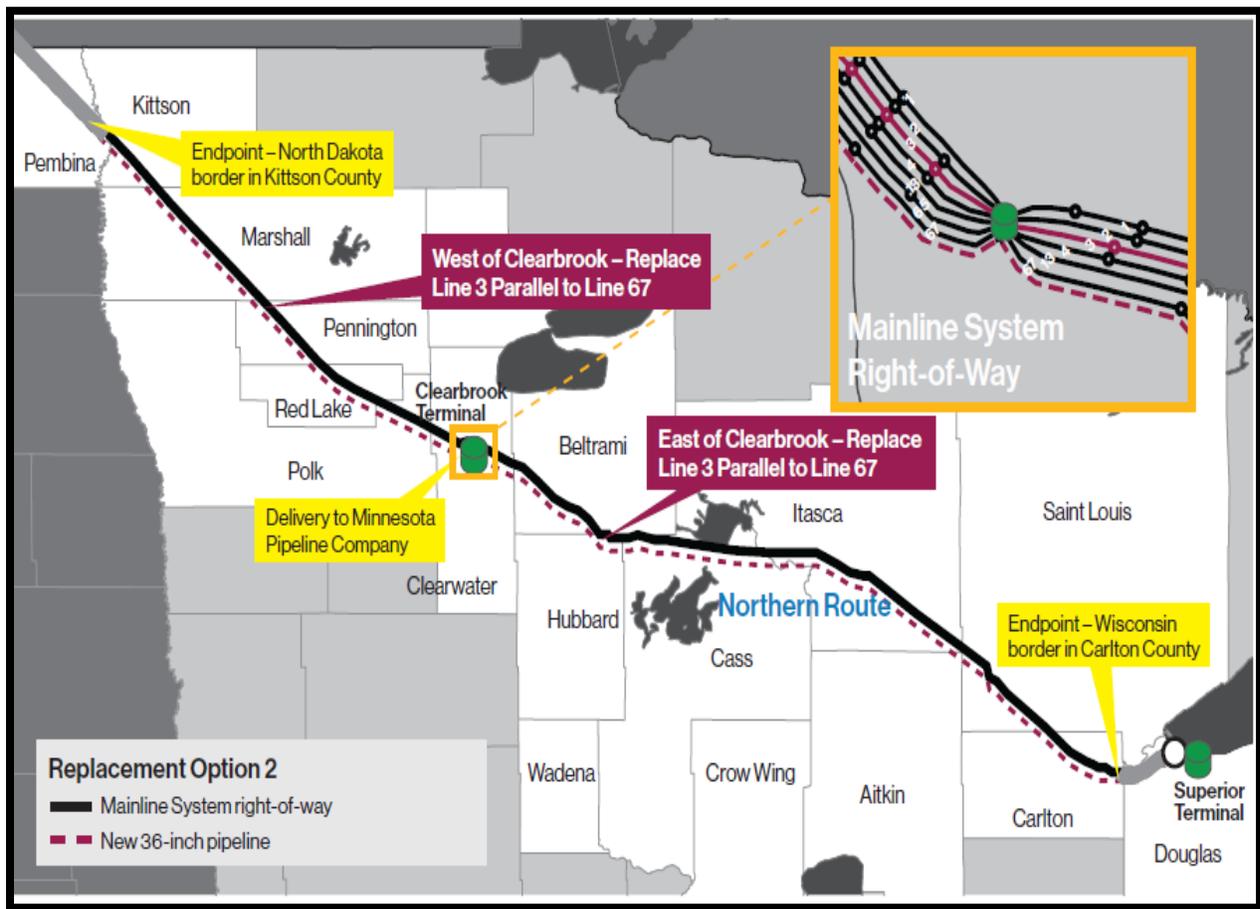
For all the reasons discussed above, Enbridge rejected this replacement alternative.

³ The Project construction workspace includes space over Line 67. The deep burial of nominally 48 inches or greater and recent construction of both pipelines allows for the workspace over these adjacent pipelines to safely be used for spoil storage. In addition, equipment will generally not be used on top of the existing pipelines.

6.6.2 Option 2 – Replace Line 3 Parallel to Existing Enbridge Mainline System west of Clearbrook and Follow Northern Route Alternative east of Clearbrook

The scope of this replacement alternative involves permanently deactivating the existing Line 3 and installing approximately 282 miles of new 36-inch pipeline generally parallel to the existing Line 67 from the North Dakota border in Kittson County to Wisconsin border in Carlton County. This alternative provides one opportunity of partial sharing and/or paralleling of existing Line 67 pipeline right-of-way along the Enbridge Mainline System west of Clearbrook and east of Clearbrook along the Northern Route (see Figure 6.6.2-1 below). However, the Northern Route east of Clearbrook presents substantial constraints, including the inability to obtain permanent easements, significant construction constraints, and greater human and environmental impacts. For example, the proposed route would require the acquisition of 25-feet of new permanent pipeline right-of-way and the purchase of land in fee for the station facilities west of Clearbrook and east of Clearbrook along the Northern Route.

Figure 6.6.2-1: Parallel Replacement West of Clearbrook and Northern Route Alternative



West of Clearbrook Routing Analysis

In examining the data collected for the routing analysis west of Clearbrook, it showed that 98 percent of this replacement route would generally run parallel to and share Line 67's existing pipeline right-of-way (see details in Table 6.6.2-1).

Table 6.6.2-1 Routing Analysis: Parallel West of Clearbrook, Northern Route Alternative				
Geographic Requirements	Miles	Sharing ROW	Paralleling	Greenfield
From North Dakota border in Kittson County to the existing Enbridge Clearbrook Terminal Station in Clearwater County for delivery to the interconnecting facilities of Minnesota Pipe Line Company	123	98%	98%	2%
From the existing Enbridge Clearbrook Terminal in Clearwater County to the Wisconsin border along the Northern Route Alternative	159	98%	98%	2%
Total	282			

It also showed that the Study Corridor west of Clearbrook is primarily rural and agricultural in nature and contains farm style residences along rural roads. It was further determined that this replacement option will have the least impact to existing residential and commercial areas because it would share and run parallel to Line 67's existing pipeline right-of-way, which does not travel through heavily populated areas, but rather along sparsely populated rural roads, as detailed in Section 7.5 of the Application. Also, this replacement option poses fewer construction challenges and technical difficulties than the same trench replacement because such work activities would not occur within a highly congested pipeline corridor where pipeline spacing is limited as described in Section 6.6.1 above. For these reasons, Enbridge determined that the alternative which follows Line 67 west of Clearbrook is the best replacement option to meet the Project's objective while also minimizing human and environmental impacts. Thus, Enbridge selected this alternative as the Project's Preferred Route west of Clearbrook. A detailed environmental analysis which complies with the Minn. R. 7852.1900 is provided in Section 7.0 of the Application.

East of Clearbrook Routing Analysis

In examining the data collected for the routing analysis east of Clearbrook along the Northern Route, Enbridge identified a number of construction constraints and technical difficulties as detailed below.

Inability to Obtain Permanent Easements

One of the key routing considerations for Enbridge east of Clearbrook is whether it can acquire contiguous permanent right-of-way along the Northern Route. It is important to note that approximately 79 percent of the Enbridge Mainline right-of-way east of Clearbrook between Clearbrook, Minnesota and Chub Lake near Carlton, Minnesota consists of federal and state public and tribal lands. Further to that point, if Enbridge cannot acquire its permanent right-of-way in these locations through amenable agreements with its affected property owners, it is important to note that eminent domain cannot be exercised to acquire a pipeline right-of-way across these lands. This is a critical routing factor that Enbridge must consider in its routing analysis because over half of its replacement route east of Clearbrook is directly impacted by this constraint.

Enbridge has constructed pipelines through these areas in the past, going back to 1949 when the first line from Canada to Superior, Wisconsin was installed. Since then, several other projects have been completed along the Enbridge Mainline right-of-way in Northern Minnesota, which crossed the Chippewa National Forest (CNF) and state public lands, the Leech Lake Reservation, and the Fond du Lac Reservation. Today, however, the ability to obtain limited-term permits and easements is uncertain, and the need to continually renew limited-term permits and easements, generally at the discretion of federal or tribal land administrators, has the potential to jeopardize this pipeline's continued operations, which extend beyond the applicable permit and easement terms. Because the economic and physical life of a pipeline exceeds the length of the permits and easements that Enbridge can acquire, not routing through areas where it cannot acquire a permanent, continuous right-of-way is the most reasonable and most feasible option for Enbridge.

Construction Constraints

The Northern Route also presents significant construction constraints. The Northern Route crosses more bedrock outcrops than the Southern Route. With bedrock construction, significant delays to the construction process, along with increased safety concerns related to blasting, hammering, and equipment travel over rock surfaces would be expected. In addition, the Northern Route requires winter construction through the Floodwood area, as the ground must be frozen in order to construct across the area's super saturated soils. This poses a significant and unavoidable risk for the Project in the event that winter construction is not possible in a given year due to repeated thawing/freezing or lack of freezing.

Enbridge has also identified significant Project construction constraints and technical difficulties for a 34.6-mile segment of its Northern Route which crosses the CNF in Cass County. Since the construction of Enbridge's Line 67, a power line known as the CapX Grand Rapids-Bemidji 230 kV transmission line has been constructed immediately adjacent and parallel to the southern boundary of Line 67's existing pipeline right-of-way. Now, as a direct result, there is only a 25-foot buffer between the Line 67 and the CapX ROW, which is too narrow of a space to install the 36-inch pipeline for this Project. Due to this construction constraint and technical difficulties, Enbridge has determined that a greenfield route would need to be developed and 120-foot construction footprint cleared through CNF in order for the Project to be constructed on the other side of the transmission line's right-of-way. In discussions with the United States Forest Service (USFS), staff has indicated that it is not amenable to a new or expanded utility corridor through the CNF. In comparison, the Southern Route does not cross the CNF and is therefore a better replacement option.

Increased Human and Environmental Impacts

Even though the Northern Route is approximately 56.6 miles shorter than the Southern Route, the Northern Route crosses more population centers and therefore has greater impacts to the human settlement. For example, the Northern Route impacts several population centers, including Bemidji, Cass Lake, Grand Rapids and several other municipalities, whereas the corresponding section of the Southern Route does not cross any municipalities and avoids densely populated areas to the extent possible. Consequently, the Northern Route impacts more people than the Southern Route.

In addition, the Northern Route crosses more miles of NWI-mapped wetlands, more perennial waterbodies, and more AMA and federal/state forest lands than the Southern Route. Approximately 45 percent of the Northern Route traverses public lands and 34 percent of its route crosses tribal lands whereas 21 percent of the Southern Route crosses public lands only.

Enbridge also determined that the Northern Route could not follow the existing Enbridge Mainline System right-of-way within the defined boundary of the St. Regis Paper Company Federal Superfund Site (Site) in the town of Cass Lake, Minnesota. The Site was placed on the National Priorities List (NPL) in 1984 due to the presence of dioxin, PCP, Polycyclic aromatic hydrocarbons (PAHs), and heavy metals in soil and groundwater, and would have to be avoided. In comparison, the Southern Route does not cross this Site and is therefore a better replacement option.

As part of the route selection process for east of Clearbrook, Enbridge next compared the routing features of the Northern Route and Southern Route. An overview map (Figure 6.6.2-2) of the Northern Route and Southern Route is provided to show the common point where the comparison analysis begins and ends for this replacement option.

Figure 6.6.2-2: Northern and Southern Route Comparison Analysis

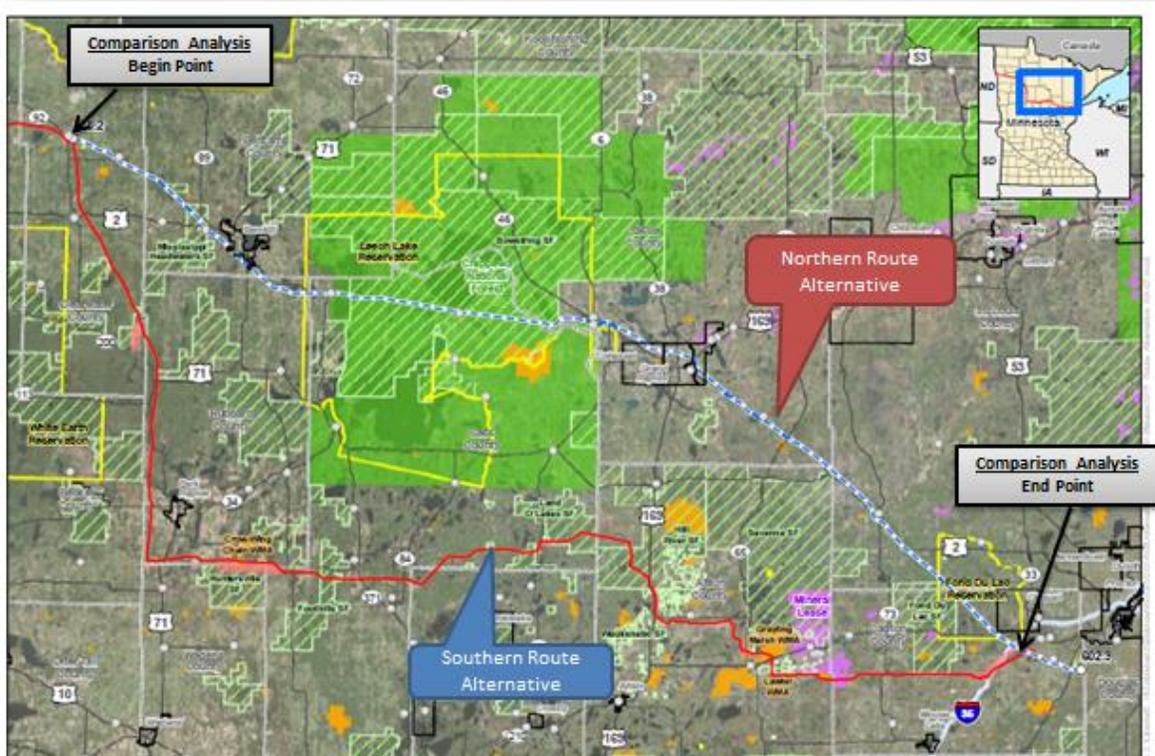


Table 6.6.2-2 provides a list of the Project features identified in this comparative analysis.

Table 6.6.2-2 East of Clearbrook Features Comparison of Replacement Alternatives			
Project Features	Unit	Northern Route Alternative	Southern Route Alternative ^a
Opportunities			
Length of Alternative for Comparison ^b	Miles	170.0	226.6
Adjacent to Existing ROW	Miles	168.3	169.3
Greenfield Route ^c	Miles	1.7	57.3
Socio-economic Constraints			
Residences within 50 Feet	Number	1	1
Residences within 500 Feet	Number	396	142
Construction Constraints having Environmental Impacts			
NWI-mapped Wetlands	Miles	46.9	41.0
NWI-mapped Wetlands	Number	372	467
Prime Farmland	Miles	66.5	115.6
Highly Wind Erodible Soils	Miles	105.0	165.9
Perennial Waterbodies	Number	33	25
State Trails	Number	4 ^d	2 ^e
Construction Constraints in Crossing Federal, State and County Resources/Jurisdictions			
National Forest Land	Miles	34.6 ^f	0.0
Tribal Land	Miles	58.2 ^g	0.0
State Forest Land	Miles	37.6 ^h	31.6 ⁱ
State WMA Land	Miles	0.0	1.6 ^j
State AMA Land	Miles	0.3 ^k	<0.1 ^l
Technical Constraints Having Associated Environmental Impact			
Trout Streams	Number	6	6
Active Mineral Leases	miles	0.0	1.8
Bedrock Outcrops	Miles	2.9	2.5
Railroads Crossed	Number	4	3
Roads Crossed	Number	157	154
Other Major Issues	Number	0	0
<p>a The comparison analysis is based solely on publicly available desktop data. Project impacts presented in Section 7 are based on publicly available data and field verified data where applicable. As such, the data in the southern route alternative column will not always match data presented in Section 7.</p> <p>b The comparison analysis begins at the Clearbrook Terminal in Clearwater County where both route alternatives separate and ends at such point where the route alternatives rejoins the Enbridge Mainline System's right-of-way in Carlton County near Chub Lake.</p> <p>c Greenfield locations are defined for purposes of this Project as any portion of the route that is greater than 250-</p>			

Table 6.6.2-2 East of Clearbrook Features Comparison of Replacement Alternatives			
Project Features	Unit	Northern Route Alternative	Southern Route Alternative ^a
feet from the centerline of a known utility.			
d	Heartland, Paul Bunyan, Taconite, and Willard Munger State Trails		
e	Paul Bunyan and Willard Munger State Trails		
f	Chippewa National Forest		
g	Leech Lake and Fond du Lac Reservations		
h	Bowstring, Mississippi Headwaters, Welsh Lake, and Fond Du Lac State Forests		
l	Mississippi Headwaters, Huntersville, Land O' Lakes, Foothills, Hill River, Waukenabo, and Savanna State Forests		
J	Lawler and Grayling Marsh WMAs		
k	Clearwater River and Little Otter Creek AMAs		
l	LaSalle Creek AMA		

A summary of the comparative analysis and the conclusions drawn is detailed below.

Opportunities

Enbridge considered the ability to follow existing pipeline right-of-way, and other existing utility and transportation corridors as part of its routing criteria. Through this evaluation process, Enbridge found that the overall percentage of greenfield miles are similar when considering that a new greenfield route must be developed in order for the Northern Route to cross CNF. Furthermore, USFS staff had indicated that it was not amenable to a new pipeline route crossing CNF. Also a route deviation would need to be developed to avoid crossing St. Regis' Superfund site near Cass Lake.

Therefore, Enbridge concluded that the Southern Route is the more viable route option, because it avoids such impacts and has similar Project Opportunities to parallel existing pipelines and other existing utilities and/or transportation corridors.

Socio-Economic Constraints

The Northern Route crosses more population centers and consequently has a greater impact on human settlements than the Southern Route. The Northern Route crosses a number of large population centers, including Bemidji, Grand Rapids, Cass Lake, and Floodwood that the Southern Route avoids. Approximately 163,000 people live along the Southern Route, which is less than half the population along the Northern Route. When accounting for homes located near the replacement options being considered, Enbridge found that 396 residents are located within 500 feet of the Northern Route in comparison to 142 residents along the Southern Route. This also demonstrates that the Northern Route has far greater impacts to residential homes than the Southern Route. Additionally, the Northern Route crosses twice the number of

recreational trails and has a greater potential to impact other community facilities since it crosses more densely populated areas.

Thus, Enbridge concluded that the Southern Route is the more viable route option because it is located primarily in a rural area.

Construction Constraints Having Environmental Impacts

The Northern Route requires approximately 17.7 miles of winter construction through the Floodwood area in contrast to approximately 10 miles of winter construction along the Southern Route. The additional 7.7 miles of winter construction along the Northern Route, poses further construction challenges with significant and unavoidable risk to the Project schedule, especially if winter construction is not possible due to repeated thawing/freezing or lack of freezing. In fact, Enbridge could realize as much as a 40 percent decrease in productivity in some cases when compared to working in summer months.

Therefore, Enbridge concluded that the Southern Route is the best alternative relative to minimizing potential unplanned construction delays.

Construction Constraints Crossing Federal, State, and Local Resources/Jurisdictions

Enbridge considered the ability to acquire permanent pipeline right-of-way as one of its major routing constraints along the Northern Route. Through its analysis, Enbridge determined that 79 percent of the Northern Route traverses public and tribal lands where eminent domain cannot be exercised. If unable to acquire such lands through amenable agreements, the Northern Route would not provide a contiguous permanent right-of-way to install the 36-inch pipeline to meet the Project's objective. In reviewing the Southern Route, Enbridge found that no tribal lands are crossed, and only 21 percent of its route traverses state public lands.

Therefore, Enbridge concluded that the Southern Route is the most viable option for providing a continuous pipeline right-of-way to replace Line 3.

Technical Constraints Having Associated Environmental and Human Impacts

The Northern Route crosses more bedrock outcrops, railroads, and roads than the Southern Route as shown on Table 6.6.2-2 above. With bedrock construction involved, significant delays to the construction process can occur and safety concerns increase when working on rock surfaces. These delays can impact an already lower construction production rate due to winter work conditions and cause up to an additional 30 percent delay in the overall Project schedule.

The Northern Route also presents construction constraints and increased safety concerns due to adding another pipeline within a congested pipeline corridor. For example, with seven lines traversing population centers such as Bemidji, Cass Lake, and Grand Rapids, installing a new line usually means placing it between existing lines or existing lines and residences, businesses, or other infrastructure. Through the city of Bemidji, multiple instances of the line being squeezed between homes and existing infrastructure exist. In Cass Lake, the line is squeezed between

homes on one side and existing lines and a railroad on the other. The last two lines placed through Cass Lake were installed under the road and due to sewer and water lines adjacent to them, construction of another adjacent line would not be possible. On the east side of town, Hwy 2 restricts the line from moving further north away from the congestion of the existing lines.

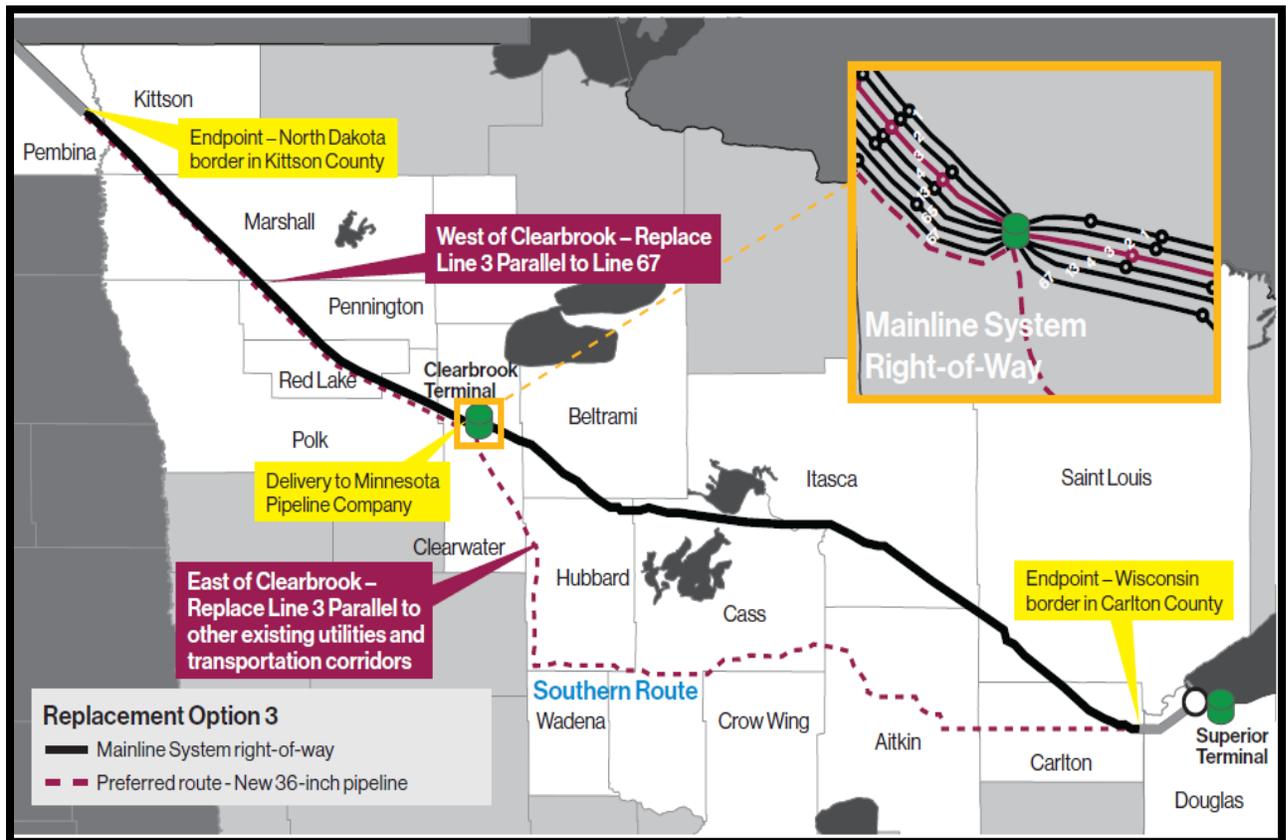
In all cases, this equates to a restricted workspace for installing new lines. Working over existing lines may not be possible, and if it is, usually requires working off mats to protect the existing lines from heavy equipment loads. Moving crews through a constricted workspace becomes very difficult as there is limited room to move around one another. Stacking spoil and moving dirt becomes a very tedious process and also makes moving around the workspace difficult. Large equipment and the ground labor force would be required to work within the congested space, which requires construction slowdowns to ensure the safety of those working near them. In some cases, crews will need to wait for the crew ahead of them to finish a task and move on before they have sufficient space to move along themselves. This creates longer impact durations for landowners as construction time through these areas will likely double in most cases. Impacts to landowners include extra noise, high volumes of traffic, dust control, and loss use of property for longer periods of time.

Safety risks would increase during construction along the Northern Route due to working within a congested right-of-way with large equipment over active lines, working within close proximity to private residences in the populated portions of this route alternative, and safety and health concerns constructing and operating the pipeline within a federal Superfund site. Enbridge concluded that based on the features evaluated in the comparative analysis for the replacement options east of Clearbrook, the Southern Route provides the most viable route alternative to minimize or avoid these impacts.

6.6.3 Option 3 - Replace Line 3 parallel to Enbridge Mainline System west of Clearbrook and Follow the Southern Route Alternative east of Clearbrook

The scope of this replacement option involves permanently deactivating the existing Line 3 and installing approximately 337 miles of new 36-inch pipeline parallel to the existing Line 67 from the North Dakota border in Kittson County to the Enbridge Clearbrook Terminal in Clearwater County. From Clearbrook, the proposed replacement route would then turn south and east to generally parallel other third-party pipelines, electric transmission and transportation corridors to end at the Wisconsin border in Carlton County.

Figure 6.6.3-1: Preferred Route



As previously noted, this option provides the most opportunities as it shares and/or runs parallel to Line 67 west of Clearbrook and parallels other existing pipeline right-of-ways, utilities, and transportation corridors for 75 percent of the corridor east of Clearbrook along the Southern Route. Enbridge will need to acquire up to 50-feet of new permanent right-of-way for this replacement option depending upon its location. Additionally, this replacement option

eliminates many of the constraints and technical difficulties identified in Replacement Options 1 and 2 above. Therefore, Enbridge has concluded that Option 3 is the most reasonable and has less human and environmental impacts, and has now identified it as the Project's Preferred Route, as more fully described in Section 6.7. The environmental analysis of the Project's Preferred Route is provided in Section 7 of this Application.

6.6.4 Summary of Line 3's Route Analysis

Enbridge developed the Project's Preferred Route based on a multi-disciplinary team approach in which extensive analysis and evaluation work has been performed, using expertise in pipeline routing; knowledge of federal and state regulations; and expertise in environment planning, biology, land use, social and economic impact assessment and pipeline construction. During the early development stages, Enbridge gathered valuable input from local government officials and permitting agencies with knowledge of the surrounding areas, and hosted coffee house chats in local communities as part of its route identification and evaluation processes.

Also, in developing the Project's Preferred Route east of Clearbrook, Enbridge utilized over 150,000 hours of route analysis and refinement conducted for the Sandpiper Pipeline in its selection, analysis, and refinement process of the Project's Preferred Route. As presented in Section 6.6, Enbridge studied a variety of replacement alternatives before selecting its Preferred Route. As a result, the Project's Preferred Route east of Clearbrook now includes twenty-four route alternatives that NDPC incorporated into its preferred route for Sandpiper during its routing application process to address landowner and agency input, as well as engineering, design and constructability concerns.⁴ Enbridge evaluated the geographic limitations of this Project, and compared routing factors including but not limited to, constraints, opportunities, technical and economic feasibility, and potential environmental impacts for each of the alternative considered. Enbridge has also utilized agency consultations and field survey work data conducted for Sandpiper and the Project in developing the Preferred Route, as well as to identify mitigation measures that will avoid or minimize potential impacts.

Through this interactive and iterative process with its stakeholders, Enbridge has now identified the Project's Preferred Route as described in more detail in Section 6.7 of the Application.

⁴ See *In the Matter of the Application of North Dakota Pipeline Company LLC for a Pipeline Routing Permit for the Sandpiper Pipeline Project*, MPUC Docket No. PL-6668/PPL-13-474, Route Alternatives for the Sandpiper Pipeline Project (Apr. 4, 2014) and Letter from NDPC Regarding Route Alternatives (May 30, 2014).

Some of the advantages include:

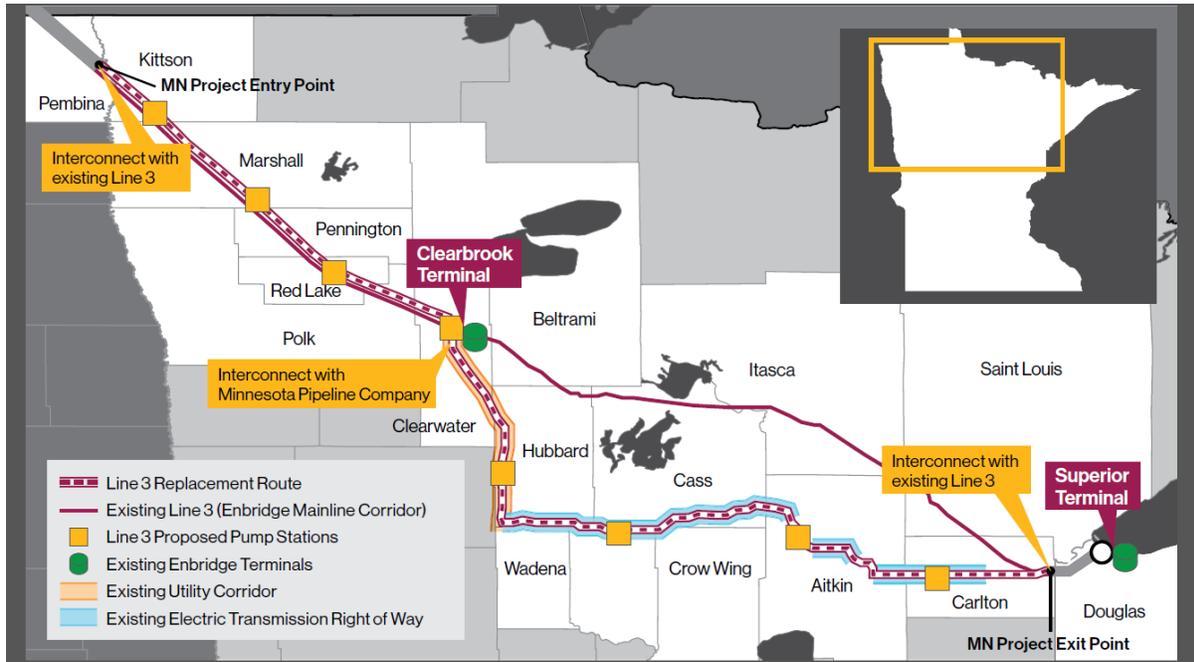
- Meeting the Project's geographic requirements;
- Paralleling existing pipeline, utility, and transportation corridors for the majority of its length;
- Feasibility from a construction and system perspective;
- Fewer water crossings;
- Avoiding national forest and tribal lands;
- Locating in primarily rural areas;
- Avoiding dense population centers; and
- Fewer disruptions to communities and recreational facilities.

6.7 Description of Preferred Route

The Project's Preferred Route begins at the North Dakota/Minnesota border in Kittson County and extends to the southeast for approximately 111 miles to follow the existing Line 3 to the Enbridge Clearbrook Terminal in Clearwater County, Minnesota. Along this route, the Project will generally share and run parallel to the existing pipeline right-of-way with Enbridge's Line 67 pipeline. At Clearbrook, the Project will have the ability to make deliveries into the existing Minnesota Pipe Line System for ultimate redelivery of such volumes to the Minnesota refineries.

From the Clearbrook Terminal in Clearwater County, the Preferred Route will generally follow other third-party pipelines as it extends to the south for approximately 65.5 miles to the southern portion of Hubbard County near Hubbard, Minnesota. The Preferred Route then turns east for approximately 160.5 miles, running parallel to other third-party electric transmission and transportation corridors, and then rejoins the existing Enbridge Mainline System in Carlton County. At this point, the Preferred Route will rejoin the existing pipeline right-of-way with Enbridge's Line 67, and continue to the ending point at the Wisconsin border in Carlton County. The Project will cross Kittson, Marshall, Pennington, Polk, Red Lake, Clearwater, Hubbard, Wadena, Cass, Crow Wing, Aitkin, and Carlton counties. Figure 6.7-1 provides an overview of the Project's Preferred Route and related pump stations.

Figure 6.7-1: Project Interconnections and Facilities



A Project map book containing USGS topographical maps and aerial photo maps has been developed to show the Preferred Route from the North Dakota/Minnesota border in Kittson County to the Minnesota/Wisconsin border in Carlton County. The detailed route map book is attached as Appendix B to this application.

It is important to note that the Project’s Preferred Route has the potential to be collocated with and run parallel to the planned pipeline right-of-way of the proposed Sandpiper Pipeline Project if approved by this Commission in MPUC Docket No. PL6668/PPL-13-474.⁵ For that reason, Enbridge has taken into consideration and used in its route selection processes. All the survey work and constructability reviews performed by the Sandpiper Project Execution Team, as more fully described in Section 7 of this Application. Moreover, Enbridge has worked diligently in a multi-disciplinary and iterative fashion to evaluate and adjust its Preferred Route to accommodate comments received from agencies, open houses, data requests and public informational meetings held in the Sandpiper regulatory proceedings. Enbridge has also adopted previous Sandpiper agency commitments in those locations where both proposed

⁵ Line 3’s Preferred Route takes into consideration the route adjustments adopted by Sandpiper during the MPUC Route Permit proceeding and any engineering refinement processes necessary to complete final design work activities.

pipeline routes would share a common right-of-way.⁶ Consequently, the Project's Preferred Route has been well studied and thoroughly analyzed to ultimately provide a reasonable and financially viable route that meets the Projects' objectives, while balancing the routing criteria in Minn. R. 7852.1900 and minimizing human and environmental impacts.

⁶ Enbridge has taken a proactive approach in the route selection of the Project's Preferred Route and adopted those commitments previously agreed to by Enbridge in the Sandpiper proceeding. Such commitments would be applicable in those locations where the Projects have the potential to be collocated along the Southern Route Alternative. These commitments are identified and so noted in footnotes in this Application.