Attachment J

Waterbody Crossing Location and Method Justifications

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MDNR ID No.	Survey ID	Milepost	Public Water Name (Kittle Number when Assigned)	Co-located Corridor Type [a]	Proposed Crossing Method	Crossing Method Justification [b]
1	s-160n50w5-a	801.8	Red River of the North (H-026)	Pipeline (Enbridge)	HDD	The Red River is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. HDD entry and exit ATWS have been sited to prevent physical alteration of forested wetlands. The public water crossing is also co-located with an existing utility corridor right-of-way. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
2	s-160n50w23-a	805.4	Unnamed Creek (H-026-011-001)	Pipeline (Enbridge)	Dry Crossing	This feature is a small, somewhat sinuous stream with a herbaceous wetland riparian zone surrounded by agricultural land. ATWS are located outside of adjacent riparian habitat. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Furthermore, physical alteration of wetlands will be minimized by working within the necked-down right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
3	s-159n49w36-a	815.6	Judicial Ditch 10 (H-026-011)	Pipeline (Enbridge)	Dry Crossing	Judicial Ditch 10 is a channelized ditch with a marginal riparian zone along the slopes of the ditch surrounded by agricultural land. ATWS will be placed back from adjacent riparian habitat. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
4a/4b	s-157n47w16-aa	828.6	Tamarac River (H-026-019)	Not co-located	HDD	The Tamarac River is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. HDD entry and exit ATWS have been sited to minimize physical alteration of forested wetland and riparian habitat. The public water crossing is not co-located with an existing right-of-way, as it was sited in this location to avoid a cultural resource site along the existing utility corridor. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
5a/5b	s-156n46w7-c	836.0	Middle River (H-026-021-004)	Pipeline (Enbridge)	HDD	The Middle River is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. HDD entry and exit ATWS have been sited to prevent physical alteration of forested wetland and riparian habitat. The public water crossing is also co-located with an existing utility corridor right-of-way. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
6	s-155n46w12-a	843.2	Snake River (H-026-021)	Pipeline (Enbridge)	HDD	The Snake River is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. HDD entry and exit ATWS have been sited to prevent physical alteration of forested wetland and riparian habitat. The public water crossing is also co-located with an existing utility corridor right-of-way. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
7	s-155n45w28-a	847.2	South Branch Snake River (H-026-021-010)	Pipeline (Enbridge)	Dry Crossing	The South Branch Snake River is moderately sinuous with a marginal riparian zone surrounded by agricultural land. ATWS will be placed back from adjacent riparian habitat. Furthermore, physical alteration of wetlands will be minimized by working within the necked-down right-of-way in addition to siting ATWS entirely outside of wetlands. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
8	s-153n43w29-a	864.3	Red Lake River (H-026-030)	Pipeline (Enbridge)	HDD	The Red Lake River is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. HDD entry and exit ATWS have been sited to minimize physical alteration of forested wetland and riparian habitat. The proximity of Highway 32, existing pipeline infrastructure, and the river sinuosity make locating the northern drill workspace completely outside wetland areas unavoidable. However, the southern drill workspace is sited outside of wetland forested riparian habitat in its entirety. The public water crossing is also co-located with an existing utility corridor right-of-way. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
9	w-152n43w4-a	866.2	Unnamed Creek (H-026-030-030)	Pipeline (Enbridge)	Modified Upland (Wetland Open Cut)	This unnamed creek, shown on the public waters inventory maps as a water basin, was delineated in the field as a wetland at the crossing location. Erosion control best management practices will be used with the modified upland (wetland open cut) construction procedures to install the pipeline. Furthermore, physical alteration of wetlands will be minimized by working within the necked-down right-of-way. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this basin, the feasible and prudent installation method is a modified upland (wetland open cut) crossing method. Refer to Section 6.2.1 of the License Application for more information.

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10	s-152n43w14-b	869.7	Unnamed Creek (H-026-030-028)	Pipeline (Enbridge)	Bore	This feature is adjacent to a road and surrounded by agricultural land. The feature, along with the adjacent road, will be crossed using a conventional bore. The public water crossing is also co-located with an existing utility corridor right-of-way. A conventional bore is the feasible and prudent crossing method for this feature, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. Furthermore, the ATWS required for the crossing has been set back from adjacent riparian habitat to limit potential net increases in loading. Refer to Section 6.1.5 of the License Application for more information.
11	s-151n42w4-a	875.4	Clearwater River (H-026-030-019)	Pipeline (Enbridge)	HDD	The Clearwater River is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. HDD entry and exit ATWS have been sited to prevent physical alteration of forested wetland and riparian habitat; however, physical alteration of wetlands are unavoidable along the pullback section on the eastern side of the river. No trench excavation will occur in the pullback ATWS, only clearing, grading, and installation of construction mats (as necessary) will occur to accommodate construction equipment and the ATWS required to string the pipe. The public water crossing is also co-located with an existing utility corridor right-of-way. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
12	s-150n41w1-b	885.8	Lost River (H-026-030-019-007)	Pipeline (Enbridge)	Dry Crossing	The Lost River is a moderately sized river with a well-defined channel at the crossing. ATWS will be placed outside of adjacent riparian habitat. A crossing using the HDD method is not feasible and prudent, due to the configuration of the river on the east side and Highway 222 on the west side, which would likely require closure of this road to weld, test, and install the pipeline. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
13	s-149n38w8-a	902.0	Unnamed Ditch (H-026-030-019-007-007)	Pipeline (Enbridge)	Dry Crossing	This feature has a marginal riparian zone along the slopes surrounded by agricultural land. ATWS will be placed outside of adjacent riparian habitat. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
14	s-149n38w15-a	904.0	Lost River (H-026-030-019-007)	Pipeline (Enbridge)	Dry Crossing	The Lost River has an herbaceous riparian zone surrounded by agricultural land. ATWS will be placed outside of adjacent riparian habitat. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way in addition to siting ATWS entirely outside of wetlands. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
15	CL018bWB	907.1	Silver Creek (H-026-030-019-007-005)	Pipeline (Enbridge)	Dry Crossing	Silver Creek has a marginal herbaceous riparian zone and is surrounded by agricultural and pasture lands. ATWS will be placed outside of adjacent riparian habitat. Furthermore, physical alteration of wetlands will be minimized by working within the necked-down right-of-way. The HDD crossing method is not feasible and prudent as it would have to include all three crossings of Silver Creek (MPs 907.1, 907.4, and 907.7) which would require a drill length of over one mile. Finally, an HDD in this location would cross under existing pipelines two times, which would present potential safety and operational reliability concerns. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
16	CL019bWB	907.4	Silver Creek (H-026-030-019-007-005)	Pipeline (Enbridge)	Dry Crossing	Silver Creek has a marginal herbaceous riparian zone and is surrounded by agricultural and pasture lands. ATWS will be placed outside of adjacent riparian habitat. Furthermore, physical alteration of wetlands will be minimized by working within the necked-down right-of-way. The HDD crossing method is not feasible and prudent as it would have to include all three crossings of Silver Creek (MPs 907.1, 907.4, and 907.7) which would require a drill length of over one mile. Finally, an HDD in this location would cross under existing pipelines two times, which would present potential safety and operational reliability concerns. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.

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MDNR ID No.	Survey ID	Milepost	Public Water Name (Kittle Number when Assigned)	Co-located Corridor Type [a]	Proposed Crossing Method	Crossing Method Justification [b]
17	s-149n37w30-a	907.7	Silver Creek (H-026-030-019-007-005)	Pipeline (Enbridge)	Dry Crossing	Silver Creek has a marginal herbaceous riparian zone and is surrounded by agricultural and pasture lands. ATWS will be placed outside of adjacent riparian habitat. Furthermore, physical alteration of wetlands will be minimized by working within the necked-down right-of-way. The HDD crossing method is not feasible and prudent as it would have to include all three crossings of Silver Creek (MPs 907.1, 907.4, and 907.7) which would require a drill length of over one mile. Finally, an HDD in this location would cross under existing pipelines two times, which would present potential safety and operational reliability concerns. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
18a/18b	s-149n37w29-a_DESKTOP	909.8/ 910.1	Unnamed Creek (H-026-030-019-007-005-001)	Pipeline (Enbridge)	Dry Crossing	This unnamed stream has a riparian zone of mixed scrub-shrub and herbaceous wetland and generally surrounded by agricultural land. ATWS will be placed outside of adjacent riparian habitat. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way in addition to siting ATWS entirely outside of wetlands. The HDD method is not feasible and prudent at this location due to the close proximity to the Clearbrook Terminal and the Town of Clearbrook, as well as the inability to configure a drill path in the somewhat congested area. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this desktop waterbody, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
19	s-149n37w32-b	910.9	Unnamed Stream (H-026-030-019-007-005-001)	Pipeline (Enbridge)	Dry Crossing	This small, unnamed stream has an herbaceous wetland riparian zone surrounded by agricultural and pasture land. ATWS will be placed outside of adjacent riparian habitat. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way in addition to siting ATWS entirely outside of wetlands. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
20	CLC5037aWB	922.2	Clearwater River (H-026-030-019)	Pipeline (Minnesota Pipe Line Company)	HDD	The Clearwater River is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. HDD entry and exit ATWS have been sited to reduce physical alteration of forested wetland and riparian habitat. The public water crossing is also co-located with an existing utility corridor right-of-way. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
21	CLC5048aWB	924.2	Walker Brook (H-026-030-019-029)	Pipeline (Minnesota Pipe Line Company)	Modified Dry Crossing	Walker Brook is a small stream that occurs within a wetland complex. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way in addition to siting ATWS entirely outside of wetlands. A true dry crossing at this location is not feasible and prudent due to the surrounding saturated wetland area and associated high water table. An HDD is also not feasible and prudent as the HDD would be approximately 1 mile long, where the risk of inadvertent returns increase due to the length of the crossing and the longer duration of the pilot hole and reaming operations. Furthermore, the pullback section would need to be set up on the north side of 350th Street, encroaching on the Bagley Municipal Airport runway operations. A lower impact crossing will be achieved by using the modified dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a modified dry crossing. Refer to Section 6.1.4 of the License Application for more information.
22	CLC5051aWB	925.4	Unnamed Creek (H-026-030-019-029-001)	Pipeline (Minnesota Pipe Line Company)	Dry Crossing	This small unnamed stream has a mixed scrub-shrub and herbaceous wetland riparian area. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way in addition to siting ATWS entirely outside of wetlands. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
23	s-146n36w8-a	928.5	Walker Brook (H-026-030-019-029)	Not co-located	Modified Dry Crossing	The Unnamed Tributary to Walker Brook is a small stream that occurs within a wetland complex. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way in addition to siting ATWS entirely outside of wetlands. A true dry crossing at this location is not feasible and prudent due to the surrounding saturated wetland area and associated high water table. A lower impact crossing will be achieved by using the modified dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is not co-located with an existing right-of-way, as it was sited in this location and outside of an existing right-of-way to follow a MPUC route segment alternative (RSA-05) which avoids the Wild Rice River Watershed. It has also been designed to avoid U.S. Fish and Wildlife Service conservation easements to the north. Based on the evaluation of this stream, the feasible and prudent installation method is a modified dry crossing. See Section 6.1.4 of the License Application for more information.

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24	s-146n36w15-a	931.7	Unnamed Stream (M-161-004-009)	Not co-located	Dry Crossing	This unnamed stream is located within a forest/scrub-shrub wetland area. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way in addition to siting ATWS entirely outside of wetlands. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is not co-located with an existing right-of-way, as it was sited in this location and outside of an existing right-of-way to follow a MPUC route segment alternative (RSA-05) which avoids the Wild Rice River Watershed. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
25	s-146n36w23-b	932.6	Unnamed Stream (M-161-004-009)	Not co-located	Bore	This feature is adjacent to a road and generally surrounded by agricultural and somewhat sparse forest land . The feature, along with the adjacent road, will be crossed using a conventional bore, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. Furthermore, the ATWS required for the crossing has been set back from adjacent riparian and wetland habitat. The public water crossing is not co-located with an existing right-of-way, as it was sited in this location and outside of an existing right-of-way to follow a MPUC route segment alternative (RSA-05) which avoids the Wild Rice River Watershed. A conventional bore is the feasible and prudent crossing method for this feature. See Section 6.1.5 of the License Application for more information.
26	s-146n36w23-c_DESKTOP	933.1	Unnamed Stream (M-161-004-009)	Not co-located	Modified Dry Crossing	This unnamed creek, shown on the public waters inventory maps as a water basin, was delineated in the field as a wetland (not a stream) as there was no discernible bed or banks. Enbridge subsequently developed a desktop waterbody in the event that flow is present during construction. Erosion control best management practices will be used with the modified upland (wetland) construction procedures to install the pipeline. Furthermore, physical alteration of wetlands will be minimized by working within the necked-down right-of-way. The public water crossing is not co-located with an existing right-of-way, as it was sited in this location and outside of an existing right-of-way to follow a MPUC route segment alternative (RSA-05) which avoids the Wild Rice River Watershed. Based on the evaluation of this desktop waterbody, the feasible and prudent installation method is a modified dry crossing. See Section 6.1.4 of the License Application for more information.
27	CLC5095aWB	940.1	Bear Creek (M-164)	Pipeline (Minnesota Pipe Line Company)	Dry Crossing	Bear Creek is located within a scrub-shrub and herbaceous wetland complex. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way in addition to siting ATWS entirely outside of wetlands. The HDD crossing method is not feasible and prudent at this location as it would increase physical alteration of forested wetland for the ATWS required for the drill. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
28	CLC5098aWB	941.0	Mississippi River (M)	Pipeline (Minnesota Pipe Line Company)	HDD	The Mississippi River is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. Physical alteration of wetlands at HDD entry and exit ATWS is unavoidable, but has been minimized as much as is feasible and prudent. The public water crossing is also co-located with an existing utility corridor right-of-way. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
29	HUC5002aWB	946.0	LaSalle Creek (M-163)	Not co-located	Dry Crossing	LaSalle Creek is a designated trout stream and within an Aquatic Management Area (AMA), which is located within a large wetland complex. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. Furthermore, physical alteration of wetlands will be minimized by working within the necked-down right-of-way. The results of a geotechnical evaluation at LaSalle Creek indicate that installation of the pipeline using the HDD crossing method is not feasible and prudent. A reroute would be required to parallel the waterbody for a substantial distance due to the existing pipeline infrastructure to the west of the proposed route and a false right-of-way for the pullback section would require additional physical alteration of forested wetlands to the east. Consultation with the MDNR suggests a dry crossing is preferable to protect this resource from a potential inadvertent release associated with an HDD. Although this crossing is not co-located with the nearby utility corridor, Enbridge has crossed in this location to provide an optimal stream crossing angle and has moved the crossing location to a preferable location based on MDNR feedback. Based on the evaluation of LaSalle Creek, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
30	HUC5074aWB	962.2	Unnamed Creek (M-096-035-002-004-000.5)	Pipeline (Minnesota Pipe Line Company)	Dry Crossing	This unnamed stream is located within a mixed herbaceous and forested wetland area. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way in addition to siting ATWS entirely outside of wetlands. The HDD crossing method is not feasible and prudent at this location as it would increase physical alteration of forested wetland for the ATWS required for the drill. Additionally the road infrastructure in the area would create entry and exit design challenges. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.

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31	HUC5081aWB	963.7	Hay Creek (M-096-035-002)	Pipeline (Minnesota Pipe Line Company)	HDD	The Hay Creek is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. HDD entry and exit ATWS have been sited to prevent physical alteration of wetlands and riparian habitat. The public water crossing is also co-located with an existing utility corridor right-of-way. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
32	HUC5098a1W	967.7	Portage Lake - Public Water Basin	Overhead Powerline	Modified Upland (Wetland Open Cut)	Portage Lake, shown of the public waters inventory as a water basin, was delineated in the field as a wetland at the point of crossing. Erosion control best management practices will be used with the modified upland (wetland open cut) construction procedures to install the pipeline. Furthermore, physical alteration of wetlands will be minimized by working within the necked-down right-of-way. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this basin, the feasible and prudent installation method is a modified upland (wetland open cut) crossing method. Refer to Section 6.2.1 of the License Application for more information.
33	HUC5122_200aWB	974.2	Straight River (M-096-035-002-002)	Pipeline (Minnesota Pipe Line Company)	HDD	The Straight River is a designated trout stream that is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. HDD entry and exit ATWS have been sited to prevent physical alteration of wetlands and riparian habitat. The public water crossing is also co-located with an existing utility corridor right-of-way. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
34	HUC5130aWB	976.6	Shell River (M-096-035-004)	Pipeline (Minnesota Pipe Line Company)	Dry Crossing	The Shell River is located within a scrub-shrub and herbaceous wetland complex. The HDD crossing method is not feasible and prudent at this location as it would increase physical alteration of wetlands for the ATWS required for the drill. In addition, there is a remotely controlled block valve on the south side of 109th Avenue, which was strategically placed based on Enbridge's intelligent valve placement study in accordance and approved by PHMSA (DOT Part 195). Moving the mainline valve would require permanent access through a wetland and would reduce its effectiveness as a sectionalizing valve, as it would be further from the waterbody and at an increased elevation. Furthermore, the geotechnical reports also indicate probable cobbles at this location which can be problematic for HDD installation. For these reasons, an HDD at this location is not feasible and prudent. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
35	HUC5162aWB	981.4	Shell River (M-096-035-004)	Overhead Powerline	Dry Crossing	The Shell River crossing at this location has an herbaceous wetland complex. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way in addition to siting ATWS entirely outside of the riparian wetlands. The HDD crossing method is not feasible and prudent at this location due to the highway infrastructure to the east ~~in the area~~ which would create entry and exit design challenges. Enbridge shifted the centerline to the south of the oxbow (approximately 25 feet) to avoid crossing at the oxbow. If the drill exit point was shifted to the east, the centerline alignment would have to change to accommodate the drill path, and a false right-of-way would be required for the pull string. The false right-of-way would require additional forest clearing between the two transmission line corridors. Enbridge would also need to obtain additional landowner permission for the pullback section, as well as authorization to work under the transmission lines. Furthermore, the geotechnical reports also indicate probable cobbles at this location which can be problematic for HDD installation. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
36	HUC5165a1W	981.7	Unnamed Public Water Basin	Overhead Powerline	Modified Upland (Wetland Open Cut)	The public waters inventory maps show an unnamed water basin, which was delineated in the field as a wetland at the point of crossing. Erosion control best management practices will be used with the modified upland (wetland open cut) construction procedures to install the pipeline. The public water crossing is also co-located with an existing utility corridor right-of-way. Only 13 feet of the workspace overlap with the public water basin boundaries, and it will be on the non-working side of the pipeline right-of-way. Based on the evaluation of this basin, the feasible and prudent installation method is a modified upland (wetland open cut) crossing method. Refer to Section 6.2.1 of the License Application for more information.
37	HUC5175aWB	983.7	Shell River (M-096-035)	Overhead Powerline	HDD	The Shell River is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. HDD entry and exit ATWS have been sited to prevent physical alteration of the large wetland complex and riparian habitat. The public water crossing is also co-located with an existing utility corridor right-of-way. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.

Attachment J
Waterbody Crossing Location and Method Justifications

MDNR ID No.	Survey ID	Milepost	Public Water Name (Kittle Number when Assigned)	Co-located Corridor Type [a]	Proposed Crossing Method	Crossing Method Justification [b]
38	HUC5179_240aWB	985.3	Shell River - Oxbow Pond (M-096-035)	Overhead Powerline	HDD	The Oxbow Pond (Shell River) is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. HDD entry and exit ATWS have been sited to prevent physical alteration of the large wetland complex and riparian habitat. The public water crossing is also co-located with an existing utility corridor right-of-way. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
39	WA002aWB	991.2	Shell River (M-096-035)	Not co-located	HDD	The Shell River is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. HDD entry and exit ATWS have been sited to prevent physical alteration of wetlands and riparian habitat. The public water crossing is not co-located with an existing right-of-way, as it was sited in this location to [insert reason we don't follow powerline to north]. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
40	WA006aWB	993.3	Crow Wing River (M-096)	Not co-located	HDD	The Crow Wing River is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. HDD entry and exit ATWS have been sited to prevent physical alteration of wetlands and riparian habitat. The public water crossing is not co-located with an existing right-of-way, as it was sited in this location to [insert reason we don't follow powerline to north]. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
41	CAC5007aWB	1000.5	Big Swamp Creek (M-096-030)	Overhead Powerline	Modified Dry Crossing	Big Swamp Creek is located within an extensive fresh wet meadow wetland complex. The HDD method is not feasible and prudent at this location. The wetland complex is very large and would increase the physical alteration to the wetland due to the placement of drilling equipment and drill pits in saturated wetland areas, which also may not adequately support the equipment. An HDD would also likely require the closure of Minnesota Highway 64 during the pullback process. Enbridge initially planned for a push-pull crossing; however, Enbridge has since committed to completing winter construction at this waterbody crossing. Therefore, a lower impact crossing will be achieved by using the modified dry crossing method to install the pipeline as opposed to a push pull method. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way in addition to siting ATWS entirely outside of wetlands. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of Big Swamp Creek, the feasible and prudent installation method is a modified dry crossing. Refer to Section 6.1.4 of the License Application for more information.
42	CA019eW	1005.3	Unnamed Public Water Basin	Overhead Powerline	Modified Upland (Wetland Open Cut)	The public waters inventory maps show an unnamed water basin, which was delineated in the field as a wetland at the point of crossing. Erosion control best management practices will be used with the modified upland (wetland) construction procedures to install the pipeline. Furthermore, physical alteration of wetlands will be minimized by working within the necked-down right-of-way. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this basin, the feasible and prudent installation method is a modified upland (wetland open cut) crossing method. Refer to Section 6.2.1 of the License Application for more information.
44	CA063aWB	1017.4	Pine River (M-106)	Overhead Powerline	HDD	The Pine River is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. HDD entry and exit ATWS have been sited to prevent physical alteration of wetlands and riparian habitat. The public water crossing is also co-located with an existing utility corridor right-of-way. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
45	CA085aWB	1026.4	Blind Lake Creek (M-106-014-002)	Overhead Powerline	Dry Crossing	Ada Brook/Blind Lake Creek occurs within a fresh wet meadow wetland and has a marginal riparian zone which is surrounded by managed pasture. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
46	CA094aW	1028.5	Peterson Lake - Public Water Basin	Overhead Powerline	Modified Upland (Wetland Open Cut)	Peterson Lake, shown of the public waters inventory maps as a water basin, was delineated in the field as a wetland at the point of crossing. Erosion control best management practices will be used with the modified upland (wetland) construction procedures to install the pipeline. Furthermore, physical alteration of wetlands will be minimized by working within the necked-down right-of-way. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this basin, the feasible and prudent installation method is a modified upland (wetland open cut) crossing method. Refer to Section 6.2.1 of the License Application for more information.

Attachment J
Waterbody Crossing Location and Method Justifications

MDNR ID No.	Survey ID	Milepost	Public Water Name (Kittle Number when Assigned)	Co-located Corridor Type [a]	Proposed Crossing Method	Crossing Method Justification [b]
47	CA133aWB	1037.4	Daggett Brook (M-106-004)	Overhead Powerline	HDD	Daggett Brook is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. HDD entry and exit ATWS have been sited to prevent physical alteration of wetlands and riparian habitat. The public water crossing is also co-located with an existing utility corridor right-of-way. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
48	CA147_525a1WB	1041.3	Spring Brook (M-106-004-002-001)	Not co-located	Dry Crossing	Spring Brook is a designated trout stream and occurs within a narrow forested wetland corridor. Enbridge's original route followed the existing transmission line corridor in this general location in the vicinity of the Spire Valley AMA and Spire Valley Fish Hatchery. Based on consultation with agencies; however, Enbridge adjusted its route away from the existing utility corridor to a greenfield location downstream of the fish hatchery and outside of the Spire Valley AMA. Enbridge has prepared the "Spire Valley/Spring Brook Construction Plan" to document the existing environment, survey efforts, and its construction methodology review process for the Project at this location. The HDD method is not feasible and prudent for several reasons. First, the moderately steep slopes on either approach to the streambed valley create excessive risk. Second, the valley floor, while nearly level, is too narrow (approximately 180 feet wide) and constrained. Third, the steep slopes on either side of the valley would significantly increase the risk of an inadvertent return at the drill entrance and require an extreme drill path configuration. This in turn would make the drill highly susceptible to a pullback failure. Finally, the medium soft clay sand and gravel substrate may not provide sufficient strength to contain hydraulic drilling fluid pressures generated by either drilling or boring. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way in addition to siting ATWS entirely outside of wetlands. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
49	CA163aWB	1048.0	Moose River (M-117-012)	Overhead Powerline	Modified Dry Crossing	The Moose River has a saturated fresh wet meadow riparian zone. The HDD crossing method is not feasible and prudent at this location as it would require more ATWS for the drill pits and pullback section in adjacent forest land, some of which would require an increase in physical alteration of wetland. Furthermore, an HDD would require Pikus Forest Road to be shut down through the duration of an HDD installation, which would also close access to a driveway. Enbridge initially planned for a push-pull crossing. Enbridge has since modified the crossing method to the lower-impact modified dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way in addition to siting ATWS entirely outside of wetlands. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of the Moose River, the feasible and prudent installation method is a modified dry crossing. Refer to Section 6.1.4 of the License Application for more information.
50	Al020aWB	1053.4	Unnamed Stream (M-117-012-002)	Overhead Powerline	Dry Crossing	This small unnamed stream has a broad fresh wet meadow riparian zone. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way in addition to siting ATWS entirely outside of wetlands. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Enbridge has since committed to completing winter construction at this waterbody crossing. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
51	w-51n26w33-b	1056.6	Moose Lake (Public Water Basin)/Tributary to Moose Lake (Non-Public Water)	Overhead Powerline	Modified Upland (Wetland Open Cut) [Basin]/Modified Dry Crossing (tributary)	The Moose Lake public water basin was delineated as a wetland at the point of crossing, with a small delineated waterbody within the public water basin boundary. The area flows within a very broad fresh wet meadow riparian zone. The HDD crossing method is not feasible and prudent at this location due to the angling of the Project route. It would also increase physical alteration of forested wetlands for the ATWS required for the drill. A dry crossing at this location is also not feasible and prudent due to the surrounding saturated wetland area and associated high water table. For basin construction, erosion control best management practices with the modified upland (open cut wetland) construction procedures to install the pipeline. Furthermore, physical alteration of wetlands will be minimized by working within the necked-down right-of-way. For tributary construction, the feasible and prudent installation method is a modified dry crossing. The public water crossing is also co-located with an existing utility corridor right-of-way. Enbridge has since committed to completing winter construction at this waterbody crossing. Refer to Section 6.2.1 and 6.1.4 of the License Application for more information.
52	s-51n24w31-b	1066.5	Willow River (M-117)	Overhead Powerline	HDD	The Willow River is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. Physical alteration of wetlands at HDD entry and exit ATWS is unavoidable on the east side of the river, but has been minimized as much as is feasible and prudent. The public water crossing is also co-located with an existing utility corridor right-of-way. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.

Attachment J
Waterbody Crossing Location and Method Justifications

MDNR ID No.	Survey ID	Milepost	Public Water Name (Kittle Number when Assigned)	Co-located Corridor Type [a]	Proposed Crossing Method	Crossing Method Justification [b]
53	s-51n24w27-a	1069.7	Mississippi River (M)	Overhead Powerline	HDD	The Mississippi River is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. Physical alteration of wetlands at HDD entry and exit ATWS is unavoidable on the west side of the river, but has been minimized as much as is feasible and prudent. The public water crossing is also co-located with an existing utility corridor right-of-way. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
54	s-51n24w26-a	1070.9	Unnamed Stream (M-122-001)	Overhead Powerline	Modified Dry Crossing	This unnamed stream is a designated trout stream that occurs within a mixed forested and herbaceous wetland area. The HDD crossing method is not feasible and prudent at this location as it would increase physical alteration of wetlands for the ATWS required for the drill. Using the HDD method would also shut down Highway 65 during drilling operations. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way. Enbridge has since committed to completing winter construction at this waterbody crossing. A lower impact crossing will be achieved by using the modified dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a modified dry crossing. Refer to Section 6.1.4 of the License Application for more information.
55	s-51n23w27-a	1075.5	Unnamed Stream (M-120-005-001-005)	Overhead Powerline	Modified Dry Crossing	This small unnamed stream occurs within a shallow marsh wetland. The HDD method is not feasible and prudent at this location due to the large adjacent wetland complex, where physical alteration to wetlands would increase due to the placement of drilling equipment and drill pits in saturated wetland areas, and also may not adequately support the equipment. A true dry crossing at this location is also not feasible and prudent due to the surrounding saturated wetland area and associated high water table. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way in addition to siting ATWS entirely outside of wetlands. A lower impact crossing will be achieved by using the modified dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Enbridge has since committed to completing winter construction at this waterbody crossing. Based on the evaluation of this stream, the feasible and prudent installation method is a modified dry crossing. Refer to Section 6.1.4 of the License Application for more information.
56	s-51n23w23-a	1076.9	West Savanna River (M-120-005-001)	Overhead Powerline	Dry Crossing	The West Savanna River flows through a shallow marsh wetland. The HDD method is not feasible and prudent at this location due to the angling of the Project route and the existing road infrastructure. It would also increase the physical alteration to the large adjacent wetland complexes in the area for the entry and exit ATWS required for the drill. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Enbridge has since committed to completing winter construction at this waterbody crossing. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
57	s-51n21w20-a	1085.9	East Savanna River (S-002-031)	Overhead Powerline	HDD	The East Savanna River is proposed to be crossed using the HDD method, which is the lowest impact crossing method as no excavation will occur within the bed and banks of the public water. The HDD method is supported by geotechnical studies. The public water crossing is also co-located with an existing utility corridor right-of-way. Therefore, the feasible and prudent method for installing the pipeline at this crossing is an HDD. Refer to Section 6.1.6 of the License Application for more information.
58	s-51n20w27-a	1094.0	Unnamed Stream (S-002-028)	Pipeline (Enbridge)	Dry Crossing	This small unnamed stream has a scrub-shrub wetland riparian zone. The HDD method is not feasible and prudent at this location due to surrounding the existing road infrastructure. It would also increase the physical alteration to the large adjacent wetland complex for the entry and exit ATWS required for the drill. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
59	s-51n20w35-a	1095.9	Unnamed Stream (S-002-027)	Pipeline (Enbridge)	Dry Crossing	This small unnamed stream has a narrow wet meadow riparian zone surrounded by agricultural land and grazed pasture. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way and by siting the ATWS entirely outside of wetlands. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
60	s-50n20w2-a	1096.7	Ahmik River (S-002-026)	Pipeline (Enbridge)	Dry Crossing	The Ahmik River has a fresh wet meadow riparian zone. The HDD method is not feasible and prudent at this location due to the angling of the Project route. It would also increase the physical alteration to the wetlands in the area for the entry and exit ATWS required for the drill. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.

Attachment J
Waterbody Crossing Location and Method Justifications

MDNR ID No.	Survey ID	Milepost	Public Water Name (Kittle Number when Assigned)	Co-located Corridor Type [a]	Proposed Crossing Method	Crossing Method Justification [b]
63a/63b	s-48n17w6-a	1115.6	Unnamed Stream (S-002-009-001-002)	Pipeline (Enbridge)	Dry Crossing	This unnamed stream is located within the Little Otter Creek Aquatic Management Area. The HDD method is not feasible and prudent at this location due to the depth needed to install the pipe in the deep river valley, and the waterbody location between a railroad and large wetland complex to the west and a road to the east. The HDD would be over 1 mile long. Enbridge is limited in the areas in which it could set up a pullback string. Therefore, the pull string for an HDD under this feature would not be able to be strung in one section. Instead, two or three section would need to be joined during the pull back process. With six to eight hours required for each weld, Enbridge would have to start and stop the pullback process, which could lead to complications. Enbridge met with the MDNR in March 2019 and developed workspace modifications to minimize workspace impacts on state land. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.
65	s-48n17w16-f	1118.4	Little Otter Creek (S-002-009-001)	Pipeline (Enbridge)	Modified Dry Crossing	Little Otter Creek is a designated trout stream that has a scrub-shrub wetland riparian zone within an extensive wetland complex. The HDD method is not feasible and prudent at this location because physical alteration to wetlands would increase due to the placement of drilling equipment and drill pits in wetland areas. A true dry crossing at this location is also not feasible and prudent due to the surrounding saturated wetland area and associated high water table. Furthermore, physical alteration of wetlands will be minimized by working within the necked-down right-of-way. A lower impact crossing will be achieved by using the modified dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a modified dry crossing. Refer to Section 6.1.4 of the License Application for more information.
67	CR144aWB	1126.2	Unnamed Stream (S-001.5-007)	Pipeline (Enbridge)	Dry Crossing	This small unnamed stream has a narrow wet meadow riparian zone surrounded by agricultural land and grazed pasture. Physical alteration of wetlands will be minimized by working within the necked-down right-of-way and by siting the ATWS entirely outside of wetlands. A lower impact crossing will be achieved by using the dry crossing method to install the pipeline as opposed to an open cut (non-isolated) method. The public water crossing is also co-located with an existing utility corridor right-of-way. Based on the evaluation of this stream, the feasible and prudent installation method is a dry crossing. Refer to Section 6.1.3 of the License Application for more information.

a Co-located is defined as any portion of the pipeline route that is within 250-feet from the centerline of a known utility corridor.
b Enbridge is proposing to conduct 19 HDDs, which will cross 21 public waters. It is not prudent and feasible to install the pipeline using the HDD method at every public water crossing for a variety of reasons: the availability of HDD rigs (only 200 exist in North America that are capable of installing 36-inch pipe); cost (proposed HDDs for the Project range from 1 to 4 million dollars); and schedule (the HDD method can take several weeks to months to complete).