

## Supplemental Information

Great Lakes Tunnel Project

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## Abbreviations

|       |   |
|-------|---|
| Amsl  | Above mean sea level (feet)                                 |
| AOI   | Area of Interest  |
| APE   | Area of Potential Effect                                    |
| BA    | Biological Assessment                                       |
| CBRA  | Coastal Barrier Resources Act                               |
| CBRS  | Coastal Barrier Resources System                            |
| Dbh   | Diameter at Breast Height                                   |
| DFIRM | Digital Flood Insurance Rate Map                            |
| EDR   | Environmental Data Registry                                 |
| EGLE  | Michigan Department of Environment, Great Lakes, and Energy |
| EPP   | Environmental Protection Plan                               |
| ESA   | Endangered Species Act                                      |
| FEMA  | Federal Emergency Management Agency                         |
| JPA   | Joint Permit Application                                    |
| LARA  | Michigan Department of Licensing and Regulatory Affairs     |
| LOD   | Limits of Disturbance                                       |
| LUST  | Leaking Underground Storage Tank                            |



## SUPPLEMENTAL INFORMATION

|         |   |
|---------|---|
| MDEQ    | Michigan Department of Environmental Quality    |
| MDNR    | Michigan Department of Natural Resources        |
| MNFI    | Michigan Natural Features Inventory             |
| NFIP    | National Flood Insurance Program                |
| NFA     | No Further Action                               |
| NLEB    | Northern long-eared bat                         |
| NPDES   | National Pollutant Discharge Elimination System |
| NRHP    | National Register of Historic Places            |
| OSA     | Office of the State Archaeologist               |
| OSHA    | Occupational Safety and Health Administration   |
| Project | Great Lakes Tunnel Project                      |
| ROW     | Right-of-way                                    |
| SHPO    | State Historic Preservation Office              |
| Straits | Straits of Mackinac                             |
| TBM     | Tunnel Boring Machine                           |
| USACE   | U.S. Army Corps of Engineers                    |
| USDA    | U.S. Department of Agriculture                  |
| USEPA   | U.S. Environmental Protection Agency            |



## 1.0 INTRODUCTION

This Supplemental Information document has been prepared in support of Enbridge Energy, Limited Partnership's (Enbridge) Joint Permit Application (JPA) for the Great Lakes Tunnel Project (Project).

The proposed Project involves replacing Enbridge's existing Line 5 dual 20-inch-diameter pipelines (Dual Pipelines) that cross the Straits of Mackinac (Straits) with a single, 30-inch-diameter pipeline. The replacement pipeline would be installed and located entirely underground in a tunnel beneath the lakebed of the Straits. The replacement pipeline would be connected to the existing 30-inch pipeline on both sides of the Straits.

The Project is located in Emmet and Mackinac Counties, Michigan. The Dual Pipelines currently cross the Straits from Point La Barbe in Michigan's Upper Peninsula to McGulpin Point in Michigan's Lower Peninsula (Figure 1). The distance between these two land points is approximately 3.58 miles and is the shortest distance between Michigan's upper and lower peninsulas.

## 2.0 RESOURCE IMPACTS

Impacts on resources not otherwise addressed in the JPA are discussed below. The following information is also provided to assist the U.S. Army Corps of Engineers (USACE) during the public interest review.

### 2.1 CONSERVATION

There are no conservation lands within the limits of disturbance (LOD) of the Project. The Project will not impact public conservation land.

### 2.2 ECONOMICS

Construction and operation of the Project is expected to positively impact the local economy through employment opportunities and local purchases. Nearly two million labor staff-hours will be required to complete this project.

The average construction workforce will consist of approximately 200 workers including construction and inspection personnel. Construction personnel may temporarily occupy rental units in or near the Project area, representing a short-term positive impact on the local rental industry. During construction, the Project could have a positive effect on the local economy through spending of worker payroll for housing, food, fuel, entertainment and other items. With a total estimated construction cost between \$300 and \$500 million, the construction contractor is estimating a potential for \$10.5 million for subcontracting opportunities including lodging, fuel,



food, and other ancillary services; and has committed to utilizing Indigenous Peoples for at least 10 percent of the total operating engineering and labor staff-hours worked.

### 2.2.1 Energy Needs

Enbridge's Line 5 pipeline transports light crude oil, light synthetic crude oil, light sweet crude oil, and natural gas liquids. It provides the feedstock for refineries throughout the region that produce petroleum products such as gasoline, propane, diesel and jet fuel used by consumers across Michigan and surrounding regions.

## 2.3 LAND USE

Land cover within the north side limits of disturbance (LOD) is classified as predominantly barren rock (rock/sand/clay) with some deciduous forest and low-intensity development (NLCD 2016). Land use within the north side LOD is industrial land. The south side LOD is classified as predominately deciduous forest, grassland/herbaceous, evergreen forest, and low intensity developed land (NLCD 2016). Land use within the south side LOD includes single family residences, industrial land including the Enbridge Mackinac Station and associated right-of-way (ROW), a Consumer's Energy substation and associated ROW, agricultural land (pasture), and non-commercial forested land (Village of Mackinac 2011; MDNR 2020). The Straits of Mackinac is classified as open water.

Enbridge has located the LODs to include and abut the existing Enbridge facilities on the north and south sides and has minimized the LOD to the extent practicable. Construction of the Project will require an LOD totaling approximately 41 acres, including approximately 16 acres within the north side LOD and 25 acres within the south side LOD. Vegetated and other non-industrial land will be cleared and graded during construction. Post-construction, some or all of the LODs will be permanently converted to industrial land. Post-construction restoration will comply with county permit requirements. New features within the permanent footprint will include access roads and a ventilation structure within each LOD.

### 2.3.1 Special Status Lands

Special status lands include federal, state, county, and local publicly owned or managed land. The north side LOD is located near an area called Pointe La Barbe. This area is not designated as public land, however, there is a boat ramp that the public uses to access the Straits from Boulevard Drive. This area will not be impacted by construction or operation of the Project.

Special status lands near the south side LOD include the historic McGulpin Point Lighthouse and the Headlands International Dark Sky Park. The McGulpin Point Lighthouse is located to the east, across Wilderness Park Drive from the existing Enbridge Mackinac Station and is not within the Project LOD. The portion of the LOD nearest to the Lighthouse is currently industrial; therefore, impacts to the Lighthouse as a result of Project construction or operation are not anticipated.



The Headlands International Dark Sky Park is located west and south of the south side LOD. This park is used for uninterrupted night-time viewing of the sky and this designation as a dark sky park will allow for this land and the darkness to be preserved in the future. The park is open to the public, with hiking trails throughout the property. The south side LOD does not cross the Headlands International Dark Sky Park and direct impacts to park land are not anticipated.

Enbridge has sited the LOD outside of special status lands to minimize ecological, cultural, visual, and noise effects. No direct impacts on special status lands are anticipated as a result of construction or operation of the Project. Visual impacts on the Lighthouse and Dark Sky Park are discussed in Section 2.3.3.

### 2.3.2 Recreation and Navigation

The proposed tunnel construction should have no effect on Lake Michigan shoreline as aboveground construction disturbances would occur away from the shoreline. On the north side, the area near the LOD is used as an unofficial boat launch, as well as for bird watching, fishing, and likely other recreational activities. Pointe La Barbe will remain accessible via Boulevard Drive and will not be directly impacted by construction activities. There may be short duration lane closures to the portion of Boulevard Drive east of the LOD, but access to Point La Barbe will remain open from Boulevard Drive to the west of the LOD during lane closures.

At the end of Wilderness Park Drive, there exists one point of public access to the shoreline near the south shore LOD. Access to McGulpin Point Lighthouse is also via Wilderness Park Drive, near the south shore LOD. Wilderness Park Drive will remain open and accessible to the public during tunnel construction. There may be short duration lane closures to Wilderness Park Drive during tunnel construction. Enbridge will work with Emmet County, the owner of the Lighthouse, to minimize possible disruptions to public access. Enbridge will also ensure temporary lane closures are of minimal duration to allow access to Lake Michigan and the owners of residential properties that use Wilderness Park Drive.

In Lake Michigan, construction activities are proposed below the lakebed of the open water areas. Construction and operation of the Project is not anticipated to have an effect on recreation or navigation within the Straits.

### 2.3.3 Aesthetics

Upon completion of the Project, the most prominent new features potentially visible would be a ventilation structure within each LOD occupying an approximate area of 100 feet by 100 feet. From beyond each LOD, the Project facilities would be noticeable to viewers as expansions of existing facility footprints, thus appearing consistent in character with existing conditions. Within the north side LOD, forest lands would obscure most close-in views of the Project from the north, including from U.S. Highway 2. Vegetation is sparser to the south of the LOD, which would result in intermittent, partial views of the Project from the waterfront area and a portion of Boulevard Road that passes to the south. The Project would also likely be visible to northbound travelers on the Mackinac Bridge; however, in such views – from distances ranging from one to three miles



away – the cleared areas and new Project facilities would appear beyond the Straits as part of a broad, diverse landscape, within which the existing North Straits Facility is already partially visible.

Similarly, the Project would not substantially alter the existing visual character of the south side LOD. It would expand the footprint of Enbridge's Mackinac Station but would relate to existing structures and infrastructure so that it would appear absorbed into the existing built environment. The expanded footprint of industrial-appearing facilities would be set back, but visible intermittently from nearby, ground-level locations, including along Wilderness Park Drive. It would also be noticeable from the tower of McGulpin Point Lighthouse. However, vista views from the lighthouse are oriented toward the Straits, as are other views along the shoreline in the vicinity of the south side LOD. The LOD is within an area already separated from the Headlands International Dark Sky Park by a transmission ROW. Vegetation along the northeastern portion of the Dark Sky Park would likely obscure – partially to fully – any views within the park toward the Project. If visible, it would appear alongside existing structures of similar scale and character.

During the Project's construction phase, temporary visual impacts would occur as a result of construction activities. Round-the-clock construction activities would require temporary nighttime lighting. Lighting would conform to Occupational Safety and Health Administration illumination standards for construction intended to ensure that specific work areas are provided with lighting that is sufficient to enable the workers to see hazardous conditions and avoid injury. Temporary, exterior lighting features are anticipated to be used during construction and would be downward facing to reduce light trespass.

Operation and maintenance of the Project would not result in new visual effects as compared to those activities already associated with the existing pipeline. Permanent operational lighting would include low-level constant lighting at building access locations and motion-detected lighting around the exterior of the building for security purposes. Generally, all exterior lighting would be downward-facing and include hooded lights to prevent skyglow. Permanent perimeter lighting is not anticipated.

### 2.3.4 Agriculture

There will be no impacts on agricultural land due to Project construction and operation. No areas of prime farmland as defined by the U.S. Department of Agriculture (USDA) or farmland of local importance that are currently in crop production, will be impacted by the Project. The Project will not impact cultivated land or land used for production of food, feed, fiber, forage, or oilseed crops.

### 2.3.5 Property Ownership

Enbridge owns the property within the LOD on the north side, with the exception of Boulevard Drive (Figure 11). Enbridge will work with Moran Township to develop a plan for the proposed improvements to Boulevard Drive.





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Enbridge or its affiliate, Tri-State Holdings, LLC, either owns the property or has acquired the right to access the property located within the LOD on the south side (Figure 11). Parcel 01 (tax ID 15-03-10-400-005) and parcel 22 (tax ID 42-03-51-300-012) shown on Figure 11 are owned by Consumers Energy Company. A letter granting Enbridge permission to access the LOD within these parcels is attached to this JPA. Also attached to this JPA is a letter of intent from the current property owner of parcel TSH20 (tax ID 15-03-10-427-026) to sell the parcel to Enbridge's affiliate, Tri-State Holdings, LLC.

The proposed tunnel will be located beneath the lake bottom of Lake Michigan. Submerged bottomlands are owned by the State of Michigan. The tunnel will be located within an easement per the Tunnel Agreement (2018) between the Mackinac Straits Corridor Authority and Enbridge Energy, Limited Partnership.

All on-shore permanent facilities will be located on Enbridge-owned property.

## 2.4 WATER RESOURCES

### 2.4.1 Wetlands and Waterbodies

Four wetlands are located within the north side LOD (Figure 7). No streams are located within the north side LOD. No streams or wetlands are located within the south side LOD surveyed to date. Approximately 5.2 acres of the south side LOD have not been surveyed for jurisdictional wetland and waterbody features and are slated to be surveyed in spring 2020.

Approximately 0.03 acres of wetland will be temporarily impacted by the Project. Approximately 0.08 acres of wetland will be permanently impacted by construction and operation of the Project (Figure 8). Wetland and waterbody impacts are detailed in the JPA and summarized in Table 2.1 below. Post-construction, 0.03 acres of Wetland 3, located north of the existing North Straits Facility, will be restored by removing fill, restoring topography, seeding with a native wetland seed mix, and allowing it to return to its natural wetland state.

**TABLE 2.1 WETLAND IMPACTS**

| Wetland ID and Activity  | Resource | Wetland Type | Impact Area (ac) | Impact Type |
|--------------------------|----------|--------------|------------------|-------------|
| W3 - General Fill        | Wetland  | PFO          | 0.03             | Temporary   |
| W12 - Access Rd Upgrades | Wetland  | PFO          | 0.0003           | Permanent   |
| W13 - Access Rd Upgrades | Wetland  | PFO          | 0.08             | Permanent   |
| W8 - Outfall Structure 1 | Wetland  | PEM          | 0.0008           | Permanent   |
| W8 - Outfall Structure 2 | Wetland  | PEM          | 0.0008           | Permanent   |
| Total                    |          |              | 0.11             |             |



### 2.4.2 Water Supply

Groundwater is the principal source of drinking water for homes and communities in the vicinity of the north and south side LODs. Public and private wells within and near the north side and south side LODs withdraw water primarily from the Silurian-Devonian Aquifer System (USGS 1992).

According to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Statewide Groundwater Database (EGLE 2019), there is one well situated within 200 feet of the Project. This well is located within the north side LOD, situated on the north side of Boulevard Drive, near its southernmost extent along Lake Michigan. This well is classified as a Type III Public well, owned by Enbridge Northern Straits, and was completed in November 2019 to a depth of 65 feet. The remaining nearest wells, per the EGLE online Water Well Viewer, are greater than 950 feet from the north side and south side LODs.

Although not listed on the EGLE online Water Well Viewer, based on field observations, it has been determined that private wells do exist within and near the south side LOD. Enbridge conducted a survey of the areas within and immediately adjacent to the south side LOD in November of 2019 and located nine private wells on Enbridge property within the LOD. Wells within the south side LOD may be plugged and abandoned per the Michigan Abandoned Water Well Plugging Manual (2012) prior to Project construction. Any remaining wells, including the recently installed well adjacent to the north side LOD, will be protected during construction according to the procedures outlined in Enbridge's Environmental Protection Plan (EPP). These procedures may include use of construction fencing, prohibition of fueling and lubricating activities and hazardous material storage in or adjacent to wells, and pre- and post-construction water quality monitoring. In the event construction adversely affects a well, the damaged well will be restored to its former quality, to the extent practicable, or replaced.

The U.S. Environmental Protection Agency (USEPA) defines a sole or principal source aquifer as one that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. There are no sole source aquifers in the State of Michigan (USEPA 2019). Additionally, no State designated wellhead protection areas were identified within 200 feet of the Project. The closest wellhead protection area is the Mackinaw City Wellhead Protection Area, with the nearest boundary approximately 0.5 mile east of the south side LOD (EGLE 2019).

No natural springs are known to exist within the north and south side LODs.

### 2.4.3 Water Quality

The north side LOD is located in the Cut River-Frontal Lake Michigan subbasin (HUC12 040601070101). No 303(d) listed streams are located within this subbasin. Several streams are listed in HUC10 0406010701 due to mercury in the water column, but Stream 1 and Lake Michigan near the north and south side LOD are not listed. Total Maximum Daily Loads (TMDLs) for these waters are scheduled to be established in 2022. The south side LOD is located in HUC12 040700030601. There are no 303(d) listed streams located within this subbasin, nor in HUC10 0407000306. No coldwater streams are located within the north or south side LODs.



### Construction and Spill Prevention Procedures

Construction, operation, and maintenance of the Project will comply with all applicable local, state, and federal permit and regulatory requirements. Enbridge's EPP outlines construction and spill prevention procedures that will minimize impacts during construction of the Project.

Enbridge will minimize impacts on waterbodies during construction by implementing Enbridge's EPP. Standards and procedures within the EPP include, but are not limited to:

- Locating the LODs at least 50 feet from surface waters except where adjacent upland is actively farmed or developed or where approved by the appropriate agencies;
- Locating equipment parking areas, equipment refueling areas, concrete coating activities, and hazardous material storage at least 100 feet from surface waters, unless unfeasible;
- Requiring maintenance of temporary erosion and sediment control measures throughout construction;
- Preventing the invasion or spread of undesirable exotic and invasive vegetation; and
- Implementing the spill response procedures if a spill or leak occurs during construction.

Accidental spills or leaks of hazardous materials associated with vehicle fueling, vehicle maintenance, and material storage present the greatest potential contamination threat to ground and surface water resources during construction of the tunnel. Soil contamination resulting from these spills or leaks could introduce pollutants to the ground and surface water. Implementation of proper storage, containment, and handling procedures will minimize the chance of such releases. Enbridge's EPP addresses preventative and mitigative measures that will be used to avoid or minimize the potential impacts of hazardous material spills during construction. Measures outlined in the EPP include, but are not limited to:

- Spill prevention and response training for construction personnel;
- Regular inspections of construction equipment for leaks;
- Prohibition of fueling and lubricating activities and hazardous material storage in or adjacent to sensitive areas;
- Secondary containment for storage of fuels, oils, hazardous materials, and equipment;
- Collection and disposal procedures for wastes generated during equipment maintenance;
- Emergency response procedures; and
- Standard procedures for excavation and off-site disposal of any soils contaminated by spillage.

#### **2.4.4 Water Management**

Water management has been a major consideration in planning the Project approach to tunnel construction. Much of the water discharge anticipated for the Project will result from the tunnel boring machine (TBM) slurry treatment. The slurry treatment plant will be located on the south



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side, adjacent to the tunnel launch portal. From the perspective of water management, the primary advantages of launching the TBM from the south side are to:

- Reduce the volume of water discharge at the more environmentally sensitive north side; and
- Leverage the availability of non-wetland land on the south side to manage, treat, and discharge water generated during tunneling activities.

The project's water management strategy has been developed to help avoid adverse impacts to the environment from the use of water and/or the generation of water discharge, and to maintain water discharge quality limits. The water management strategy addresses the following four areas:

1. Tunnel construction water;
2. Construction stormwater;
3. Hydrostatic testing of the new pipeline; and
4. Post-construction water.

Enbridge will minimize water discharge during tunneling activities, principally by using water recycling, and also by limiting groundwater inflows during construction of the north side shaft and south side portal. All generated discharge water (including stormwater) will be properly treated prior to disposal throughout the life of the Project. Discharges will be conducted in accordance with National Pollutant Discharge Elimination System (NPDES) regulations and permits. Details of the water management system proposed for the Project are included in Enbridge's NPDES permit application.

### Hydrostatic Testing

To ensure integrity, any new pipe will be hydrostatically pressure tested upon completion of construction. The pipeline will be filled with water and brought to a designated test pressure for a designated amount of time consistent with the requirements of 49 CFR Part 192. Any significant loss of pressure indicates that a leak may exist. Any leaks will be repaired, and the section of pipe retested until the required specifications are met. The anticipated volume of water needed for completing the hydrostatic testing is approximately 943,600 gallons. Enbridge proposes to withdraw the water from Lake Michigan and register the withdraw with EGLE. Enbridge is requesting authorization under a separate NPDES application to discharge the water back to Lake Michigan.

### **2.4.5 Floodplains**

According to Digital Flood Insurance Rate Map (DFIRM) panel 2604430075B, portions of the north side LOD are within Zone AE (100-year floodplain) (FEMA 2000). These areas include sections of Boulevard Drive in the southern and eastern portions of the north side LOD (Figure 9).



Construction activities in these areas involve cut and fill for road improvements of the existing Boulevard Drive for construction access. Enbridge will comply with local floodplain development permitting requirements and coordinate with the local floodplain manager.

A section of Boulevard Drive that is proposed for improvements in the eastern portion of the north side LOD is located within a Coastal Barrier Resources System (CBRS) buffer zone (Figure 10). The Coastal Barrier Resources Act (CBRA) was passed by Congress in 1982 to encourage conservation of hurricane-prone, biologically rich coastal barriers. CBRA prohibits most new federal expenditures that encourage development or modification of coastal barriers. As such, most new or substantially improved residences, businesses, or other developments in the CBRS are not eligible for certain federal funding and financial assistance, including coverage under the Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP). Development can still occur within the CBRS, as long as private developers or other non-federal parties bear the full cost (FEMA 2019).

The south side LOD is located in an area that has not been mapped by FEMA. No impacts to the 100-year floodplain are anticipated in the south side LOD.

## 2.5 HISTORIC PROPERTIES

As part of its environmental review and examination of impacts on cultural resources, Enbridge conducted a desktop review, followed by Phase I cultural resources investigations to identify any significant cultural sites that might be affected by the Project. Significant cultural resources are more than 50 years old and can be above ground historic structures, below ground archaeological sites, underwater archaeological sites, cultural landscapes, traditional cultural properties, or historic districts. Enbridge searched the files of the State Historic Preservation Office (SHPO) and the Office of the State Archaeologist (OSA) in order to identify the cultural resources sites and studies that have been previously recorded within the one-mile study area for the Project.

In March of 2018, Stantec, on behalf of Enbridge, conducted a records search and identified eight previously recorded cultural resources located on the south side and one on the north side within a defined area of interest. The 2018 area of interest encompassed the entirety of the proposed LODs as well as a buffer on both the north and south sides. All previously recorded cultural resources identified on shore were unevaluated. The potential for submerged archaeological sites within the tunnel corridor was also assessed. Only one submerged resource was identified and was recommended not eligible for listing on the National Register of Historic Places (NRHP).

In January of 2019, SEARCH conducted a desktop and data gap analysis to evaluate the potential for submerged cultural resources within the area of the proposed tunnel alignment across the Straits. Background research included a review of terrestrial resources as well as submerged in order to present contextual data for the analysis (Grinnan 2019). Background research conducted by SEARCH identified nine previously recorded terrestrial cultural resources, one on the north side and eight on the south side within a one-mile radius of existing pipelines



crossing the Straits. None of the previously recorded resources have been evaluated for listing on the NRHP. SEARCH also reviewed historic maps and shipwreck data in the vicinity of the study area and documented a moderate to high potential for submerged cultural resources within the Area of Potential Effect (APE). SEARCH did analyze side-scan sonar imagery and identified 32 acoustic contacts within the APE, including natural, pipeline-related, and unknown features. None of the 32 contacts were determined likely to represent a submerged cultural resource. SEARCH identified 17 anthropogenic contacts in the APE. Many of these contacts were determined to likely be associated with pipeline construction. It has been determined that the tunnel will be excavated below any potential submerged surface that would contain potential shipwrecks or submerged archaeological sites and no further underwater studies are recommended.

In June of 2019, Commonwealth Heritage Group conducted a Phase I Cultural Resources Survey in the north side and south side study area (Hagenmaier et al. 2019). The study area for the Phase I survey encompassed all area with the potential to be disturbed by the Project as described at the time of the survey and was subsequently larger than the current LOD to allow for potential changes to design. Commonwealth recorded one historic structure, a residence (and modern outbuilding) at 6770 David Drive within the LOD on the south side. Commonwealth recommended the house at 6770 David Drive as not eligible for listing on the NRHP. Six archaeological sites (20MK543 through 20MK548) were identified on the north side; only two of these are located within the proposed LOD (Table 2.2). All six archaeological sites were recommended not eligible for listing on the NRHP and no further archaeological work was recommended for this Project.

**TABLE 2.2. CULTURAL RESOURCES IDENTIFIED DURING THE PHASE I SURVEY**

| Site #           | Site Type  | Site Association                         | Site Location | Within LOD | NRHP Recommendation |
|------------------|--|--|---------------|------------|---------------------|
| 6770 David Drive | House and Modern Outbuilding                                   | Ca. 1965                                 | South side    | Yes        | Not Eligible        |
| 20MK543          | Recreation Camp or Trailer Location                            | Late 19 <sup>th</sup> Century to Present | North side    | Yes        | Not Eligible        |
| 20MK544          | Group of Features Associated with Line 5 Pipeline Construction | Late 19 <sup>th</sup> Century to Present | North side    | Yes        | Not Eligible        |
| 20MK545          | Structural Depressions former Cabins                           | Late 19 <sup>th</sup> Century to Present | North side    | No         | Not Eligible        |
| 20MK546          | Dump Site  | Late 19 <sup>th</sup> Century to Present | North side    | No         | Not Eligible        |
| 20MK547          | Structural Depressions former Cabins                           | Late 19 <sup>th</sup> Century to Present | North side    | No         | Not Eligible        |
| 20MK548          | Lithic Scatter   | Prehistoric                              | North side    | No         | Not Eligible        |

In summary, the tunnel will be excavated below a depth where there is a potential for submerged cultural resources and preliminary side scan sonar imagery did not show acoustic



contacts or anthropogenic contacts that would represent intact cultural resources. Phase I survey of the north and south side study areas identified one historic structure and six archaeological sites, all of which were recommended not eligible for listing on the NRHP. Two of the six documented archaeological sites are within the north side LOD; the remaining four are located outside of the LOD but within the larger study area. It is anticipated that the Project would have no effect on historic properties. Cultural resource reports were submitted to USACE Detroit in December of 2019.

## 2.6 FISH AND WILDLIFE

### 2.6.1 Common Species

The Project area falls within the Northern Lakes and Forests Level III Ecoregion (Wiken et al 2011). Common wildlife species found within this ecoregion include, but are not limited to: moose (*Alces alces*), black bear (*Ursus americanus*), white-tailed deer (*Odocoileus virginianus*), snowshoe hare (*Lepus americanus*), ruffed grouse (*Bonasa umbellus*), pileated woodpecker (*Dryocopus pileatus*), bald eagle (*Haliaeetus leucocephalus*), turkey vulture (*Cathartes aura*), common loon (*Gavia immer*), walleye (*Sander vitreus*), northern pike (*Esox lucius*), brook trout (*Salvelinus fontinalis*), and muskellunge (*Esox masquinongy*) (Wiken et al. 2011).

The north side LOD consists predominately of the following vegetative communities: wooded dune and swale complex, limestone bedrock glade, coastal fen, mesic northern forest, and northern shrub thicket and northern wet meadow, upland meadow, and rich conifer swamp (Stantec 2019). Natural communities confirmed within the south side LOD include boreal forest and upland meadow (Stantec 2019).

A review of data from the Michigan Natural Features Inventory (MNFI) Natural Communities list and Sargent (1999) indicate common species groups found within the natural communities located at the site (Stantec 2019) include: shorebirds (e.g., American woodcock (*Philohela minor*), common snipe (*Gallinago gallinago*), semi-palmated sandpiper (*Calidris pusilla*), and dunlin (*Calidris alpina*)); songbirds (e.g., black-throated blue warbler (*Dendroica caerulescens*), black-throated green warbler (*Dendroica virens*), scarlet tanager (*Piranga olivacea*), and ovenbird (*Seiurus aurocapillus*)); waterbirds (e.g., mallard (*Anas platyrhynchos*), wood duck (*Aix sponsa*), blue-winged teal (*Anas discors*), and Canada goose (*Branta canadensis*)); mammals (e.g., muskrat (*Ondatra zibethicus*), big brown bat (*Eptesicus fuscus*), beaver (*Castor canadensis*), cottontail rabbit (*Sylvilagus floridanus*), river otter (*Lutra canadensis*), and mink (*Mustela vison*)); and, reptiles and amphibians (e.g., green frog (*Lithobates clamitans*), leopard frog (*Lithobates pipiens*), eastern garter snake (*Thamnophis sirtalis sirtalis*), and painted turtle (*Chrysemys picta*)).

If practical, site clearing and grading will be completed during the winter months (i.e., October 30 to March 15) to minimize effects to nesting birds and roosting bats.



The proposed tunnel will extend beneath the lakebed between the north and south side LODs and no physical impacts will occur to the lakebed or the aquatic habitats above. Therefore, no effects to aquatic species are anticipated as a result of the Project.

### 2.6.2 Threatened & Endangered Species

Appendix A catalogs the state and federally listed species that have the potential to occur within 1.5 miles of the Project and provides a summary of habitat preferences, habitat suitability within the Project area, and an impact assessment for each of the federal and state-listed species identified during the MNFI review (MNFI 2018). No designated critical habitat for federally listed species is present within the Project area (MNFI 2018).

#### Natural Communities

The north side LOD consists predominately of the following vegetative communities: wooded dune and swale complex, limestone bedrock glade, coastal fen, mesic northern forest, northern shrub thicket, and northern wet meadow upland meadow, and rich conifer swamp (Stantec 2019). Natural communities confirmed within the south side LOD consist primarily of boreal forest and upland meadow (Stantec 2019). Field surveys confirm a limestone cobble shore community along both the north and south shorelines with a sand and gravel beach community limited to a small portion of the north side LOD (Stantec 2019). Natural communities are not protected under Michigan endangered species legislation.

#### Survey Results

Previous work in the north side LOD identified the presence of two federally listed plant species: dwarf lake iris (*Iris lacustris*) and Houghton's goldenrod (*Solidago houghtonii*). Meander surveys focusing on these two species were conducted in 2019 during optimal survey periods. The survey for dwarf lake iris was conducted June 17 through June 19, 2019; the survey for Houghton's goldenrod was conducted August 27 through August 30, 2019 (Stantec 2019).

In addition to the protected plant surveys, a wetland delineation and general protected species habitat assessment of the north and south side LODs was completed in September 2018. Populations of both the dwarf lake iris and Houghton's goldenrod were confirmed within the north side LOD in 2019; however, no other rare, threatened, or endangered plant species were identified during field surveys conducted for the Project. No suitable habitat for state or federally listed plant species was identified within the south side LOD (Stantec 2019).

#### Summary of Determinations of Effect – Federal Species

A summary of the determinations of effect for federally listed species is below. Additional details regarding these determinations are found in Appendix A.

A determination of **No Effect** was made for the following species:

- Canada lynx (*Lynx canadensis*) – Threatened
- Hart's tongue fern (*Asplenium scolopendrium* var. *americanum*) – Threatened





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- Pitcher's thistle (*Cirsium pitcher*) – Threatened
- Lakeside daisy (*Hymenoxys acaulis* var. *glabra*) – Threatened
- Michigan monkey-flower (*Mimulus michiganensis*) – Endangered
- Eastern massasauga rattlesnake (*Sistrurus catenatus*) – Threatened
- Hine's emerald dragonfly (*Somatochlora hineana*) – Endangered
- Hungerford's crawling water beetle (*Brychius hungerfordi*) – Endangered

A determination of **May Affect but Not Likely to Adversely Affect** was made for the following species:

- Piping plover (*Charadrius melodius*) – Endangered
- Rufa red knot (*Calidris canutus rufa*) – Threatened
- Gray wolf (*Canis lupus*) – Endangered

A determination of May Affect, **Likely to Adversely Affect** was made for the following species:

- Northern long-eared bat (*Myotis septentrionalis*) – Threatened
- Houghton's goldenrod (*Solidago houghtonii*) – Threatened
- Dwarf lake iris (*Iris lacustris*) – Threatened

Approximately 11 acres of suitable summer habitat for the federally threatened northern long-eared bat (NLEB; *Myotis septentrionalis*) (i.e., forested areas with live trees and/or snags with a DBH of at least three inches with exfoliating bark, cracks, crevices and/or other cavities) are present within the Project area. If practical, clearing will occur during the winter months (i.e., October 30 to March 15) when the NLEB is not present. However, if clearing occurs during the bats' active season and an inhabited roost tree is cleared as a result of the Project, there is potential for mortality or harassment of roosting bats using the tree. Therefore, the Project is likely to adversely affect the NLEB. However, there are no known roosts or hibernacula within or adjacent to the Project area; therefore, this take is accounted for in the biological opinion issued for the NLEB 4(d) rule (USFWS 2016).

An estimated 7,757 dwarf lake iris and 3,777 Houghton's goldenrod stems will be cleared as a result of Project construction within the north side LOD. Once cleared, the project area will be graded and gravel will be placed to facilitate project construction; therefore, the plants will not redevelop within the Project area, resulting in an adverse effect to these plant species.

### Measures to Avoid and Minimize Potential Impacts to Threatened and Endangered Species

Houghton's goldenrod and dwarf lake iris, both listed as federally threatened, were confirmed present within the north side LOD. Enbridge has sited the LOD to avoid wetlands and protected species to the extent practical while still allowing enough space for a technically feasible and safe construction area.

If practical, site clearing and grading will be completed during the winter months (i.e., October 30 to March 15) to minimize effects to environmental features such as nesting birds and roosting bats.



The proposed tunnel will extend beneath the lakebed between the north and south side LODs and no physical impacts will occur to the lakebed or the aquatic habitats above.

Enbridge is willing to consider mitigation measures, within and/or outside of the LOD, to help compensate for effects to protected plant species within the LOD. For example, it may be practical to relocate some plant populations to off-site areas nearby to enhance existing populations or establish new ones.

### 2.6.3 Invasive Species

To manage invasive species, procedures for minimizing the spread and/or introduction of undesirable species will be followed as outlined in Enbridge's EPP. Procedures include:

- Cleaning of construction equipment prior to arrival at the site.
- Maintaining logs of construction equipment cleaning.
- During construction, minimizing the time duration between final grading and permanent seeding/installation of aggregate stone fill material.

## 2.7 GEOLOGY AND SOILS

The north side LOD is located in the Niagara Limestone Terrain physiographic region, within the Eastern Upper Peninsula Lowlands of Michigan. The Niagara Limestone Terrain physiographic region is characterized by low-elevation and low-relief landscapes that have been influenced by glacial deposition, glacial meltwater, and post-glacial lacustrine and eolian processes; producing an area of moderate relief and sandy/loamy drift underlain by limestone bedrock of Silurian age (MGS 2019).

The south side LOD is located in the Algonquin Lake Plain Northwest physiographic region, within the Algonquin Lake Plain of Michigan. The Algonquin Lake Plain Northwest physiographic region is characterized by a low-relief landscape associated with the Glacial Lake Algonquin, which formed gravelly and sandy spits and some low drumlins as the major landforms. Glacial drift is generally 9 to 15 feet thick, underlain by Devonian area limestone bedrock (MGS 2019).

Per EGLE GeoWebFace program, the bedrock at or nearest the surface consist primarily of the Silurian-age Point Aux Chenes Shale in the north side LOD, and the Devonian-age Bois Blanc Formation in the south side LOD. Adjacent and beyond the north side LOD along U.S. Highway 2 the bedrock nearest the surface consists of the Devonian-age Mackinac Breccia (EGLE 2019).

Soils within the LODs were evaluated using the Web Soil Survey database (USDA 2019). The majority of the north side LOD is underlain by Udipsammets and Udorthents soil types, which are comprised of sand to variable soil types. The northern-most extent of the north side LOD, as well as most of the LOD surrounding Boulevard Drive where it extends to the north and east, is underlain by Esau-Zela Complex (gravelly sandy loam to gravelly coarse sand). The soils lakeside of Boulevard Drive, where it extends to the north and east, is underlain by Markey and Carbondale mucks moderately decomposed plant material overlying muck and sand).



The majority of the south side LOD is underlain by St. Ignace Stony Sandy Loam, which is a stony to flaggy sandy loam down to approximately 16 inches, underlain by bedrock (limestone and/or breccia). From the waterline to approximately 250 feet inland, the south side LOD is underlain by Alpena Gravelly Loamy Sand, comprised of gravelly loamy sand to very gravelly sand.

Project construction activities such as clearing, grading, trench excavation, backfilling, and heavy equipment traffic could result in adverse impacts on soil resources within the LOD. Clearing will remove protective vegetation cover and will expose soil to the effects of wind, sun, and precipitation, which could potentially increase soil erosion and the transport of sediment to sensitive areas such as wetlands or waterbodies. Grading and equipment traffic could compact soil, reducing porosity and percolation rates, which could result in increased runoff potential. Soil contamination from equipment spills and/or leakage of fuels, lubricants, and coolants could also impact soils.

The principal temporary impacts on soils resulting from construction of the Project may include soil erosion and sedimentation. To minimize or avoid potential soil erosion and sedimentation, Enbridge will utilize erosion and sedimentation control devices as described in its EPP and according to erosion control plans submitted pursuant to county-specific and state permits.

### 2.7.1 Shore Erosion

The topography of the north side LOD ranges from approximately 583 to 588 feet above mean sea level (amsl), generally sloping downward to the south and southeast. The topography of the south side LOD ranges from approximately 583 to 665 feet amsl, generally sloping downward to the north and northwest (State of Michigan 2019).

The Great Lakes high lake levels in 2019, which are expected to continue into 2020, will be taken into consideration while planning and conducting construction. Recent high lake levels, combined with rough seas and recent large storms, for example, have eroded limestone blocks supporting part of the Waugoshance Lighthouse, located at the western entrance of the Mackinac Straits (MLive 2019).

Enbridge has implemented approximately a 50-foot shoreline buffer on the north side and a 115-foot buffer on the south side. In addition, to help prevent shoreline erosion, Enbridge will use the following protective precautions (Tip of the Mitt Watershed Council 2007):

- Install access control structures to protect the shoreline soil surface against foot traffic;
- Preserve strips of natural, diverse vegetation along shorelines; and
- Control overland runoff, erosion, and sedimentation.

Enbridge will avoid or further minimize potential impacts by using construction techniques described in its EPP.



### 2.7.2 Mineral Needs

The Michigan Basin is an important source of crude oil, natural gas, salt, gypsum, and limestone, as well as brines containing bromine, magnesium, and other elements that are the basis for much of the chemical industry in the State (University of Michigan 2003b). The rock units in the vicinity of the Project provide present-day resources such as salt, limestone and dolomite, and oil and gas in the Silurian bedrock located north of the Straits; and limestone, shale, oil and gas in the Devonian bedrock primarily located south of the Straits (University of Michigan 2003b).

Mineral resources identified in the vicinity of the Project include sand and gravel. There are known sand and gravel pits located greater than 0.5 mile north and northeast of the north side LOD. One gravel pit is located near the south side LOD, approximately 0.5 miles to the south. No current or former mineral resource mines are located within 200 feet of the LODs (USGS 2019). Per the EGLE GeoWebFace program, there are no mines, mineral deposits, or oil and gas wells located within 200 feet of the Project (EGLE 2019).

## 2.8 AIR AND NOISE QUALITY

### 2.8.1 Air Quality

The Clean Air Act (CAA) of 1970, 42 U.S. Code Part 7401 et seq., amended in 1977 and 1990, is the basic federal statute governing air quality. The provisions of the CAA that are potentially relevant to construction emission sources include the following:

- Prevention of Significant Deterioration;
- Nonattainment Area New Source Review;
- New Source Performance Standards;
- National Emission Standards for Hazardous Air Pollutants; and
- Title V Operating Permits.

The Project is neither subject to nor triggers any of the requirements listed above.

Construction of the Project will result in intermittent and temporary emissions of criteria pollutants during pipeline installation. These emissions will generally include dust (PM<sub>10</sub> and PM<sub>2.5</sub>) generated from vehicle traffic during construction. The amount of dust generated during construction will be a function of vehicle numbers and types, vehicle speeds and roadway characteristics and precipitation events. Dust emissions will be greater during dry periods and in areas of fine-textured soils. Enbridge will use the following measures as needed to control dust emissions:

- Watering access roads, storage piles and disturbed surfaces;
- Placement of construction stone on unpaved areas, as practicable;
- Imposing speed restrictions for vehicles driving on unpaved areas; and
- Installing gravel tracking pads at entrances to the LOD to help remove dirt from tires and tracks.



If blasting is required, additional dust mitigation will be implemented, including the use of fog cannons to spray atomized water across the excavation area. The excavation area may also be pre-soaked with water and blasting mats may be used, as necessary.

Construction also results in combustion emissions from diesel and gasoline-fueled vehicles and construction equipment, such as a welding truck, used in various construction activities. Combustion-related emissions will include NO<sub>x</sub>, CO, Volatile Organic Compounds, SO<sub>2</sub>, PM, and small amounts of hazardous air pollutants. Construction equipment also emits greenhouse gases. Gasoline and diesel engines must comply with the USEPA mobile source regulations for on-road and non-road engines in 40 CFR Parts 85 to 90 and Parts 1033 to 1054. These regulations are designed to minimize emissions from all types of compression ignition and spark ignition engines. The USEPA requires manufacturers of on- and non-road engines to certify their products to engine emission standards based on the year of manufacture and develop manufacturers' recommendations for maintenance of the engines. Enbridge contractors will maintain all fossil-fueled construction equipment in accordance with manufacturer's recommendations to minimize construction-related emissions.

Air emissions from the construction of the Project will be localized, intermittent, and short-term. Emissions from fugitive dust and construction equipment combustion will be controlled to the extent required by state and federal agencies. Emissions from the modified pump stations and piping will be negligible.

### 2.8.2 Noise Impacts

Construction of the Project would represent an intermittent, short-term noise source and may result in noise impacts. The level of construction noise at any one time would vary over the course of the entire construction period and would be highly dependent on the type of equipment being used, amount of equipment used, and activities being conducted. Concentrated construction activities would only occur at periodic intervals.

The primary sound generation would be construction equipment and vehicular traffic into, on, and off of the worksite. According to studies performed by the United States Department of Transportation ("DOT"), almost all construction equipment has a sound pressure level between 75 and 85 decibels ("dBA") at a distance of 50 feet (DOT 2011). Additional noise impacts may occur if blasting is required. Blasting events would occur one to two times per day and would be limited to daylight hours. Blasting activities are anticipated to produce a sound pressure level between 84 and 89 dBA at a distance of 50 feet. For comparison, the sound pressure level of a typical vacuum cleaner to the person operating it is between 84 and 89 dBA (NPC 2020). Sound attenuates (loses intensity) over distance.

When noise is created by a source such as a backhoe, it attenuates at 6 dBA per doubling of distance from a source. So, if the backhoe has a sound pressure level of 80 dBA at 50 feet, it has a sound pressure level of 74 dBA at 100 feet, a sound pressure level of 68 dBA at 200 feet, and a sound pressure level of 62 dBA at 400 feet. The construction workspaces will be 2,400 feet or greater from the nearest residential structures on the north side; therefore, noise impact at these



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residences is anticipated to be less than 50 dBA. The construction workspaces will be 350 feet or greater from the nearest residential structures on the south side; therefore, noise impacts at these residences is anticipated to be approximately 59 dBA or less.

Internet searches were conducted to identify applicable noise regulations for the proposed pipeline installation activities. None were found for Mackinac County or Emmet County, Michigan, or the township of Wawatam. Moran Township Performance Standards and Provisions Ordinance (Article 16) states that for all uses in addition to the site development standards and performance criteria required, the intensity level of sounds shall not exceed 55 dBA at the common lot line for residential dwellings.

The State of Michigan has established a motor vehicle noise regulation under Act 300 Section 257.707 Michigan Compiled Laws that requires all motor vehicles to be operated with a muffler. Enbridge will mitigate sound impacts to the neighbors by requiring that no equipment would have unmuffled exhausts. All contractors will utilize sound control devices no less effective than those provided by the manufacturer and maintain equipment in accordance with manufacturer's recommendations. On-site vehicle idle time while in the construction area would be minimized for all equipment.

Project construction activities will create a temporary increase in sound levels attributable to construction equipment. The increase in noise levels resulting from construction will be temporary, localized, and generally considered negligible. The proposed facility upgrades will not result in an increase of noise levels when in service.

## 2.9 SAFETY

At Enbridge, safety is a core value and Enbridge addresses safety and integrity by various means including, but not limited to, initial system design, materials, construction practices, and operation, maintenance and inspection procedures. Enbridge is committed to operating and maintaining the Project in a manner that protects the environment and protects the safety of the public, contractors, and employees.

During construction, the applicable requirements of the U.S. and Michigan Occupational Safety and Health Administrations (OSHAS) will be followed by all construction contractors and Enbridge staff. All applicable requirements for construction set forth under 49 CFR Part 192 and 29 CFR Parts 1910 and 1926 will be emphasized by Enbridge to all employees and contractors as part of general practices. Enbridge will utilize safety inspectors to ensure safe work practices and controls are in place during construction activities. Enbridge does not anticipate any public safety concerns associated with construction or operation of the Project.

Enbridge will restrict the public from LODs to ensure public safety and Project site security. Temporary safety fencing and barriers will be installed around areas of active construction until permanent perimeter fencing is in place. Access to the LODs will be limited to Enbridge and its contractors. Materials will be stockpiled within the LODs and secure off-site industrial or



commercial locations. Enbridge will install and maintain permanent operational lighting around facility entrances and buildings for security purposes.

Traffic safety in the area surrounding the Project is important for ensuring the safety of the public and construction crews. Traffic associated with construction workers and equipment deliveries may increase congestion along public roadways near the Project, and Enbridge will install warning signage and impose Project speed limits, as appropriate. Enbridge does not anticipate needing any detours to maintain traffic flow near LODs; however, if temporary impacts to traffic are deemed necessary, Enbridge will coordinate with local authorities as required by local and/or state road permits.

## 2.10 OTHER ENVIRONMENTAL CONCERNS

### 2.10.1 Environmental Records Review

This section presents findings based upon review of information available through the public records, state agency registries, and the Environmental Data Registry (EDR) on the USEPA's System of Registries.

A desktop review of the following resources was completed to identify potential contaminated sites in the vicinity of the north side and south side LODs.

- EGLE Storage Tank Registry
- EGLE Environmental Mapper
- Michigan Department of Environmental Quality (MDEQ) Leaking Underground Storage Tank (LUST) Information Center
- Michigan Department of Licensing and Regulatory Affairs (LARA) Underground Storage Tank Active and Closed Lists
- Sanborn Map Reports
- Historical Topographic Maps
- Historical Aerial Photograph Records
- EDR Radius Map Reports
- City Directory Search Records
- Property Tax Records; and
- Building Permit Records.

### 2.10.2 North Side EDR Records Review

Based upon review of available records, the north side LOD was largely undeveloped prior to 1939. Aerial photographs indicate that on-going clearing and earthwork activities were completed along the eastern and western boundaries of the subject property in 1953 and an access drive leading to US 2 from the northern edge of the property was installed by 1964. Utility easement corridors appear to have been sequentially cleared by 1976 and maintained to present day.



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Minor site work, maintenance, and development appears to have continued through 1994 and additional site structures were added between 2005 and 2014.

The EGLE Environmental Mapper interactive website indicates there are historical records for up to three storage tanks within one mile of the subject property and no records for sites of environmental contamination. Tanks at two of the three locations are reported as having been closed and removed from the ground. The third location is listed as business entity "Castle Oil Company, Blarney" with a registered address of 895 Portage Road in St. Ignace, Michigan. This address could not be verified with a physical location in the vicinity of the subject property.

The EDR Radius Map Report identified two potential contaminated sites at "Slagg's Auto Service" and "St. Ignace Bridgeview EZ Mart" in the general vicinity of the subject property that were listed on the MDEQ LUST registry. Although no physical address was provided, further investigation indicates that the references are likely associated with the following businesses:

- Slagg's Auto & Marine is located at 1296 US Highway 2 W in St. Ignace, Michigan, approximately 1.2 miles Northeast of the north side LOD and does not represent a likely source of contamination.
- St. Ignace Downtown EZ Mart is located at 200 N State Street in St. Ignace, Michigan approximately 1.5 miles to the Northeast of the north side LOD and does not represent a likely source of contamination.

The EDR Radius Map Report also identifies a "High Risk Historical Record" for "McGregor Oil Company" at 1070 US Highway 2 W in St. Ignace, Michigan as being located 0.8 miles north of the north side LOD. This identification is based solely on historically automotive-related activities and no known contamination exists. Further investigation indicates that this business is likely associated with the Shell Oil retail service station located approximately 1.5 miles northeast of the north side LOD and does not represent a likely source of contamination.

Two previously closed underground storage tanks registered to Mackinac Sales, Inc. were identified at 1052 W. US Highway 2 in St. Ignace, Michigan. This location is near the former access drive to the subject property, approximately 0.78 mile north of the planned excavation area. Both tanks were reported as closed and removed from the ground in 1990 according to the LARA Underground Storage Tank Closed List.

No other potential contaminated sites were identified within a mile of the subject property.

Hydrogeologic information indicates that the subsurface contains sandy loam and gravel that may exhibit relatively high transmissivity. If historical leaks or spills occurred up-gradient of the subject property, the potential exists for the historically impacted and upgradient groundwater to migrate towards the subject property.

### 2.10.3 South Side EDR Records Review

Based upon review of available records, the south side LOD appears to be developed as farmland prior to 1938 with no adjacent infrastructure or residences. Aerial photographs





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beginning in 1953 indicate that on-going clearing and earthwork activities were completed along the western boundary and to the east of the subject property. Regular maintenance, additional earthwork, and infrastructure construction are documented in subsequent aerial photographs and multiple residential properties appear to have been developed after 1994. The footprint of the developed site was expanded by 1994 and expanded again between 2014 and 2016 with additional infrastructure.

The EGLE Environmental Mapper interactive website indicates no pertinent environmental records for other properties within one mile of the subject property.

The EDR Radius Map Report identified one potential contaminated site in the general vicinity of the subject property at "International Transmission Company, LLC" located at 218 Headlands Road in Mackinaw City, Michigan. This facility is classified as a Conditionally Exempt Small Quantity Generator of hazardous waste. This location is approximately 0.25 mile from the proposed excavation area and down-gradient of groundwater flow; this location does not represent a likely source of contamination.

No other potential contaminated sites were identified within a mile of the subject property.

Hydrogeologic information indicates that the subsurface contains prevalent sand and gravel materials as well as fractured rock that may exhibit relatively high transmissivity. If unreported historical leaks or spills occurred up-gradient of the subject property, the potential exists for historically impacted and upgradient groundwater to migrate to the subject property.

Enbridge reviewed the EGLE Statewide Groundwater Database (EGLE 2019) to determine if environmental contamination sites may be present within 200 feet of the LOD. According to EGLE data, there are no Michigan Part 201 environmental contamination, solid waste disposal, hazardous waste, or Michigan Part 213 open or closed leaking underground storage tank sites situated within 200 feet of the LOD, with one exception. A Part 201 site of environmental contamination (Site ID 24000115) is reported at 16309 Headlands Road, Emmet County, Michigan located within the south side LOD, at the Enbridge Energy Mackinac Facility (EGLE 2019).

Enbridge installed several monitoring wells at the facility in 2016 as part of the internal proactive Groundwater Monitoring Program (GMP). In 2017, Enbridge performed soil borings to complete delineation of the site. In 2018, Enbridge completed one year of quarterly groundwater monitoring with no detections to groundwater being noted. Also, in 2018 Enbridge gathered all site data and prepared a No Further Action (NFA) report for submittal to EGLE. In 2019, after some review, EGLE notified Enbridge that the NFA was incomplete and advised Enbridge to rescind the original submittal. Enbridge is currently working with EGLE to respond to their comments and resubmit the NFA.



## 3.0 TUNNEL AND PIPELINE INTEGRITY

Both the tunnel and pipeline will be designed, constructed, operated and maintained to meet or exceed federal, state and local requirements

### 3.1 TUNNEL INTEGRITY

#### 3.1.1 Tunnel stability during construction

The tunnel will be constructed using a state-of-the-art pressurized face TBM which will be custom-designed and fabricated specifically for the Project. The water, soil, and rock will be continually supported as tunneling advances. See the attached TBM information file.

The shield of the TBM prevents water, soil and rock from entering the tunnel during construction. The concrete segments are assembled into a watertight lining inside the shield. No water, soil or rock enters the tunnel during construction.

As the shield advances during tunneling, three tail seals at the back, or "tail", of the TBM prevent water from leaking inside the TBM.

In the tunneling world, slurry is an engineered mixture of bentonite (a clay-like mineral) and water. It will be injected under high pressure into the in front chamber of the TBM to balance earth and water pressures, and the slurry circulation system carries the excavated material back to the surface.

The face of the tunnel boring machine will be supported by slurry under pressure. The precast concrete tunnel lining segments will be assembled and erected within the shield of the TBM. Grouting will be performed as the TBM moves forward and the tunnel lining emerges from the back of the advancing shield.

Periodically, the cutting teeth at the face of the TBM require maintenance, which requires workers to enter the cutterhead chamber. First, the slurry will be removed from the chamber and, depending on the ground conditions, compressed air may be applied to maintain the void and prevent groundwater inflow. When compressed air is used, workers that have been exposed to the same pressure that exists in the excavation chamber, are brought underground in a sealed capsule. The capsule is pressure locked to the tunnel face, and once the pressures are equal, the workers enter the excavation chamber to work.

During construction, the concrete tunnel lining will be monitored to check for deformation, cracking, or leakage, to confirm that the tunnel lining is performing as expected. With this tunneling technology and monitoring, stable conditions will be maintained throughout construction, with negligible risk of tunnel collapse.



Tunneling with a pressurized TBM and a precast concrete tunnel is entirely different from historic mining and tunneling methods where the face was exposed and there was a risk of a cave-in or collapse.

### 3.1.2 Protection of the lakebed during tunneling

Tunneling beneath waterbodies is a common construction practice. The Project is being designed to avoid impacts to the bottomlands of the Straits. The alignment is specifically offset from project boreholes that could connect the tunnel to the water above and will be located at a depth of approximately 60 feet to 250 feet beneath the lake bottom.

Typically, the TBM operates with slurry pressures that are not significantly above water pressures. When the slurry pressure is higher than the water pressure, then it can penetrate the ground, although typically a bentonite slurry tends to 'cake up' and prevent flow. Slurry breakout can be a risk in tunnels in soil with shallow depth of cover, which is not the case for this project. Slurry breakout risk is managed by designing the tunnel with sufficient cover and is monitored during construction by metering of the volume of slurry flow in and out in the slurry circulation system.

### 3.1.3 Tunnel stability following construction

Everyday people safely use transportation tunnels located below waterbodies. The risk of collapse of the completed tunnel is extremely low. Planned inspections will verify the tunnel is safe and identify maintenance needs in a timely manner. Just as bridges are routinely inspected, so are transportation tunnels regularly being inspected to ensure safety.

### 3.1.4 Tunnel as secondary containment

Based on an independent report completed for the State of Michigan, it was determined that the probability of tunnel failure that could impact both the pipeline and the tunnel is not a credible threat.

Considering the proposed design of the tunnel, it is reasonable to conclude that the probability of oil escaping the tunnel and entering the water in the Straits is so low that it is considered virtually zero. There is no credible scenario that would result in a release of product into the Straits.

The concrete lining of the tunnel will provide secondary containment, preventing any leakage of liquids from the pipeline into the lakebed or Straits. The concrete lining system includes high strength, high quality pre-cast concrete elements and durable, chemical-resistant, high pressure resistant gaskets, with the annular space around the concrete elements filled with low-permeability grout. Additionally, the tunnel will be constructed well beneath the lakebed with soil and/or rock separating the tunnel from the Straits. Finally, existing groundwater pressure in the soil and rock pores around the tunnel further prevents any leaked liquids within the tunnel from migrating into the lakebed or Straits, since the pressure outside the tunnel will far exceed any leaked liquids pressure within the tunnel.



## 3.2 PIPELINE INTEGRITY

Enbridge's Liquids Pipelines integrity management program addresses aspects of evaluating and maintaining pipeline integrity to minimize the risks and consequences of having a pipeline failure that could impact populated areas and surrounding environments.

Enbridge's liquids integrity management (IM) plan is built around information and knowledge gathered through more than 50 years of pipeline operating experience. This includes technical and surrounding environment knowledge from repeated inside-the-pipeline inspection and testing data, as well as from information gathered outside the pipeline from thousands of excavations performed along our pipeline system.

This detailed knowledge of Enbridge's pipeline system enables us to design the pipeline with appropriate materials and geometry to accommodate inline inspection tools and specially designed pipe supports and external coating systems to protect the pipeline. In addition, this knowledge also allows Enbridge to adopt a defect management approach to our pipeline monitoring and assessment. Using our extensive knowledge base, the IM plan is designed and implemented to assess and address, in a proactive manner, the risk associated with each potential defect that exceeds scientifically determined tolerances.

This approach involves identification and timely repair of those defects that affect the pipeline. Enbridge uses established engineering guidelines for tolerances, specifications and procedures to guide its assessment. The focus of our IM plan is to identify and correct low-level pipeline damage and deterioration before major repairs are required. This approach will not change for the section of pipeline that is located within the tunnel.

The tunnel would be open and accessible, and the pipeline would be supported within the tunnel, providing sufficient space for pipeline inspection and maintenance. Additionally, it will be monitored 24 hours a day, 365 days a year from our control center. And as with all Enbridge pipelines, regular inspections of the line will be carried out, using inline tools.

Internal inspections are done at least every five years using sophisticated tools that run through the pipe and examine it from the inside, inch by inch. These tools use imaging technology, with a level of detail similar to that of MRIs, ultrasound and X-ray technologies used in the medical industry. The tools alert Enbridge to any issues in the pipeline that may require immediate attention, further analysis or maintenance. Data collected from those scans is analyzed by specialized computer programs and expert engineers and is continually compared to get a full picture of what is happening in the pipes.

## 4.0 PUBLIC HEARING REQUEST

Enbridge is requesting a public hearing be held for the Project.





## 5.0 REFERENCES

EGLE 2019. Water Well Viewer. Michigan Department of Environment, Great Lakes, and Energy. Available online at: <https://www.mcgi.state.mi.us/waterwellviewer/>. Accessed October 22 and 29, 2019.

FEMA 2000. Flood Insurance Rate Map, Township of Moran, Michigan, Mackinac County, Panel 75 of 75. Federal Emergency Management Agency. [fema.gov](http://fema.gov)

FEMA 2019. Coastal Barrier Resources System. Federal Emergency Management Agency. <https://www.fema.gov/coastal-barrier-resources-system>

Grinnan, Joseph, 2019. *Maritime Archaeology Desktop Assessment and Data Gap Analysis in Support of the Enbridge Line 5 Geotechnical Surveys Project, Emmet and Mackinac Counties, Michigan*.

Hagenmaier, Kelly M., Brandon M. Gabler, and Elaine H. Robinson, 2019. *Phase I Cultural Resource Survey for the Enbridge Mackinac Straits Project*. Report submitted to Enbridge.

Michigan Department of Environmental Quality (MDEQ) 2012. Michigan Abandoned Water Well Plugging Manual, Resource Management Division, Drinking Water and Environmental Health Section, Environmental Health Programs Unit, April 2012. Available online at: [https://www.michigan.gov/documents/deq/Plugging\\_Manual\\_411893\\_7.pdf](https://www.michigan.gov/documents/deq/Plugging_Manual_411893_7.pdf). Accessed November 21, 2019.

Michigan Department of Environmental Quality (MDEQ) 2019. Leaking Underground Storage Tank Information Center. <http://www.deq.state.mi.us/sid-web/Default.aspx>

Michigan Department of Environment, Great Lakes, and Energy Environmental Mapper <https://www.mcgi.state.mi.us/environmentalmapper/#>

Michigan Department of Environment, Great Lakes, and Energy, 2019. GeoWebFace – online Geologic Maps and Data. Available at [https://www.michigan.gov/egle/0,9429,7-135-3311\\_60700---,00.html](https://www.michigan.gov/egle/0,9429,7-135-3311_60700---,00.html). Accessed October 25 and 29, 2019.

Michigan Department of Licensing and Regulatory Affairs, Underground Storage Tanks [https://www.michigan.gov/lara/0,4601,7-154-89334\\_42271\\_4115\\_4238---,00.html](https://www.michigan.gov/lara/0,4601,7-154-89334_42271_4115_4238---,00.html)

Michigan Department of Natural Resources (MDNR) 2020. Commercial Forest Program Lands. Mackinac County. [http://www.midnr.com/Publications/pdfs/ForestsLandWater/Commercial\\_Forest/CF\\_Mackinac.pdf](http://www.midnr.com/Publications/pdfs/ForestsLandWater/Commercial_Forest/CF_Mackinac.pdf)

Michigan Geological Survey, 2019. Physiographic Map of Michigan. Available at <https://www.esrs.wmich.edu/mgs/webmgs/physiography/physio.html>. Accessed October 21, 2019.



## SUPPLEMENTAL INFORMATION

MLive, 2019. High Water, Erosion Threaten to Topple Historic Lake Michigan Lighthouse, by Emily Bingham, October 24, 2019. Available at <https://www.mlive.com/life/2019/10/high-water-erosion-threaten-to-topple-historic-lake-michigan-lighthouse.html>. Accessed December 4, 2019.

MNFI. 2018/ Rare Species Review #2103-Enbridge-Line 5 Straits of Mackinac Regulatory Applicability Analysis, Environmental Impact Report (Emmet & Mackinac counties, MI). Section 7 Compliance Comments. Michigan Natural Features Inventory, Michigan State University Extension.

NLCD, 2016. National Land Cover Database – 2016 – Landcover and Imperviousness. Multi-Resolution Land Characteristics Consortium. <https://www.mrlc.gov/data/nlcd-2016-land-cover-conus>

Sargent, M.S and Carter, K.S., ed. 1999. Managing Michigan Wildlife: A Landowners Guide. Michigan United Conservation Clubs, East Lansing, MI. 297pp.

Stantec Consulting Services Inc. *The Enbridge Line 5 Geotechnical Surveys Project, Emmet and Mackinac Counties, Michigan*. Report submitted to Enbridge.

State of Michigan, 2019. State of Michigan Geographic Information Systems (GIS), Map Gallery. Available at [https://www.michigan.gov/som/0,4669,7-192-78943\\_78944---,00.html](https://www.michigan.gov/som/0,4669,7-192-78943_78944---,00.html). Accessed October 23, 2019.

Tip of the Mitt Watershed Council, 2007. Understanding, Living With, & Controlling Shoreline Erosion, A Guidebook for Shoreline Property Owners, Third Edition. Available at: [https://www.watershedcouncil.org/uploads/7/2/5/1/7251350/shoreline\\_erosion\\_3rd\\_edition.pdf](https://www.watershedcouncil.org/uploads/7/2/5/1/7251350/shoreline_erosion_3rd_edition.pdf). Accessed December 4, 2019.

United States Department of Agriculture, 2019. Web Soil Survey, United States Department of Agriculture Natural Resources Conservation Service. Available at <https://websoilsurvey.nrcs.usda.gov/app/>. Accessed December 4, 2019.

United States Geological Survey, 2019. Mineral Resources On-Line Spatial Data. Available at: <https://mrdata.usgs.gov/mrds/map-us.html>. Accessed October 24, 2019.

University of Michigan, 2003b. Bedrock Geology of Michigan, University of Michigan Geological Sciences. Available at [http://www.michigan.gov/documents/deq/ogs-gimdl-GTLH\\_geo\\_307674\\_7.pdf](http://www.michigan.gov/documents/deq/ogs-gimdl-GTLH_geo_307674_7.pdf). Accessed October 23, 2019.

USEPA 2019. Sole Source Aquifers for Drinking Water. United States Environmental Protection Agency. Available online at: <https://www.epa.gov/dwssa>. Accessed October 22, 2019.

USFWS. 2016. Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions. U.S. Department of the Interior, Fish and Wildlife Service, Midwest Regional Office, Bloomington, MN. January 5, 2016.



## SUPPLEMENTAL INFORMATION

USGS 1992. Ground Water Atlas of the United States, Hydrologic Investigations Atlas 730-J, Segment 9 – Iowa, Michigan, Minnesota, Wisconsin, by Perry G. Olcott. United States Geological Survey. Available online at: <https://pubs.er.usgs.gov/publication/ha730J>. Accessed October 22, 2019.

Village of Mackinaw City. 2018. "Village of Mackinaw City 2018 Master Plan Draft." Accessed March 2018.  
[http://www.mackinawcity.org/Portals/22/MASTER%20PLAN%20Update%202018\\_Review%20Draft.pdf](http://www.mackinawcity.org/Portals/22/MASTER%20PLAN%20Update%202018_Review%20Draft.pdf).

Wiken, E., F. J. Nava, and G. Griffith. 2011. North American Terrestrial Ecoregions—Level III. Commission for Environmental Cooperation, Montreal, Canada.





## SUPPLEMENTAL INFORMATION

### Appendix A Summary of State and Federally Listed Species within the Project Area, Emmet and Mackinac Counties, Michigan

| Common Name   | Scientific Name              | State Listing <sup>1</sup> | Federal Listing <sup>1</sup> | Known to Occur within 1.5 miles of the North Side LOD? | Known to Occur within 1.5 miles of South Side LOD? | Habitat Preference   | Suitable Habitat Observed in the LOD? | Impact Assessment  |
|---------------|------------------------------|----------------------------|------------------------------|--|--|--|---------------------------------------|--|
| <b>Birds</b>  |                              |                            |                              |  |  |  |                                       |  |
| Piping plover | <i>Charadrius melodus</i>    | E                          | E                            | Yes  | Yes  | This species nests on sand-pebble beaches in dry sections, away from water. They are known to breed along prairie rivers and Great Lakes shorelines. Piping plovers begin arriving to the area in mid-April to mid-May. Nesting season is underway by mid-May and lasts until mid-July to early August. <sup>2</sup> | No                                    | No construction activities will occur on the adjacent shoreline; therefore, no impacts to suitable nesting or foraging habitat for this species will occur as a result of the project.<br><br>Although the adjacent shoreline is outside of the LOD, individuals that may use this area as stopover or nesting habitat may avoid the area due to construction and increased human activity. There is potential for mortality as a result of collision with construction equipment; however, this is unlikely given the absence of suitable habitat within the project area. The USFWS recommends at least a 50-meter (164-foot) buffer around nests to prevent disturbance of piping plovers (USFWS 1994).   |
| Rufa red knot | <i>Calidris canutus rufa</i> | --                         | T                            | Yes  | Yes  | Rare transients in the Great Lakes region. <sup>3</sup>  | No                                    | No construction activities will occur on the adjacent shoreline; therefore, no impacts to suitable nesting or foraging habitat for this species will occur as a result of the project. Rufa red knots are known to migrate along the Atlantic coast and are only rare transients in the Great Lakes region, making the probability of the species occurring in the Action Area during migration possible, but unlikely.<br><br>Although the adjacent shoreline is outside of the project area, individuals that may use this area as stopover habitat may avoid the area due to construction and increased human activity. There is potential for mortality as a result of collision with construction equipment; however, this is unlikely given the absence of suitable habitat within the project area. |



SUPPLEMENTAL INFORMATION

| Common Name      | Scientific Name         | State Listing <sup>1</sup> | Federal Listing <sup>1</sup> | Known to Occur within 1.5 miles of the North Side LOD? | Known to Occur within 1.5 miles of South Side LOD? | Habitat Preference   | Suitable Habitat Observed in the LOD? | Impact Assessment  |
|------------------|-------------------------|----------------------------|------------------------------|--|--|--|---------------------------------------|--|
| Peregrine falcon | <i>Falco peregrinus</i> | E                          | --                           | Yes  | Yes  | This species historically nested on cliff faces, including limestone lakeshore cliffs. Their migration period occurs during March, and from October through November. Nesting occurs from the beginning of April through the end of June. <sup>4</sup>   | No                                    | No suitable habitat was observed within the project area. Therefore, no adverse impacts are anticipated.   |
| Common loon      | <i>Gavia immer</i>      | T                          | --                           | Yes  | Yes  | This bird typically nests in sheltered islands on large, undeveloped lakes. Preferred nest sites are on small islands or bog mats, at the water's edge. Nursery areas - quiet, shallow, sheltered coves - are important for rearing chicks. <sup>4</sup> | Yes                                   | Suitable habitat may be present within the aquatic portions of the project area; however, the proposed tunnel will extend below the lakebed between the north and south side and no physical impacts will occur to the lakebed or the aquatic habitats above.<br><br>Although the adjacent shoreline is outside of the project area, individuals that may use this area as stopover habitat may avoid the area due to construction and increased human activity. There is potential for mortality as a result of collision with construction equipment; however, this is unlikely given the absence of suitable habitat within the project area. |
| Common tern      | <i>Sterna hirundo</i>   | T                          | --                           | Yes  | Yes  | This bird is found on sand and gravel beaches, and typically nests on islands to avoid many terrestrial predators. <sup>4</sup>  | Yes                                   | No suitable nesting or foraging habitat for this species is located within the project area; therefore, no impacts to suitable nesting or foraging habitat for this species will occur as a result of the project.<br><br>Although the adjacent shoreline is outside of the project area, individuals that may use this area as stopover or nesting habitat may avoid the area due to construction and increased human activity. There is potential for mortality as a result of collision with construction equipment; however, this is unlikely given the absence of suitable habitat within the project area.                                 |



## SUPPLEMENTAL INFORMATION

| Common Name               | Scientific Name                 | State Listing <sup>1</sup> | Federal Listing <sup>1</sup> | Known to Occur within 1.5 miles of the North Side LOD? | Known to Occur within 1.5 miles of South Side LOD? | Habitat Preference  | Suitable Habitat Observed in the LOD? | Impact Assessment   |
|---------------------------|---------------------------------|----------------------------|------------------------------|--|--|---|---------------------------------------|---|
| American bittern          | <i>Botaurus lentiginosus</i>    | SC                         | --                           | Yes  | Yes  | This bird nests and forages in a wide variety of wet to wet-mesic habitats with herbaceous or herbaceous-shrub cover. <sup>4</sup>  | Yes                                   | Suitable habitat (mesic habitats with herbaceous cover) was observed within the project area. Individuals that may use this area as foraging or nesting habitat may avoid the area due to construction and increased human activity. There is potential for mortality as a result of collision with construction equipment if the birds are present.  |
| Black tern                | <i>Chlidonias niger</i>         | SC                         | --                           | Yes  | Yes  | This bird is found in Great Lakes marshes and coastal plain marshes. They nest on floating rack or vegetation within the marsh. <sup>4</sup>  | No                                    | No suitable habitat (i.e., Coastal Plain Marsh, Emergent Marsh, and Great Lakes Marsh communities) was observed within the project area. Therefore, no adverse impacts are anticipated.   |
| Bald eagle                | <i>Haliaeetus leucocephalus</i> | SC                         | --                           | Yes  | Yes  | This bird will nest in a wide variety of habitats that provide suitable nest sites close to open water. Nests may be placed in snags or large live trees as well as on constructed platforms or utility poles. They are resident (stay year-round) as long as there is open water where they can forage. <sup>4</sup> | Yes                                   | Suitable nesting and foraging habitat is present along the Lake Michigan shoreline (adjacent to, but outside of the project area). Coordination with the USFWS will occur if a nest is observed within or adjacent to the project area.   |
| Osprey                    | <i>Pandion haliaetus</i>        | SC                         | --                           | Yes  | Yes  | This bird historically nested only in trees or snags or on cliffs but have adapted to use some man-made structures such as utility poles and towers, chimneys, windmills, buoys, and platforms. Preferred nest sites are above or near water. <sup>4</sup>  | Yes                                   | No impacts to suitable nesting or foraging habitat for this species will occur as a result of the project.<br><br>Although the adjacent shoreline is outside of the project area, individuals that may use this area as nesting or foraging habitat may avoid the area due to construction and increased human activity. There is potential for mortality as a result of collision with construction equipment. |
| Black-crowned night-heron | <i>Nycticorax nycticorax</i>    | SC                         | --                           | Yes  | Yes  | This bird typically occurs near the coast of the Great Lakes. Nests are found in shrubs or small trees 6 to 18 feet tall.   | Yes                                   | No impacts to suitable nesting or foraging habitat for this species will occur as a result of the project.  |



## SUPPLEMENTAL INFORMATION

| Common Name             | Scientific Name               | State Listing <sup>1</sup> | Federal Listing <sup>1</sup> | Known to Occur within 1.5 miles of the North Side LOD? | Known to Occur within 1.5 miles of South Side LOD? | Habitat Preference  | Suitable Habitat Observed in the LOD? | Impact Assessment   |
|-------------------------|-------------------------------|----------------------------|------------------------------|--|--|---|---------------------------------------|---|
|                         |                               |                            |                              |  |  | Black-crowned night-herons arrive in this area in early April and begin their migration south in September and October. <sup>4</sup>  |                                       | Although the adjacent shoreline is outside of the project area, individuals that may use this area as nesting or foraging habitat may avoid the area due to construction and increased human activity. There is potential for mortality as a result of collision with construction equipment.   |
| Marsh wren              | <i>Cistothorus palustris</i>  | SC                         | --                           | Yes  | Yes  | This bird occurs in freshwater marshes, typically with dense vegetation and deep water. Breeding season for the marsh wren begins in mid-May, and they leave Michigan by Late September or early October. <sup>4</sup>                                  | No                                    | No suitable habitat was observed within the project area. Therefore, no adverse impacts are anticipated.  |
| <b>Mammals</b>          |                               |                            |                              |  |  |   |                                       |   |
| Gray wolf               | <i>Canis lupus</i>            | SC                         | E                            | Yes  | Yes  | This species requires extensive tracts of contiguous forest in which to range. <sup>4</sup>   | Yes                                   | Potential suitable habitat was observed within the project area, but due to the mobility of this species, no adverse impacts are anticipated.   |
| Northern long-eared bat | <i>Myotis septentrionalis</i> | SC                         | T                            | Yes  | Yes  | This bat hibernates in abandoned mines and caves, and roosts in forests underneath bark, in cavities or in crevices of both living and dead trees. Foraging occurs along woodland edges, woodland clearings and over small woodland ponds. <sup>5</sup> | Yes                                   | Approximately 11 acres of suitable summer habitat will be cleared as a result of the Project. If practical, clearing will occur during the winter months (i.e., October 30 to March 15) when the NLEB is not present. However, if clearing occurs during the bats active season and an inhabited roost tree is cleared as a result of the Project, there is potential for mortality or harassment of roosting bats using the tree.<br><br>The Project is likely to adversely affect the NLEB. However, there are no known roosts or hibernacula within or adjacent to the project area; therefore, this take is accounted for in the biological opinion issued for the NLEB 4(d) rule (USFWS 2016). |



## SUPPLEMENTAL INFORMATION

| Common Name              | Scientific Name                                       | State Listing <sup>1</sup> | Federal Listing <sup>1</sup> | Known to Occur within 1.5 miles of the North Side LOD? | Known to Occur within 1.5 miles of South Side LOD? | Habitat Preference  | Suitable Habitat Observed in the LOD? | Impact Assessment  |
|--------------------------|---|----------------------------|------------------------------|--|--|---|---------------------------------------|--|
| Canada lynx              | <i>Lynx canadensis</i>                                | E                          | T                            | Yes  | Yes  | The lynx prefers dense, mature stands of boreal forest and other conifer or mixed conifer stands; this species uses large hollow logs, overturned stumps, and thick brush for den sites. <sup>5</sup>                             | No                                    | No suitable habitat was observed within the project area. Therefore, no adverse impacts are anticipated.   |
| Little brown bat         | <i>Myotis lucifugus</i>                               | SC                         | --                           | Yes  | Yes  | This bat forages during the summer along forest edges, lakes and streams and occasionally over small cultivated fields. They over-winter in caves, mines, and sometimes in hollow trees. <sup>5</sup>                             | Yes                                   | Given similar habitat requirements, Project effects are anticipated to be similar to those described above for the NLEB; however, the 4(d) rule does not apply to the little brown bat, a special concern species in Michigan. |
| <b>Plants</b>            |   |                            |                              |  |  |   |                                       |  |
| Michigan monkey-flower   | <i>Mimulus michiganensis</i>                          | E                          | E                            | Yes  | Yes  | Endemic to Michigan, it is found in cold springs and streams in areas with northern white-cedar. <sup>5</sup>   | No                                    | No suitable habitat was observed within the project area. Therefore, adverse impacts to this species are not anticipated.  |
| Hart's tongue fern       | <i>Asplenium scolopendrium</i> var. <i>americanum</i> | E                          | T                            | Yes  | Yes  | This plant occurs in cool limestone sinkholes in mature hardwood forests. In Michigan, this fern is found on north or east-facing shaded slopes of moist boulders and ledges of Niagaran Dolomite. <sup>5</sup>                   | No                                    | No suitable habitat was observed within the project area, therefore, adverse impacts to this species are not anticipated.  |
| Calypso or fairy-slipper | <i>Calypso bulbosa</i>                                | T                          | --                           | Yes  | Yes  | Occurs in spruce-balsam-cedar swamps, moist coniferous forests with cool soils, and Great Lakes shoreline forests dominated by spruce, cedar, fir, and paper birch. It is especially found on calcareous substrates. <sup>5</sup> | Yes                                   | Suitable habitat (Great Lakes shoreline forest) was observed within the project area, however this species was not observed. Therefore, no adverse impacts to this species are anticipated.                                    |



## SUPPLEMENTAL INFORMATION

| Common Name       | Scientific Name              | State Listing <sup>1</sup> | Federal Listing <sup>1</sup> | Known to Occur within 1.5 miles of the North Side LOD? | Known to Occur within 1.5 miles of South Side LOD? | Habitat Preference  | Suitable Habitat Observed in the LOD? | Impact Assessment   |
|-------------------|------------------------------|----------------------------|------------------------------|--|--|---|---------------------------------------|---|
| Pitcher's thistle | <i>Cirsium pitcheri</i>      | T                          | T                            | Yes  | Yes  | This plant grows on open sand dunes and occasionally on lag gravel associated with dunes. It is found exclusively along or near Great Lakes shorelines. <sup>5</sup>  | No                                    | No suitable habitat was observed within the project area, therefore, adverse impacts to this species are not anticipated.   |
| Lake Huron tansy  | <i>Tanacetum huronense</i>   | T                          | --                           | Yes  | Yes  | This plant is typically found in calcareous dune systems and along sandy beaches of Lake Huron and Lake Michigan. <sup>5</sup>  | Yes                                   | Suitable habitat (Great Lakes shoreline forest) was observed within the project area, however this species was not observed. Therefore, no adverse impacts to this species are anticipated.   |
| Dwarf lake iris   | <i>Iris lacustris</i>        | T                          | T                            | Yes  | Yes  | This plant occurs near the Great Lakes shore in soils over calcareous gravel or bedrock, typically amongst scattered trees or on shoreline forest margins. <sup>5</sup>   | Yes                                   | An estimated 7,757 dwarf lake iris stems will be cleared as a result of Project construction within the north side project area. Once cleared, the project area will be graded and gravel will be placed to facilitate project construction; therefore, the plants will not redevelop within the project area, resulting in an adverse effect to these plant species. |
| Hills pondweed    | <i>Potamogeton hillii</i>    | T                          | --                           | Yes  | Yes  | This plant is found in cool northern Michigan ponds and cold, alkaline streams on sandy, mucky, and marly substrates. It usually occurs in water up to one meter in depth. <sup>5</sup>                                       | No                                    | No suitable habitat was observed within the project area. Therefore, no adverse impacts are anticipated.  |
| Pine-drops        | <i>Pterospora andromedea</i> | T                          | --                           | Yes  | Yes  | This plant is found in dry to moist woods dominated by pines or mixed conifers, usually with a well-developed needle duff. Along Great Lakes shorelines, it is found in boreal forest and on forested backdunes. <sup>5</sup> | Yes                                   | Suitable habitat (Great Lakes shoreline forest) was observed within the project area, however this species was not observed. Therefore, no adverse impacts to this species are anticipated.   |



## SUPPLEMENTAL INFORMATION

| Common Name               | Scientific Name                             | State Listing <sup>1</sup> | Federal Listing <sup>1</sup> | Known to Occur within 1.5 miles of the North Side LOD? | Known to Occur within 1.5 miles of South Side LOD? | Habitat Preference  | Suitable Habitat Observed in the LOD? | Impact Assessment  |
|---------------------------|---|----------------------------|------------------------------|--|--|---|---------------------------------------|--|
| Houghton's goldenrod      | <i>Solidago houghtonii</i>                  | T                          | T                            | Yes  | Yes  | This plant is found along the northern shores of Lake Huron and Lake Michigan. It grows on calcareous beach sands, rocky and cobbly shores, beach flats and shallow, interdunal wetlands paralleling shoreline areas. <sup>5</sup>  | Yes                                   | An estimated 3,782 Houghton's goldenrod stems will be cleared as a result of Project construction within the north side LOD. Once cleared, the project area will be graded and gravel will be placed to facilitate project construction; therefore, the plants will not redevelop within the project area, resulting in an adverse effect. |
| Lakeside daisy            | <i>Hymenoxys acaulis</i> var. <i>glabra</i> | E                          | T                            | Yes  | Yes  | This plant is found in gravelly or sandy thin-soiled fields and alvars with dolomitic limestone bedrock at or near the surface. <sup>5</sup>  | Yes                                   | Suitable habitat (gravelly or sandy thin-soiled fields) was observed within the project area, however this species was not observed within the project area and is likely absent. Therefore, no adverse impacts are anticipated.   |
| Ram's head lady's-slipper | <i>Cypripedium arietinum</i>                | SC                         | --                           | Yes  | Yes  | This plant is found primarily on cedar-fir-spruce beach ridges and in forests along the Great Lakes shoreline in northern Michigan. It also occurs in upland jack, red, and white pine forests, in conifer-dominated swamps, and at the margins of bedrock glades. <sup>5</sup> | Yes                                   | Suitable habitat (Great Lakes shoreline forest) was observed within the project area, however this species was not observed. Therefore, no adverse impacts to this species are anticipated.  |
| Butterwort                | <i>Pinguicula vulgaris</i>                  | SC                         | --                           | Yes  | Yes  | This plant inhabits interdunal flats and hollows, marly flats, occasionally marly fens, and rock outcrops inland from the Great Lakes. <sup>5</sup>   | Yes                                   | Potentially suitable habitat (gravelly or sandy habitat) was observed with the project area, however this species was not observed. Therefore, no adverse impacts are anticipated.   |
| <b>Insects</b>            |   |                            |                              |  |  |   |                                       |  |
| Hine's Emerald Dragonfly  | <i>Somatochlora hineana</i>                 | E                          | E                            | Yes  | Yes  | This insect is found in graminoid dominated wetlands with cool, shallow, flowing water. Adults require adjacent woodland for hunting and roosting. Communities in and around  | No                                    | No suitable habitat was observed within the project area. Therefore, no adverse impacts are anticipated.   |



SUPPLEMENTAL INFORMATION

| Common Name                        | Scientific Name                | State Listing <sup>1</sup> | Federal Listing <sup>1</sup> | Known to Occur within 1.5 miles of the North Side LOD? | Known to Occur within 1.5 miles of South Side LOD? | Habitat Preference  | Suitable Habitat Observed in the LOD? | Impact Assessment  |
|------------------------------------|--------------------------------|----------------------------|------------------------------|--|--|---|---------------------------------------|--|
|                                    |                                |                            |                              |  |  | Hine's emerald observations include coastal and northern fen, rich conifer swamp, and emergent marsh. <sup>5</sup>  |                                       |  |
| Hungerford's Crawling Water Beetle | <i>Brychius hungerfordi</i>    | E                          | E                            | Yes  | Yes  | This insect inhabits cool, fast flowing streams with sand and gravel. Adults prefer gravel and cobble riffles while larvae prefer areas with slow currents and dense microalgae growth. <sup>5</sup>  | No                                    | No suitable habitat was observed within the project area. Therefore, no adverse impacts are anticipated. |
| Lake Huron locust                  | <i>Trimerotropis huroniana</i> | T                          | --                           | Yes  | Yes  | This insect occurs only in sparsely vegetated, high-quality Great Lakes sand dunes along northern Lake Michigan, northern Lake Huron, and eastern Lake Superior. Ideal habitat includes at least a mile of shoreline with two or more sets of dunes with blowouts. It primarily feeds on dune grass, beach grass, and wormwood, but will eat other forbs also, including the federally threatened pitcher's thistle. <sup>5</sup> | No                                    | No suitable habitat was observed within the project area. Therefore, no adverse impacts are anticipated. |
| Sprague's pygarcia                 | <i>Pygarcia spraguei</i>       | SC                         | --                           | Yes  | Yes  | This insect is found in openings of oak barrens and oak-pine barrens. The species also is associated with prairie, idle/old field, right-of-way, savanna, dry hardwood and forest opening habitats wherever the larval host plant flowering spurge ( <i>Euphorbia corollata</i> ) is found. <sup>5</sup>  | No                                    | No suitable habitat was observed within the project area. Therefore, no adverse impacts are anticipated. |





## SUPPLEMENTAL INFORMATION

| Common Name                    | Scientific Name            | State Listing <sup>1</sup> | Federal Listing <sup>1</sup> | Known to Occur within 1.5 miles of the North Side LOD? | Known to Occur within 1.5 miles of South Side LOD? | Habitat Preference   | Suitable Habitat Observed in the LOD? | Impact Assessment   |
|--------------------------------|----------------------------|----------------------------|------------------------------|--|--|--|---------------------------------------|---|
| Grizzled skipper               | <i>Pyrgus wyandot</i>      | SC                         | --                           | Yes  | Yes  | This insect is found in large open areas in oak-pine barrens, disturbed areas and along trails. Adults have been observed nectaring on bearberry, blueberry, dandelion, wild strawberry, and birdfoot violet. Eggs are laid on wild strawberry. <sup>5</sup>   | No                                    | No suitable habitat was observed within the project area. Therefore, no adverse impacts are anticipated.  |
| <b>Reptiles</b>                |                            |                            |                              |  |  |  |                                       |   |
| Eastern massasauga rattlesnake | <i>Sistrurus catenatus</i> | SC                         | T                            | Yes  | Yes  | Suitable habitat for this snake species includes moderate to large open canopy wetland habitats with adjacent upland or wet/mesic meadows for foraging. <sup>5</sup>   | No                                    | No suitable habitat was observed within the project area. Therefore, no adverse impacts are anticipated.  |
| <b>Snails</b>                  |                            |                            |                              |  |  |  |                                       |   |
| Delicate vertigo               | <i>Vertigo bollesiana</i>  | T                          | --                           | Yes  | Yes  | This land snail is found in wooded calcareous or igneous outcrops, limestone/dolomite lakeshore ledges, and algific (cold air producing) talus slopes. The species also reportedly occurs in moist wooded hillsides and marshes. This species is intolerant of disturbance and has only been documented at sites that have been stable for approximately 100 years or more. <sup>5</sup> | Yes                                   | Potentially suitable habitat (limestone glade) was observed within the project area, however, given this species is known from sites undisturbed for approximately 100 years or more, habitat suitability of the Project site is likely very limited. |



## SUPPLEMENTAL INFORMATION

| Common Name   | Scientific Name                | State Listing <sup>1</sup> | Federal Listing <sup>1</sup> | Known to Occur within 1.5 miles of the North Side LOD? | Known to Occur within 1.5 miles of South Side LOD? | Habitat Preference  | Suitable Habitat Observed in the LOD? | Impact Assessment  |
|---|--------------------------------|----------------------------|------------------------------|--|--|---|---------------------------------------|--|
| Widespread column   | <i>Pupilla muscorum</i>        | SC                         | --                           | Yes  | Yes  | This snail inhabits calcareous slopes and wetlands. It is thought to be tolerant of disturbed habitats such as roadsides, culverts, and even quarries. <sup>5</sup>                                   | Yes                                   | Suitable habitat (limestone bedrock glade) was observed within the project area.   |
| Crested vertigo   | <i>Vertigo cristata</i>        | SC                         | --                           | Yes  | Yes  | This snail is found in inland and lakeshore calcareous cliffs and igneous outcrops. The species apparently prefers forest edges and igneous outcrops forested with northern white-cedar. <sup>5</sup> | No                                    | No suitable vegetation communities (i.e., limestone or granite cliff communities and volcanic lakeshore communities) were observed within the project area. Therefore, no adverse impacts are anticipated. |
| Crested vertigo   | <i>Vertigo pygmaea</i>         | SC                         | --                           | Yes  | Yes  | This snail is found in calcareous coastal fens dominated by sedges, especially near the shore. <sup>5</sup>   | Yes                                   | Suitable habitat (coastal fen) was observed within the project area.   |
| Great Lakes physa   | <i>Physella magnalacustris</i> | SC                         | --                           | Yes  | Yes  | This snail occurs in shallow water along the rocky shorelines of large lakes. <sup>5</sup>  | No                                    | Suitable habitat for this species may be present along the Lake Michigan shoreline (outside of the project area).  |
| <sup>1</sup> T=Threatened, E=Endangered or SC= Special Concern <sup>2</sup> Great Lakes and Northern Great Plains Piping Plover Recovery Plan (USFWS 1988)<br><sup>3</sup> Baker et al. 2013 <sup>4</sup> <a href="https://mnfi.anr.msu.edu/species/">https://mnfi.anr.msu.edu/species/</a><br><sup>5</sup> Northern Long-eared Bat Interim Conference and Planning Guidance (USFWS 2014) |                                |                            |                              |  |  |   |                                       |  |

