Pipeline Impact Minimization through Routing, Design and Crossing Methods

The Project will cross an area of Wisconsin with numerous and large wetland systems. As previously stated in Enbridge's application materials and supplemental information filings, it is not feasible to avoid all wetland and waterbody impacts associated with construction of a linear project such as the Project. Enbridge's evaluation of major route alternatives demonstrates this fact. As described in its application materials, Enbridge evaluated a number of different routes in order to select the proposed route. Enbridge did not field delineate these alternative routes but did conduct desktop analyses, which indicate that all of these other routes cross and would disturb a number of waterbodies and wetlands. Given the preponderance of waterbodies and forested wetlands in the region, the resources affected by these other routes would include many high-quality forested wetlands and waterbodies.

Where feasible, Enbridge utilized routing as a tool to minimize resource disturbance to the extent practicable. Specifically, Enbridge designed the pipeline route in a manner that minimizes the environmental footprint while adhering to the purpose and need of the Project. The route review process consists of an assessment of technical and economic feasibility; constructability; impacts on environmental resources; and coordination with agencies and other stakeholders to identify and, where feasible, avoid sensitive habitats or resources. Where it was practical, Enbridge collocated the pipeline route with other existing corridors to minimize the creation of an entirely new right-of-way. Enbridge also planned to maximize the use of existing access roads rather than developing new access roads. Enbridge also attempted to locate the Project in open versus wooded areas. This is evident primarily along the western portion of the proposed route. Enbridge was unable to find connected existing corridors that it could follow along the eastern portion of the route. While several roads and other corridors are present in the area, none of them travel in the direction required by Enbridge. Residences, schools, churches, commercial buildings, and traffic impacts are also a component of the routing process to avoid impacts to the community as well.

After selecting the proposed route as environmentally preferable to other major route alternatives, Enbridge conducted extensive wetland and waterbody field surveys along a corridor encompassing the proposed alignment. The corridor evaluated by these field surveys (which was typically between 300 feet and 500 feet wide) was intentionally wider than the proposed workspace. Enbridge attempted to minimize resource disturbance within this corridor to the extent practicable and adjusted the proposed route where feasible and agreeable by the landowners. Through the routing process Enbridge avoided wetlands, waterbodies, and steep slopes areas at the macro and micro routing level to the extent practicable which is always the first step conducted in the process. Enbridge also modified and reduced construction workspace where practicable to avoid sensitive wetland resources while still maintaining adequate room to safely construction the Project. Enbridge planned its right-of-way configuration to minimize impacts. For example, Enbridge will use a 120-foot-wide construction right-of-way in most upland areas to construct the pipeline. Enbridge believes this is the minimum width needed to efficiently construct the pipeline and accommodate safe operation of the construction equipment. To reduce impacts to wetlands, including forested wetlands, Enbridge has reduced the construction right-of-way width to 95 feet. This reduced width can be accommodated due to reduced grading and temporary soil (topsoil) segregation required in wetlands (ditch line only vs. full right-of-way topsoil segregation). The 95 feet construction right of way reduction was also implemented at most waterbody crossings to reduce impacts. The construction alignment sheets previously provided show the level of routing completed to avoid wetland impacts and selecting the appropriate locations to cross waterbodies. Wetlands are clearly avoided by minor alignment shifts and where a wetland could not avoided practicably the pipeline was routed to minimize the crossing distance where practicable.

Where impacts could not be avoided, Enbridge minimized potential impacts through the selection of crossing methods, incorporation of Best Management Practices (BMPs) and implementation of its EPP. For example, Enbridge incorporated the use of horizontally directional drilling (HDDs) or Direct Pipe (DP) at 13 locations to minimize waterbodies and adjacent riparian area disturbance. The HDD method will be used to install the pipeline in approximately 6 miles of the route, or approximately 15 percent of the entire Project. In addition, Enbridge proposes to reduce the width of the cleared area between the HDD drill entry and exit holes to 30 feet at all but one HDD location. Following construction Enbridge will only maintain vegetation on a 50-foot-wide corridor (30 foot wide between entry and exit holes of HDDs) to operate the pipeline. The remainder of the construction right-of-way including temporary extra workspaces will be allowed to revegetate naturally following initial restoration and seeding. As natural succession proceeds in these areas, the early successional or forested communities present before construction will eventually re-establish. The regrowth of this vegetation will soften the transition between the maintained right-of-way and bordering forestlands. Because of the linear nature of the Project, temporary impacts in these habitats will be minimized by the presence of undisturbed habitat communities adjacent to the right-of-way.

As stated above, Enbridge proposes to install the pipeline using the HDD method in about 15 percent of the entire Project route. However, use of the HDD to cross every environmental feature along the route is not practicable or economically feasible. While the HDD method avoids cutting the bed and banks of a waterbody, this method does have specific requirements that limit HDD feasibility (e.g., longer duration, large additional workspace for equipment and pipe string fabrication, and suitable topography and subsurface conditions). HDDs are not practical in some situations due to additional, otherwise avoidable, sensitive resource impacts and/or environmental disturbance.

HDDs are generally not practicable for crossing narrow waterbody crossings, particularly for large diameter pipelines which require long HDDs. For the Project's proposed pipeline diameter and wall thickness, the HDD method requires a minimum length of approximately 1,300 feet with 56 feet of depth and a 90-foot bottom tangent under optimal conditions. While installing an HDD, the pipe is pulled through a curved path underground. A large-diameter, thick-walled pipe will bend, but there are limits to the extent of the bend and distortion of the pipe that cannot be exceeded without risking damage to the installed pipe.

The minimum length of installation may be extended through modification of a few major design inputs including angle of entry and exit of the HDD, entry elevation, exit elevation, depth of primary obstacle, depth of non-primary included obstacles, desired burial depth, hydrofracture factor of safety, soil types, hydrotechnical scour susceptibility, channel width, and others. Any of these factors may affect the length of the HDD and pullback string length. When coupled with the pullback length, and working room, the required total workspace length for a relatively straight segment of ROW is approximately 3,600 feet. For reference, the shortest HDD drill path on this Project is 1,774 feet and requires an additional approximately 1,800 feet for assembly of the pull back segment of pipe to be installed through the HDD path.

Installation using the HDD method may not be feasible without additional right-of-way, and suitable topography and subsurface geology. The HDD method typically requires more workspace in adjacent areas, which can increase impacts on resources in these areas, including other wetlands and waterbodies. These additional impacts offset environmental advantages gained by use of the HDD. Additionally, further use of the HDD method would result in extension of the Project construction schedule to accommodate the additional time required to complete an HDD, resulting in longer disturbance to resources near the HDD locations that would remain disturbed until the HDDs could be completed.

The advantages of the HDD method compared to open cut methods are that:

- it avoids or reduces construction caused sedimentation more than either wet trench or dry crossing methods provided there is not an inadvertent return of drilling fluid into the waterbody;
- there is no streambed or bank disturbance unless an inadvertent return occurs;
- there are no potential streamflow or fish passage effects; and
- can reduce the amount of cleanup and restoration necessary between the HDD entry and exit points.

There are limitations/disadvantages of the HDD method compared to open cut methods that include:

- HDDs may result in direct and secondary impacts different than those of the trenched method, such as inadvertent returns ("IRs") of drill mud;
- HDDs require large cleared additional temporary workspace (ATWS) on each side of the crossings to stage construction, fabricate the pipeline, and store materials;

- HDD requires additional water to formulate the drilling fluid as well as hydrostatic testing the HDD pipe segment;
- Successful completion of an HDD depends on substrate. Attempting an HDD through fractured or unconsolidated substrates can increase risk of inadvertent returns and/or failure to successfully complete the HDD.
- HDDs for the Project pipeline size requires large, specialized equipment and supplies. Transporting the HDD equipment to the respective drilling sites may increase disturbance along access roads and/or the construction right-of-way. Additionally, HDD's require support equipment and supplies which increase construction traffic through the adjacent areas, potentially including other wetlands/waterbodies.
- HDD increases the overall duration of construction disturbance at the drilling site, in adjacent workspace, as well as on the access routes to and from the HDD workspaces. For example, a 1,300-foot HDD and associated workspace, including pipe assembly workspace, can require 1,500 feet of additional disturbance or more. The drilled installation of these 1,300 feet takes a minimum of approximately 8 weeks. The same 1,300 feet of pipeline installation by open cut construction would take 2 to 3 weeks to complete and restore. Over the eight-week period, when the HDD is being completed, the ROW cannot be restored on either side of the HDD because construction crews need to maintain access to each side of the HDD. The result is the direct construction impacts remain in place longer on each side of the HDD, which may increase secondary construction impacts.
- HDDs must be long enough to accommodate the drilling radius limitations, which make short drills infeasible.
- Conducting an HDD requires specialized equipment and highly skilled, experienced crews. Enbridge has been able to contract for enough equipment and crews to complete the 12 proposed HDDs and one direct pipe installation method. Adding additional HDDs will require extending the construction calendar by months or contracting for additional crews of unknown skill and experience.
- HDDs require a long flat or gently sloped staging area the same length as the crossing to fabricate the pipe string and allow continuous pullback of the pipe.
- HDDs are best executed where there are relatively similar elevations on the drill entry and exit sides.
- Design of an HDD requires collection of geotechnical information along the HDD drill path early in the design and evaluation stages. Gathering this information requires access to the HDD sites, which can involve clearing, matting through wetlands, bridging waterbodies, and ground disturbance at the geotechnical boring sites.
- Access for the HDD equipment to reach the drill site and the construction footprint needed for the pull back string does not decrease the construction footprint in wetlands from installing the pipeline by trenching.

In addition to the construction disadvantages, there are also operational disadvantages. Due to the depth of HDD installation, the pipeline cannot be accessed for maintenance if there were to be an integrity issue between the entrance and exit. An integrity issue along the HDD segment would require the complete replacement of the HDD segment with new pipe, resulting in new impacts.

In addition to the limitations/disadvantages of the HDD method, there are also additional risks associated with the HDD.

- Successful installation using the HDD method is not guaranteed. Failure can increase environmental disturbance spatially as well as temporally.
- As the length of an HDD increases, the risk of failure also increases. When all other factors are equal, HDDs at or near the minimum practicable length have the least likelihood of in-hole failure.
- Drill hole collapse results in a loss of the drill hole as well as potential surface subsidence.
- Drilling equipment can break off or become lost down hole. Efforts to retrieve lost drilling equipment extends the duration of the drilling activity. Unrecoverable drilling equipment could

damage the pipe segment during pullback, resulting in a failed HDD. Unrecoverable drilling equipment can also result in a need to abandon the current drill hole/path and require reinitiating the HDD process, along an adjacent pathway, from the pilot hole stage.

- Damage to the pipe (e.g., ovality, pipe coating loss, gouging of the steel) during pullback/pipe installation caused by unforeseen obstructions not identified by the geotechnical investigations could result in the completed HDD being unusable and necessitate reinitiating the HDD process.
- Pullback failure – an infrequent type of HDD failure that occurs when drawing the assembled pipe through the completed bore hole, the pipe can become lodged and cannot be freed, resulting in the need to cut of the downhole segment of pipe and begin drilling again along an adjacent pathway.
- In the event of a failed HDD, the time for successful completion of an HDD may extend from weeks to months per site.
- Cost of clean-up and disturbance associated with a failed HDD can be extensive and may require the addition of expanded workspace to complete.

As briefly previously discussed above, HDDs have an economic constraint component as well. This section provides more details on the economic constraints. Installing the pipeline by HDD is approximately two to three times more expensive than installing the pipeline by trenched construction methods with most HDDs being on the upper end of this range and the lower end of the range being limited to near ideal subsurface formations for the HDD process. The cost range of two to three times more expensive, does not include the extra engineering, the additional geotechnical investigations required, the drilling material and mud disposal, the thicker wall pipe required for HDDs, and the cost of the mainline trenching crew move arounds. HDDs result in a mainline trenching crew move around because the crews typically cannot travel down the ROW along the HDD path to minimize disturbance. The mainline trenching crew move around requires loading all the equipment, materials and personnel and transporting them around the HDD. Once equipment, material, and personnel are transported around the HDD they are then unloaded and travel back to the ROW on the other side of the HDD. Mainline crew move arounds range from a few to several hundred thousand dollars per move around and take a material amount of time to complete which adds time to the construction schedule and the duration of ROW disturbance. The cost of these additional items, as discussed above, would increase the cost factor range per drill to over three times the cost of conventional installation. The routing process conducted avoided wetland, waterbody, and other resource impacts to the extent practicable, and additionally by avoiding the impacts thru routing the additional costs of HDDs, move arounds, and construction duration increases are also avoided which is discussed further below in the Waterbody Crossing Method Selection section.

Logistical constraints, as introduced above will be discussed in more detail in this section. The number of HDD rigs available at any one time is limited as there are only so many experienced HDD contractors and rigs capable of installing a 30-inch diameter pipeline available to support the work across the country. Michel's, the selected contractor for this project, has extensive HDD experience and has scheduled to have HDD rigs and experienced crews available to complete the 12 HDDs and one Direct Pipe installation proposed for the Project. Resourcing additional qualified HDD rigs and/or contractors could be challenging. As discussed above, another logistical component is HDDs require a minimum straight ROW length of approximately 3,600 feet to not increase disturbance due to needing the area for the HDD and assembled pipe to be pulled into the bore hole. Incorporating additional HDDs at this time would most likely increase impacts which were avoided in the routing process. Increasing the number of move arounds is also a logistical constraint as loading equipment, materials, and personnel on the roadways increases construction traffic on public roadways. Locating HDDs where the pull back pipeline string does not cross roads is also a logistics factor previously mentioned as a disadvantage. The pull back pipeline segment is assembled and pre-hydrostatically pressure tested prior to being pulled into the HDD borehole. This process takes a couple weeks or more and as a result cannot cross roads without an impact to local traffic and adds a traffic logistics component. Additionally, there would be more drilling fluid disposal and water usage for the drilling process which would have further logistics requirements for these items. Access to the drill sites is also a logistical consideration. Example being HDDs in a relative short series would not reduce the construction footprint. Access would still be required down the construction ROW to reach the next HDD drill site if there was not an access road in between the two HDDs. The pull back pipe string has the same construction footprint or slightly large than the trenching installation in wetlands. The result is then there would not be a reduced amount of wetland clearing, matting, or equipment traffic, only reduced excavation and stockpiling, but this would be offset by the increased amount of time the HDD activities are occurring and the increased equipment traffic to support the HDD process. The addition of more HDD in these situations does not provide the reduction of wetland impact being imagined by just looking at the site-specific feature avoidance by HDD and not looking at the full impacts of the HDD and workspace and time requirements associated with an HDD.

The technical constraints described above are reiterated as bullets as follows:

- The requirement of approximately 3600 ft of straight ROW to complete the HDD without increased impacts.
- The limitations/disadvantages of HDD described above.
- The operational maintenance activity limitations associated with not being able to access the pipeline by a maintenance dig and having to reinstall the entire HDD. HDD seldom require maintenance activities and is a low-risk probability but the impacts are high should the risk materialize.

The HDD discussion above provides a preamble for the Waterbody Crossing Method Selection section. Avoidance is completed by overall routing and considerations above and then the Waterbody Crossing Method Selection comes next for what could not be avoided by routing on a linear project.

Waterbody Crossing Method Selection

Enbridge has provided substantial information in the Project's application materials, supplements, and agency information requests regarding the criteria used to select waterbody crossing methods. This document provides further information on how the waterbody crossing methodologies were selected and how the selected method minimizes impacts to wetlands and streams.

One of the best ways to reduce both primary as well as secondary impacts is to complete construction in an expedited fashion to minimize the duration of temporary impacts associated with disturbance. The quickest way to cross a waterbody and limit the duration of secondary impacts is to complete an open-cut crossing. Open-cut crossings minimize the duration of in-stream construction and allow restoration of the ROW to occur relatively quickly. Open-cut crossings do result in temporary impacts to the waterbody. However, completion of work on the ROW and subsequent restoration of the ROW can occur more expediently which can minimize the secondary impacts which results in a net benefit to the Project. Depending upon the flow and morphology of the stream crossed, total temporary direct impacts to a waterbody crossing can be greatly reduced by completing an open-cut dry crossing versus trenchless methods, which will be discussed in future detail later in this response.

Based on the factors above when selecting the waterbody crossing method, the best approach is to evaluate if an open cut crossing method is feasible. Open cut crossings are feasible in most cases; however, where there are high flows, deep streams, wider stream widths, boat traffic, and other factors present, the open cut can become challenging and require more work and time in the waterbody. Open cut crossings of large width waterbodies would require equipment traffic to a large extent on the bed of the waterbody and side casting excavated material in the waterbody, which if a dry crossing was not completed would result in increased sedimentation. Dry crossings could be completed but it would require dam and pumping or dam and flumes to be in place for a longer time, more equipment driving on the waterbody bed, and sidecasting excavated spoil material below the ordinary high-water mark ("OHWM") would still occur within the dams on the waterbody bed which could increase sedimentation once the dams are removed. High flows of a large width waterbody require more extensive dams and pumps or flumes to maintain water flow. Increased depths make dry crossings more challenging for similar reasons. A sauerman dragline could be used to cross wide, high flow, and/or deep waterbodies, but this construction method results in higher sedimentation during construction and is not favorable. For streams or rivers with active boat traffic, navigation present in the waterbody makes a dry crossing not practicable unless the crossing was completed in two halves to maintain navigability. The presence of a sauerman dragline operation would also impact navigation by boat traffic. The more time construction crews spend in an area almost always results in increased direct and secondary impacts as previously stated. Attachment 3 shows the crossing method decision flow chart. The flow chart starts out with assessing if the waterbody crossing is feasible as an open cut crossing. The gray box to the right of the first box shows the considerations for feasibility of an open cut crossing. Based on these considerations the next decision box factors in these considerations to determine if there would be challenges or secondary impacts such as time or increased sedimentation to an unacceptable level.

The decision box here sends the flow chart down the trenchless method flow path. More definition of this decision box is provided as follows:

Primary Driver for Trenchless method:

- Large streams or rivers with high flows or deep depths which are challenging and require more time to cross, pose a risk for more sedimentation, and would have impacts to navigation are the primary drivers for a trenchless crossing method.

Secondary Drivers for the Trenchless method:

- Streams or rivers with steep banks or bank materials which will be difficult to restore.
- Elevated topography at the crossing in combination with flow and depth is also a consideration.

The next box on the Trenchless Method flow path looks at the ability to have a straight ROW to accommodate a Trenchless method. The decision box considers HDD, as this is the most available and widely used trenchless method in the industry. As discussed above, the minimum drill length for a 30-inch diameter pipe of the required pipe wall thickness is approximately 1,300 feet. The minimum drill length increases with topography, minimum depth required under the waterbody to have an acceptable safety factor in the hydrofracture analysis to not have IRs, and entry and exit angle limitations. If this minimum drill length is not available, then there are three options. One is shown on the flow chart, specifically consideration of rerouting the pipeline. The two not shown because a flow chart needs to have yes, or no decision boxes is to assess suitability for direct pipe or to reconsider the feasibility of open cutting.

The next decision box on the Trenchless flow path pertains to availability of and potential impacts to workspace. As discussed above, trenchless methods require more workspace for the HDD drilling or direct pipe installation equipment and process, as well as for pipe assembly. The pipe string and assembly workspace must be relatively flat because the drill string cannot have bends that would impact the ability to install the pipe in the drill hole. Limited topography changes can be accommodated by the height of pipe cribbing and the flexibility of the pipe string, but there are limitations to these options that limit the feasibility of the HDD trenchless method. When this method is not available, reroutes are considered as before, with the minimum radius requirement. Again, at this box two options are not shown because of the reason previously stated and they are direct pipe or relooking at open cutting. The additional workspace must also be reviewed for the additional impacts. Wetlands, waterbodies, forested areas, and secondary impacts of the increased time to complete the HDD as previously described. Depending on topography, the additional impacts may make an HDD not appropriate and again may result in a reroute decision or looking at direct pipe and/or open cut.

The last decision box in the Trenchless method flow path looks at the geotechnical results for feasibility of an HDD. The HDD technology has developed extensively since it was first conducted in the industry. HDD's can be completed in most soil and bedrock geologies. There are some geologies however that are less conducive to drilling such as substrates with large boulders and cobbles present or other conditions which result in collapse of the borehole which does not allow the pipe to be pulled through the pilot and reamed hole.

When the geology is problematic for an HDD, a DPI is considered. The DPI uses a mechanical auger process versus a fluid drilling process. The mechanical auger process also advances the pipe as the auger progresses. The mechanical auger process can address the geology limitations of an HDD by advancing the pipe as the auger progresses since the pipe advancing with the auger thereby keeping the hole open throughout the crossing process. Similar to HDD, the DPI method requires significant workspace to accommodate the equipment necessary to install the pipeline and has greater limitations on the installation angles. DPI is less commonly used and there are not as many mechanical auger rigs available for these types of crossings, so they are only used when needed.

The crossing method flow chart has a second flow path, which is the more commonly used path because most waterbodies crossed by the Project are relatively small, shallow, and have limited flows. Waterbodies of this nature can be crossed by a dry crossing method which limits the potential for sedimentation. Excavation equipment can operate in uplands from the banks of the river, excavated material can be stored in piles outside the waterbody in the temporary workspace, and the crossings can be completed in a short period. The dry open cut crossing process was modeled by RPS for sediment transport which showed limited temporary impacts to water quality from suspended solids and no permanent adverse impacts to sediment loads.

The open cut flow path starts with the open cut method and then looks at the considerations as before. When the stream is not wide, does not have high flows, is not deep, and does not have navigation, the open cut crossing has limited temporary impacts, the workspaces are smaller, and secondary impacts are reduced because of the expediate nature of completing the crossing and the Project as a whole.

The second decision box in the open cut flow path considered if the stream has a special designation or an endangered species. Streams that have a special designation and have medium flows, larger widths and depth, and other factors may be moved to the Trenchless flow path. The Project does not have any waterbodies of this nature which are not being crossed via HDD. The majority of waterbodies with special designations are being crossed by HDDs on the Project.

Stream banks considerations are the next decision box in the open cut crossing flow path. Most stream bank materials can be restored. Billy Creek on the Line 5 relocation Project was changed to an HDD from an open cut because of the soils and the slopes at the creek.

The sediment discharge decision box asks the question whether potential sediment discharge can be controlled. There are many Best Management Practices ("BMPs") available to control sediment discharge. The Project Environmental Protection Plan ("EPP") and Erosion and Sediment Control Plans ("ESCP") document the BMPs to be used. As a result, sediment discharge can be controlled, but there are limited cases where this could be a factor and thus a box to direct back towards the trenchless flow path.

The final decision box in the open cut crossing flow path considers if there is water flowing at the time of crossing. The vast majority of waterbodies on the Project are very small intermittent or ephemeral streams. Enbridge has committed to using the dry crossing method where flowing water is present to minimize the direct impacts from construction as well as the secondary impacts. When water is not present, or the water is stagnant and fewer than 6 inches deep, the crossing would be crossed by the wet trench method, meaning dam and pumps or flumes will not be used.

Routing and Selection Nuances:

The flow chart discussions above do not capture some of the nuances in the pipeline routing and waterbody crossing reasons. There are times when features exist where multiple features, such as a highway or a railroad and a waterbody are located close together with limited space between each feature. When this occurs, an HDD is often proposed versus completing each crossing as separate items. An example like this is at the Highway 13 crossing, where there is a highway, a railroad, and a stream in-between. Each by themselves, could be crossed using standard pipeline installation techniques, but when stacked together the routing and crossing method selection decisions are made by looking at the collective features.

HDD

As discussed in previous Enbridge filings as well as above, Enbridge has internal construction standards that are used in conjunction with experience from specialized HDD design firms to develop site-specific plans for each HDD. Enbridge's designs incorporate and consider geotechnical information documenting subsurface geology, topography between the entry and exit locations as well as workspace for pipe fabrication, required depth below river bottom, pipe diameter and associated installation radius and drilling mud hydraulics. For this Project, Enbridge conducted preconstruction geotechnical investigations to design and confirm the suitability of the subsurface material for HDD. In concert with those carefully developed designs, Enbridge will use a highly experienced HDD company with years of experience successfully completing drills to help plan, design and execute each drill. These plans include the requirements set forth in Wisconsin Technical Standard 1072 for Horizontal Directional Drilling. Enbridge further evaluated the designs and events of the recent Line 3 Replacement Project in Minnesota with its HDD design engineering firm to assess modifications to the Project designs to further reduce the likelihood of an IR. Enbridge made modifications to the Project HDD designs as appropriate. However, to be successful, an HDD operation requires large additional temporary workspaces at the drill entry and exit locations for staging and equipment. It also requires suitable subsurface geology conductive to drilling; relatively flat topography for pipe fabrication; and a relatively straight cleared area of ROW on the drill exit side to fabricate the pipe segments to be pulled back under the river.

An HDD crossing of this length or greater for narrow waterways is not warranted and may not be feasible without additional ROW area, and suitable topography and subsurface geology. Moreover, as described above, use of the HDD method could result in additional wetland and waterbody impacts due to the additional workspace required for drilling and pipe string fabrication. For small waterbodies, the additional impacts associated with an HDD could offset any environmental advantages in the utilization of HDD. Additionally, further use of the HDD method would result in extension of the Project construction schedule to accommodate the additional time required to complete an HDD, resulting in longer disturbance to resources near the HDD locations that would remain disturbed until the HDDs could be completed.

Enbridge has also developed a Compensatory Wetland Mitigation Plan ("Mitigation Plan") to offset both permanent and temporary wetland impacts.

Enbridge believes that the proposed route provides the least environmentally damaging practicable alternative. Route modification, workspace modifications, and/or crossing method modifications (i.e., incorporating more HDDs) to minimize impacts on a site-specific resource or resource area, such as a specific wetland or waterbody, would likely shift impacts to other sensitive resource areas, and increase the overall length of the route. This would increase the acreage of land disturbed and the duration of construction. Any changes to the route would also require initiating new landowner approvals (Enbridge has secured all required landowner approvals for the proposed route), require new surveys if there is workspace beyond the existing survey corridor, increase overall Project costs, and result in Project delays.

The avoidance thru routing process, HDD information, cost, logistics, and technical constraints and subsequent waterbody crossing method selection are the driving factors for the Project. The requirements to avoid, minimize, and mitigate for the project have been satisfied. Many of the compare-and-contrast questions stated in the WDNR Information Request are challenging because they look at finite elements, or individual features of the project when the routing, design, and execution considers the project in its entirety including all factors. It's not practicable to analyze potential differences associated with crossing a single stream crossing, which may be only five feet to 10 feet wide, with a conventional crossing method to a disturbance associated with a 3,600-foot HDD footprint. If the goal was to avoid all impacts by HDD the route would most likely look entirely different and the resource disturbance could be more or less than the current disturbance and would potentially add significant cost and logistics. The result, if it was completed, would be a pipeline that Enbridge could not complete our industry management Integrity program on without further increased costs and impacts due to the amount of the pipeline being below excavatable depths. Enbridge's goal is to provide energy to the end user safely, reliably, economically, and minimize environmental impacts. This has been accomplished through the processes described above.

Based on the discussion above, responses to specific feature by feature questions included in the WDNR Information Request have been addressed through this broader discussion of routing and HDDs.