US Army Corps
of Engineers®
Detroit District

U.S. Army Corps of Engineers

ENBRIDGE LINE 5
TUNNEL PROJECT

Final
Environmental Impact Statement

Executive Summary

January 2026





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1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

The United States (U.S.) Army Corps of Engineers (USACE), Detroit District, is evaluating the environmental impacts associated with Enbridge Energy, Limited Partnership's (the Applicant) proposal to construct a 3.9-mile tunnel (Tunnel or Project) under the lakebed of the Straits of Mackinac (the Straits), a waterbody that connects Lake Michigan and Lake Huron, which would house a replacement segment of the Applicant's Line 5 pipeline. The Line 5 Dual Pipeline segment (Dual Pipelines) currently consists of two 20-inch diameter pipes that are buried in sediment near shore and rest on, or are anchored to, the lakebed of the Straits. The proposed Tunnel would cross under the lakebed of the Straits, connecting Point La Barbe in Michigan's Upper Peninsula to McGulpin Point in Michigan's Lower Peninsula, in Mackinac and Emmet counties, respectively (see Figure ES-1 for Project location).

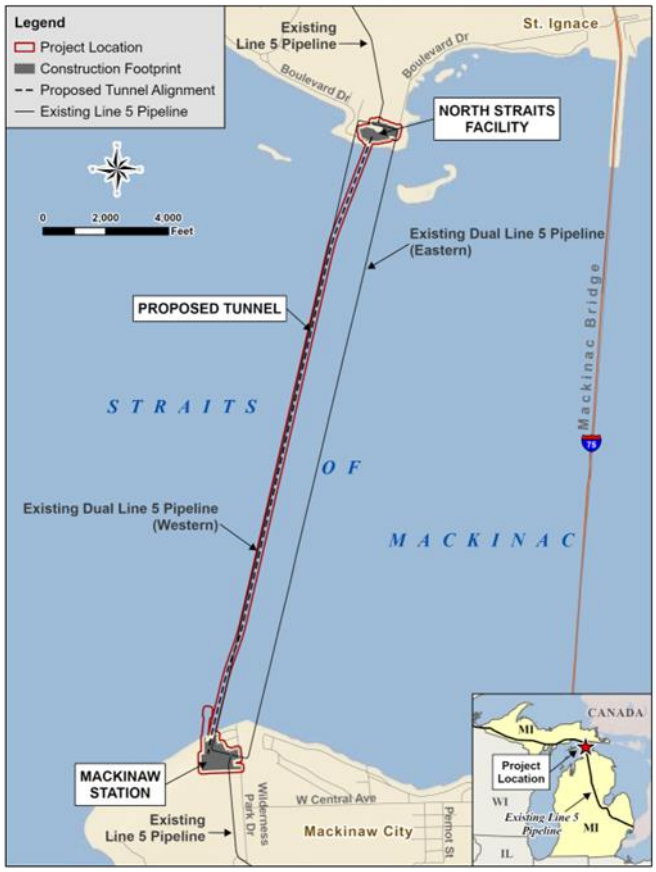


Figure ES-1. Project Location

The Project involves a federal action (Department of the Army (DA) authorization), which requires compliance with the National Environmental Policy Act of 1969 (NEPA) (Title 42 United States Code [U.S.C.] § 4321 *et seq*.). DA authorization for Projects that affect navigable waters of the U.S. (NWOTUS) is required pursuant to Section 10 of the Rivers and Harbors Act of 1899 (Title 33 U.S.C. Section 403). Discharges of dredged or fill material into waters of the U.S. (WOTUS), including wetlands, require DA authorization pursuant to Section 404 of the Clean Water Act (CWA) (Title 33 U.S.C. Section 1344). Decision options available to the USACE District Engineer are to issue the permit, issue with modifications or conditions, or deny the permit (33 Code of Federal Regulations [C.F.R.] Part 325, Appendix B Subparagraph 9(b)(5)). The DA permit review file number for the Project is LRE–2010–00463–56–A19.

Based in part on initial public input (inset at right), USACE determined that the proposed Project could significantly affect the quality of the human environment, and that the DA permit decision is a major federal action requiring preparation of an Environmental Impact Statement (EIS). The EIS identifies and assesses a reasonable range of alternatives, as well as the direct, indirect, and cumulative environmental consequences of those alternatives, in order to identify options to avoid and minimize detrimental effects on the quality of the human environment.

Early Public Notices & Reviews

Initial Public Notice
May 15 to July 14, 2020

Public Hearing Written Comment Period
November 7 to December 17, 2020

Public Hearing
December 7, 2020

1.2 PURPOSE OF THE EIS & PUBLIC INPUT

The EIS will inform USACE's permit decision, but it is not a decision document. USACE will issue a Record of Decision (ROD) at the conclusion of the NEPA process (See Figure ES-2). The ROD will document USACE's permit decision, including USACE's public interest review (Title 33 C.F.R. § 320.4) and determination of whether the proposed Project complies with the U.S. Environmental Protection Agency's (USEPA's) Section 404(b)(1) Guidelines (40 C.F.R. § 230). The ROD will also summarize the USACE's NEPA analysis and will include the findings of the USACE's treaty rights analysis and its review under Section 106 of the National Historic Preservation Act (NHPA).

To proceed with Project construction, the Applicant must receive authorization from USACE, as well as approvals from other federal, state, and local agencies. Appendix A of the EIS contains a summary and status of required permits.

Figure ES-2. NEPA Process and Opportunities for Public Involvement

The EIS process starts with a public scoping process (inset below). The Scoping Report in Appendix B provides details regarding the scoping period and the nature of comments received.

EIS Public Scoping

Notice of Intent to Prepare an EIS
August 15, 2022

Public Scoping
August 15 to October 14, 2022
(17,788 comments)

Scoping Meetings
September 1 and October 6, 2022 (virtual)
September 8, 2022 (in-person in Saint Ignace, MI)

www.Line5TunnelEIS.com

Tribal Nations and federal, state, and local resource agencies (agencies) were notified of public comment opportunities and invited to attend scheduled public meetings. USACE held Tribal Nation consultation meetings and additional meetings with Tribal Nations and other agencies, including NHPA Section 106 Consulting Parties, as needed throughout development of the EIS. Tribal Nations and federal, state, and local resource agencies (agencies) were notified of public comment opportunities and invited to attend scheduled public meetings. Additional meetings with Tribal Nations and other agencies, including National Historic Preservation Act Section 106 Consulting Parties, were held as needed throughout development of the EIS.

USACE also invited Tribal Nations and federal and state agencies to participate as Cooperating Agencies[1]. Cooperating Agencies contributed to the Draft EIS development by providing information, participating in technical teams, and reviewing draft documents. During Draft EIS

[1] A cooperating agency is any federal agency, other than a lead agency, which has jurisdiction by law or special expertise with respect to Project environmental impacts or alternatives. Tribal Nations, state or local agency of similar qualifications, may, by agreement with the lead agencies, also become a cooperating agency.

development, the Tribal Nations withdrew from Cooperating Agency status in March of 2025. Although the Tribal Nations are no longer participating in the development of the EIS as Cooperating Agencies, they will still had the opportunity to comment on the Draft EIS during the public comment period.

The Advisory Council on Historic Preservation (ACHP), Bureau of Indian Affairs, Pipeline and Hazardous Materials Safety Administration (PHMSA), and U.S. Fish and Wildlife Service (USFWS) all declined to be Cooperating Agencies. Cooperating Agencies for this Project include the USEPA Region 5; U.S. Coast Guard, Ninth District; and Michigan State Historic Preservation Office.

1.3 SCOPE OF ANALYSIS

The USACE's scope of analysis is defined based on its regulatory authorities and the activities where there is sufficient federal control and responsibility to warrant federal review. The activities within USACE's scope of analysis include:

- Construction of the proposed Tunnel between the tunnel-boring machine (TBM) entry and exit portals
- Associated construction activities, equipment use, and materials staging within the Project construction footprints, including site restoration
- Transport and disposal of spoils material
- Select operation and maintenance activities related to the Tunnel and structures within it
- Decommissioning of the existing Dual Pipelines as proposed by the Applicant

Not all activities or potential impacts described in this EIS fall within USACE authority, or the authority of other federal agencies. Section 1.5 and Appendix D of the EIS provides information regarding the scope of analysis and regulatory authorities for the proposed Tunnel and pipeline construction and operations, respectively.

1.4 PROJECT PURPOSE AND NEED

The Purpose and Need statement is what USACE is responding to and provides the framework in which ‘‘reasonable alternatives’’ are identified. Before defining the Project purpose, the Project need must be established. The USACE independently defines the project purpose and need for its analysis, while considering the Applicant's input and the public interest perspective (33 C.F.R. Part 325, Appendix B). The USACE relies on its defined project purpose and need in identifying "reasonable alternatives" to the Applicant's proposal for evaluation. USACE will develop its public interest review with information contained in this EIS and will be documented in the ROD.

1.4.1 Project Need

1.4.1.1 Tunnel Agreement

USACE was not a party to the State of Michigan’s negotiations or agreements with the Applicant. These agreements and the State’s legislation do not obligate USACE to take any particular course of action.

The State of Michigan and the Applicant entered into an agreement on December 19, 2018 requiring the Applicant to design, construct, operate, and maintain a Tunnel to replace the existing Dual Pipelines in the Straits. The State entered the agreement to “eliminate the risk of a potential release from Line 5 at the Straits…. And in furtherance of the public’s interest in the protection of waters, waterways, or bottomlands held in public trust by the State of Michigan.” The Agreement requires the Applicant to comply

with past agreements and the 1953 easement[2], including financial assurances, inspection of pipeline coatings and visual inspections (State of Michigan and Enbridge 2018).

1.4.1.2 Continued Product Transport

The Applicant states that the Straits crossing, which currently transports approximately 540,000 barrels per day (bpd) of light crude oil and natural gas liquids (NGLs) to markets in the U.S. and Canada, is needed to (Enbridge 2023a):

- Receive petroleum products from the existing northern segment of Line 5 extending from Superior to the Line 5 North Straits Facility (located north of the Straits)
- Transport those petroleum products to the existing Line 5 Mackinaw Station (located south of the Straits) to allow for further delivery on the existing southern segment of Line 5 extending to Sarnia

The Applicant states that the northern and southern segments of the pipeline cannot operate independently due to engineering and business reasons, including existing connections and delivery destinations. The pipeline delivers petroleum products to refineries in Michigan, Ohio, Pennsylvania, Ontario, and Quebec. Market demand for these products in the Eastern North Central region of the U.S., which consumes much of the commodities transported by Line 5, remains steady or slightly increases through 2050, according to the U.S. Energy Information Administration (EIA 2025). Furthermore, these projections were calculated prior to the Executive Office of the President revoking and replacing previously established energy policies as part of its directive to encourage domestic energy exploration and production (DOE 2025). The USACE determined the current needs for transport of the pipeline products are supported by their existing use, and the need for the pipeline products in the foreseeable future is supported.

1.4.1.3 Minimize Environmental Risks

The Applicant has stated that the Project would enhance protection of the Great Lakes by providing secondary containment for a new replacement segment for the existing Dual Pipelines, minimizing the environmental risks of a potential release from Line 5 in the Straits. In the 2018 Tunnel Agreement referenced above, the State indicated that the proposed Tunnel would address this need.

For the purposes of this review, "Minimizing environmental risks" means reducing the risk of physical strikes (e.g., vessel anchor) and/or providing secondary containment for existing or proposed pipelines transporting petroleum products across the Straits.

Comments received during the scoping process assert that the Applicant's Preferred Alternative would not provide secondary containment because there is a risk that potential methane in the substrate or a leak from the new pipeline could result in an explosion that would destabilize the proposed Tunnel. The Applicant has asserted that methane is not present in the Straits at a concentration to present an explosion risk and that there is virtually no risk of explosion in the Tunnel from operations of the Line 5 Replacement Segment. USACE's analysis will assume that the Applicant would comply with all laws, regulations, and conditions of issued permits. The screening of alternatives is based on a qualitative analysis of available information. In light of conflicting statements regarding the risk of explosion and potential for loss of secondary containment, the determination whether it is reasonably foreseeable that the Tunnel may lose secondary containment due to explosion is considered in Chapter 4 of the EIS.

[2] In the December 19, 2018 agreement itself, the definition of "1953 Easement" means "Straits of Mackinac Pipe Line Easement [granted by] Conservation Commission of the State of Michigan to Lakehead Pipe Line Company, Inc. (Lakehead) executed April 23, 1953." Lakehead was an American subsidiary to Interprovincial Pipe Line Company, Inc (now Enbridge Energy, Limited Partnership).

1.4.2 Project Purpose

The Applicant's stated Project purpose is to fulfill its contractual obligations to the State of Michigan (i.e., the Tunnel Agreement) and to enhance protection of the Great Lakes by providing secondary containment.

Title 33 C.F.R. Part 325, Appendix B, paragraph 9(b)(4) states that, "If the scope of analysis for the NEPA document (see paragraph 7b) covers only the proposed specific activity requiring a Department of the Army permit, then the underlying purpose and need for that specific activity should be stated." Based on USACE's authority and scope of analysis, the purpose and need statement focuses on the waterway crossing itself, including the activities that would occur between two logical termini on either end of the waterway crossing. As an existing pipeline, the existing products, capacity, and infrastructure on the north and south shores of the Straits are primary considerations in USACE's definition of the Project purpose and need. Safety improvements appear to be the underlying need addressed in the State of Michigan's negotiations and agreements with the Applicant, and USACE will evaluate the opportunity for safer transport of the pipeline products.

USACE determined that the purpose for the Project is to *provide safe transportation of light crude oil, light synthetic crude oil, light sweet crude oil, and NGLs between the Applicant's existing North Straits Facility and Mackinaw Station, and to approximately maintain the existing capacity of the Line 5 pipeline while minimizing environmental risks*.

2 ALTERNATIVES

NEPA requires evaluation of a reasonable range of alternatives that would accomplish a project's underlying purpose and need, and to inform decision-makers of the consequences of the Proposed Action. Reasonable alternatives include the No Action Alternative, the Applicant's Preferred Alternative, and other reasonable alternatives. Rationale for eliminating alternatives from detailed study is provided in the EIS.

Title 33 C.F.R. Part 325, Appendix B, USACE's Procedures for Implementing NEPA, Paragraph 9(b)(5), Alternatives, establishes that the "Corps is neither an opponent nor a proponent of the applicant's proposal"; therefore, the Applicant's final proposal will be identified as the 'Applicant's Preferred Alternative'.

2.1 CWA REQUIREMENTS

The USACE federal permit program requires all applicants for a DA permit under Section 404 of the Clean Water Act to avoid and minimize impacts to WOTUS. The substantive criteria used to evaluate permit alternatives are the Section 404(b)(1) Guidelines (40 C.F.R. Part 230). The Guidelines require the evaluation of "practicable alternatives," and are used to identify the Least Environmentally Damaging Practicable Alternative to ensure that "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences" (40 C.F.R. § 230.10(a)). The Guidelines define an alternative as practicable "if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the Applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered" (40 C.F.R. § 230.10 (a)(2)).

2.2 USACE PUBLIC INTEREST REVIEW

USACE's decision on whether to issue a permit is also based on an evaluation of the probable impacts, including cumulative impacts, of the Project and its intended use on public interest (Title 33 C.F.R. § 320.4(a)(2)(ii)). As part of this process, USACE considers the practicability of using reasonable alternative locations and methods to accomplish the objective of the proposed work where there are unresolved conflicts as to resource use.

2.3 DEVELOPMENT OF ALTERNATIVES

USACE evaluated numerous alternatives against the screening criteria described below to identify alternatives to carry forward for detailed analysis in the EIS. USACE considered a variety of sources in its initial identification of a wide range of alternatives for screening, including public, Tribal Nation, and Cooperating Agency input, State-commissioned analyses, Applicant-provided information, and industry studies and evaluations (including opposition).

2.3.1 Screening Criteria

The preparation of this EIS began prior to the April 11, 2025 effective date of the Council on Environmental Quality's (CEQ's) interim final rule, Removal of National Environmental Policy Act Implementing Regulations. 90 Fed. Reg. 10610 (Feb. 25, 2025). Consistent with CEQ's February 19, 2025 memorandum, Implementation of the National Environmental Policy Act, the Detroit District voluntarily relied on the CEQ regulations in completing its ongoing NEPA review. The Detroit District also followed USACE existing practices and procedures for implementing NEPA, consistent with the text of NEPA, Executive Order (EO) 14154, *Unleashing American Energy* and the CEQ guidance.

The USACE evaluated and screened alternatives while considering both the NEPA requirements and the Section 404(b)(1) Guideline requirements. The alternatives analysis in the EIS satisfies both NEPA and Section 404(b)(1) requirements. USACE examined the full scope of possible alternatives and components and systematically screened each alternative using the sequential three-tiered approach described below. If an alternative failed to meet a screening criterion, USACE did not screen the alternative against subsequent screening criteria. Only those alternatives (with the exception of the No Action Alternative, which is a NEPA requirement) meeting all three criteria were carried forward for detailed analysis in the EIS.

Criterion 1. Does the alternative meet the purpose and need? Relevant considerations include:

- Does the alternative provide for transport of pipeline products between the Applicant's existing North Straits and Mackinaw Station facilities?
- Does the alternative approximately maintain Line 5's existing capacity (annual average of approximately 540,000 bpd)?
- Does the alternative minimize environmental risks and provide for safe transport?

Criterion 2. Are the alternative(s) that meet Criterion 1 reasonable and practicable? Relevant considerations included:

- Is the alternative technically and economically feasible?
- Is the alternative available and capable of being implemented after taking into consideration cost, existing technology, and logistics?

Criterion 3. Might the alternative(s) that meet both Criteria 1 and 2 have less environmental impacts than the Applicant's Preferred Alternative? Relevant considerations included:

- The Project footprints and best available information to characterize natural and cultural resources within each alternative.
- Alternatives or sub-alternatives that had apparent equal or greater environmental impacts than the Applicant's Preferred Alternative were removed from detailed consideration.

2.3.2 Results of Alternative Screening

Appendix E in the EIS summarizes the results of applying USACE's screening criteria, which resulted in the following alternatives being carried forward for detailed analysis (see Appendix F for additional details on the alternatives and Figures ES-3 through ES-6 for general locations):

***No Action Alternative*:** Under the No Action Alternative, USACE would not issue a permit, and operation of the existing Dual Pipelines would continue. The No Action Alternative is required by NEPA as a baseline condition for comparing environmental effects.

***Applicant's Preferred Alternative*:** As noted, this involves construction of a Tunnel under the Straits and includes two excavated material placement sites (EMPS) S1 and N1 ('S' designates south of the Straits and 'N' designates north of the Straits), and three off-site laydown areas S2, S5, and N2 (see Figure ES-3). Other EMPS and off-site laydown area locations were screened and removed from detailed analysis (see Appendix E in the EIS).

***Engineered Gravel/Rock Protective Cover Alternative*:** Placement of an engineered gravel/rock protective cover over the exposed portions of the existing Dual Pipelines as an alternative to the Applicant's Preferred Alternative.

Horizontal Directional Drilling (HDD) Installation Alternative[3]: Installation of a 30-inch diameter replacement pipeline segment beneath the lakebed of the Straits via HDD, utilizing the intersect method, as an alternative to the Applicant's Preferred Alternative.

Sub-Alternatives

USACE considered a number of sub-alternatives that do not constitute a complete project on their own. Rather, they must be combined with one or more alternatives to make a complete project. USACE considered sub-alternatives to the proposed designs/layouts of the Applicant's Preferred Alternative (e.g., location and type of Tunnel entrance, location of EMPS and associated haul routes). USACE also considered decommissioning sub-alternatives, which must be combined with the Applicant's Preferred Alternative to make a complete project. These sub-alternatives are carried through the EIS for detailed analysis.

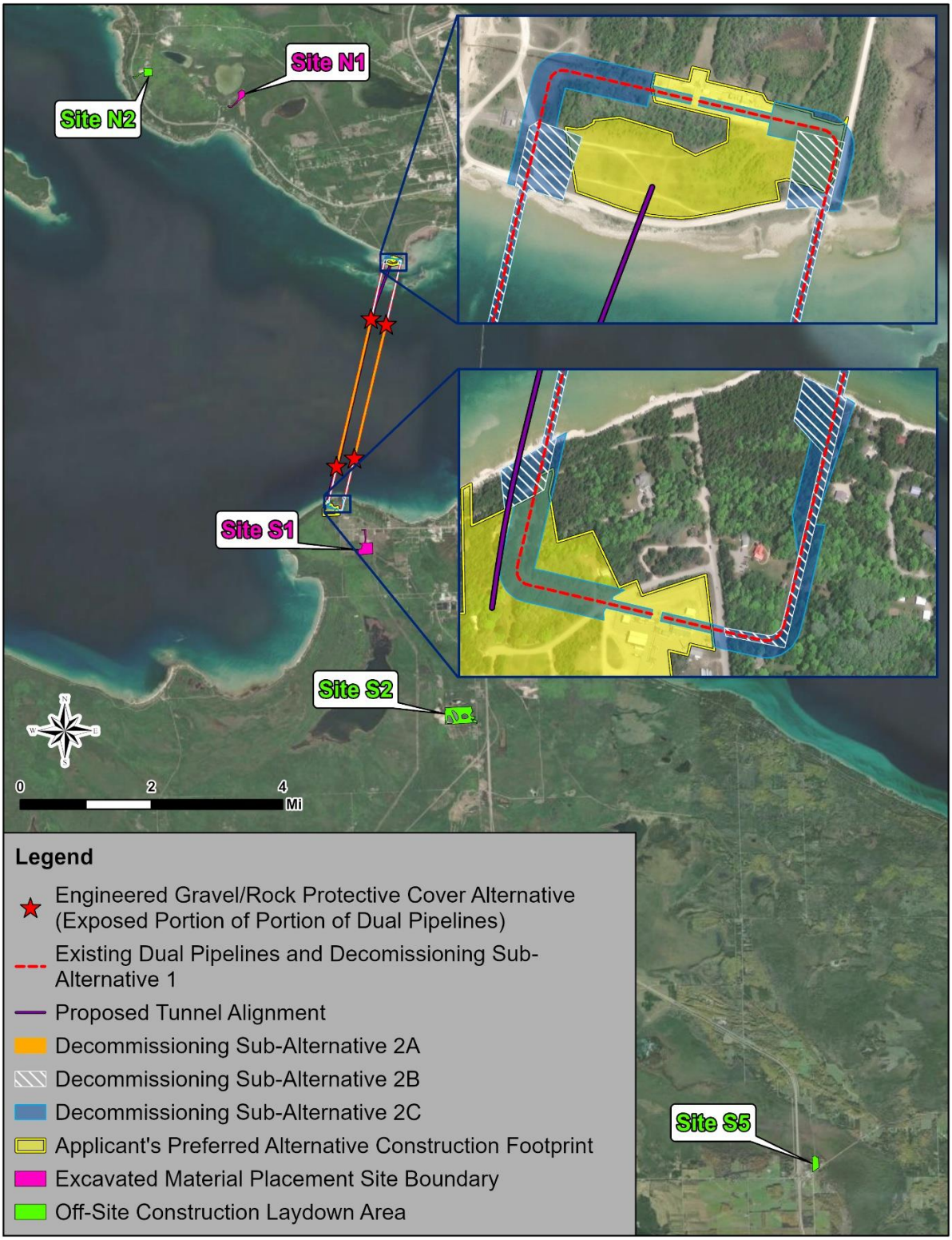
***Decommissioning Sub-Alternative 1*:** Decommissioning the Dual Pipelines and abandon in-place, after cleaning and plugging. Note that Decommissioning Sub-Alternative 1 as shown on Figure ES-3 is the same as the "Dual Pipelines" shown on the figure.

***Decommissioning Sub-Alternative 2a*:** Decommission the Dual Pipelines, partially in-place, removing exposed portions of the pipeline segments along the lakebed. Similar to Sub-Alternative 1, this would include cleaning of the entire line and plugging the remaining segments.

***Decommissioning Sub-Alternative 2b*:** Decommission the Dual Pipelines, partially in-place, removing pipeline segments within the lake between the ordinary high water marks. Similar to Sub-Alternative 2a, this would include cleaning of the entire line and plugging the remaining segments.

***Decommissioning Sub-Alternative 2c*:** Decommission and fully remove the Dual Pipelines, including buried, onshore segments. Similar to Sub-Alternative 1, this would include cleaning of the entire line prior to removal.

[3] The HDD Installation Alternative was originally discussed in the Applicant's 2018 report, Alternatives for Replacing Enbridge's Dual Line 5 Pipelines Crossing the Straits of Mackinac. During that time, the Applicant did not consider this alternative to be technically feasible due to the length of the replacement pipeline, length of drill required, and the hard characteristics of the subsurface rock. During its review of the May 2025 Draft EIS, the Applicant indicated that newer technologies exist in the HDD industry that would allow the installation of a replacement pipeline using HDD to be technically feasible; therefore, the HDD Installation Alternative is considered in the Final EIS.



*Note: The Engineered Gravel/Rock Alternative involves only exposed portions of the existing Dual Pipelines along the lakebed. Its footprint (not shown due to scale) would include an approximately 72-foot wide disturbance along each of the Dual Pipelines (36 feet along either side of each existing pipeline's centerline).

Figure ES-3. Alternatives Analyzed in the May 2025 Draft EIS

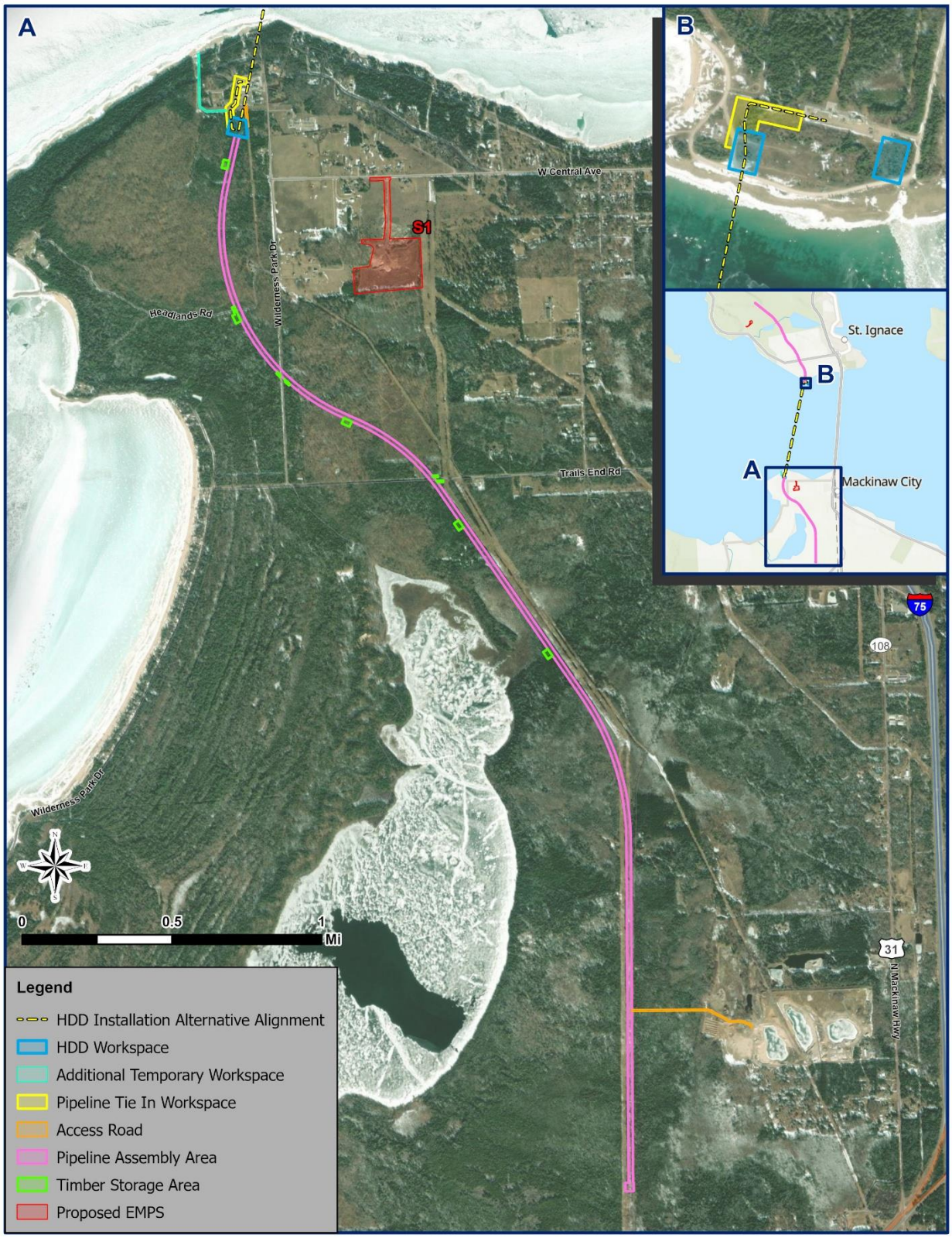


Figure ES-4. HDD Installation Sub-Alternative 1: Pipeline Assembly Area South

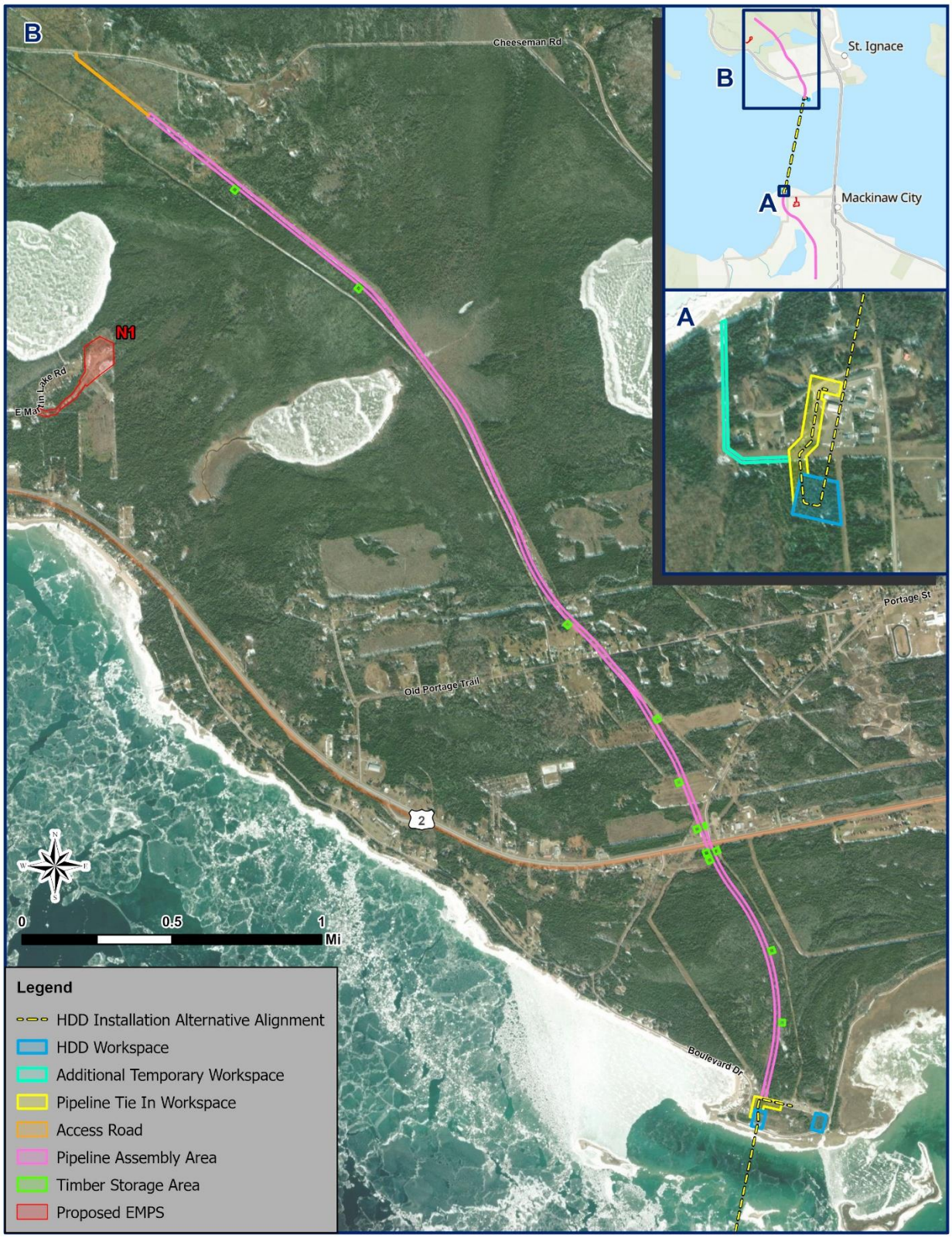


Figure ES-5. HDD Installation Sub-Alternative 2 Pipeline Assembly Area North

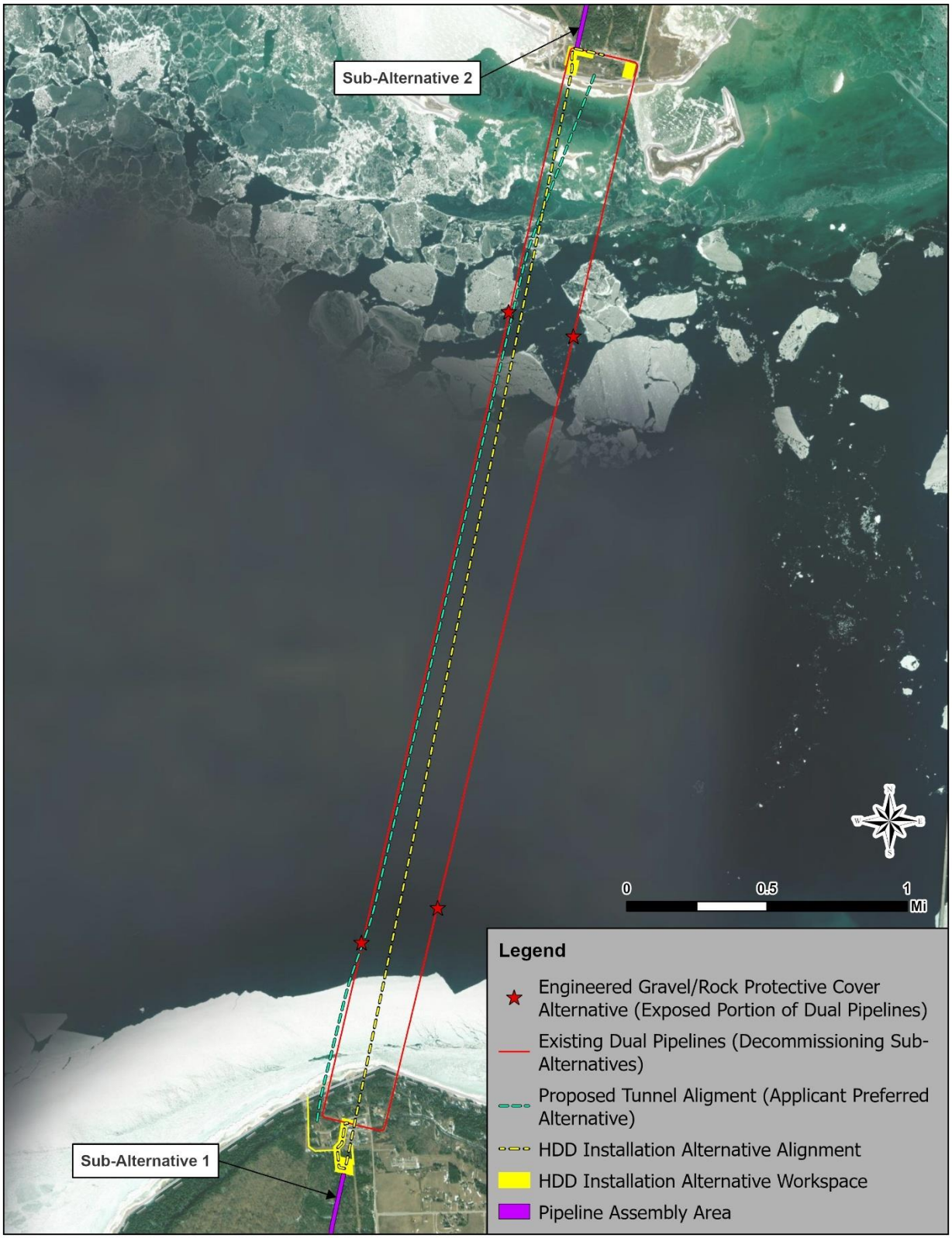


Figure ES-6. HDD Installation Alternative Alignment Underneath the Straits

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The Affected Environment (EIS Chapter 3) provides the context to understand the Environmental Consequences (EIS Chapter 4) of the Project alternatives and sub-alternatives. Where possible, USACE has incorporated consideration of Indigenous Knowledge and Traditional Ecological Knowledge into resource descriptions and evaluation of consequences. Table ES-1 summarizes the resources and consequences discussed in the EIS. Consequences are characterized using the terminology provided in the inset at the right and using the *Legend* that follows Table ES-1.

Terminology	
Effects	**Definition**
Direct	Caused by the Project at the same time and place.
Indirect	Caused by Project but occurring later in time or farther removed in distance.
Cumulative	The incremental impact of a Project when added to the effects of other past, present, and reasonably foreseeable future actions (see Appendix H of the EIS).
Temporary or Short-Term	Impacts generally occurring during construction that resolve upon construction completion.
Long-Term	Permanent, long-term impacts that do not resolve after construction.
Beneficial	A positive change in resource conditions when compared to the No Action Alternative.
Detrimental	A negative change in resource conditions when compared to the No Action Alternative.

The EIS also considers the context of potential impacts, such as the likelihood of the impact (unlikely, possible, or probable) and the geographic scope of the effect or size of the population affected (e.g., localized or regional). In addition, magnitude or intensity are considered, which is measured in terms of change or degree of change in a resource condition (e.g., acres of impact, number of units of change, differences in levels of use compared to existing conditions, etc.). Appendix G of the EIS includes calculations related to determinations of magnitude or degree of impact. As applicable, the impact discussions also summarize USACE review compliance under 33 C.F.R. Part 320 as it relates to the DA authorization.

Table ES-1. High-Level Summary of Impacts by Alternative

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
Land Use and Recreation				
		Land Ownership and Land Use		
No impact	No change in land ownership would occur within the expected construction footprints. Change of land ownership may occur at EMPS/off-site laydown areas as the Applicant may purchase land within the sites or acquire temporary and/or permanent easements. Additionally, a small piece of land owned by Cloverland Electric Cooperative would also be required within the proposed construction footprint (the required temporary easement has already been acquired). Work on Straits bottomlands (installation of water intake structure) and the proposed Tunnel easement would require authorization from the State of Michigan. Long-term/permanent, detrimental impacts associated with a change from undeveloped forest land to developed industrial land, and from permanent alteration of geology along the proposed Tunnel alignment, shaft, and portal (approximately 665,000 CYs total).	Authorization from the State of Michigan would be required for installation of a cover on State-managed Straits bottomlands. Permanent, detrimental impacts to Straits bottomlands/lakebed due to a change from a natural to an armored state.	No change in land ownership would occur within the expected construction footprints. Change of land ownership may occur at the EMPSs. The Applicant may purchase land within the sites or acquire temporary and/or permanent easements. To utilize land within the pipeline assembly area/associated timber storage areas (and HDD workspace south of the Straits), coordination may be required for land managed by MDNR, Emmet County, the Little Traverse Conservancy, and the State of Michigan. Work on Straits bottomlands (installation of water intake structures) and the replacement pipeline easement would require authorization from the State of Michigan. Short- and long-term detrimental impacts to land use due to changes from undeveloped to developed land for the duration of construction, with continued maintenance of a 50-foot-wide ROW (approximately 0.69 acre) within Headlands International Dark Sky Park post-construction (ROW would be revegetated but	No change in land ownership would occur within the expected construction footprints. Change of land ownership may occur at the EMPSs. The Applicant may purchase land within the sites or acquire temporary and/or permanent easements. To utilize land within the pipeline assembly area/associated timber storage areas (and HDD workspace south of the Straits), coordination may be required for land managed by the U.S. Forest Service, Emmet County, the Little Traverse Conservancy, and the State of Michigan. Work on Straits bottomlands (installation of water intake structures) and the replacement pipeline easement would require authorization from the State of Michigan. Short- and long-term detrimental impacts to land use due to changes from undeveloped to developed land for the duration of construction, with continued maintenance of a 50-foot-wide ROW (approximately 0.69 acre) within Headlands International Dark Sky Park post-construction

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	**Sub-Alternative 2: Pipeline Assembly Area North**
			trees would not be permitted to reestablish). Impacts would be mitigated by revegetation post-construction. Areas requiring forest removal (approximately 32.1 acres) would experience long-term land use change from forested to open meadow due to the slow regeneration rate of trees. Permanent alterations to geology would occur due to removal of approximately 6,000 CYs of rock.	(ROW would be revegetated but trees would not be permitted to reestablish). Impacts would be mitigated by revegetation post-construction. Areas requiring forest removal (approximately 11.4 acres) would experience long-term land use change from forested to open meadow due to the slow regeneration rate of trees. Highway 2 Corridor/View Preservation by Moran Township would experience a short-term, detrimental impact due to construction noise/visual effects, including the presence of cranes. Permanent alterations to geology would occur due to removal of approximately 6,000 CYs of rock.
Recreation – Land Based				
Current maintenance and surveillance practices would result in occasional ground disturbing activities, resulting in short-term, detrimental impacts to land-based recreation occurring nearby.	Short-term, detrimental impacts to nearby recreationists due to noise and aesthetic effects of construction. Impacts would depend on the type of recreation and tolerance of the individual and would end when construction is complete. Impacts associated with blasting would occur during initial shaft excavation only. Headlands International Dark Sky Park, McGulpin Point Lighthouse, Mackinaw Area Historic Society Heritage Village,	Short-term, detrimental impacts to nearby recreationists due to noise and aesthetic effects of construction. Impacts would depend on the type of recreation and tolerance of the individual and would end when construction is complete. McGulpin Lighthouse, Colonial Michilimackinac Historic State Park, and the Straits of Mackinac may experience detrimental impacts from construction noise and aesthetic changes. Impacts	Short- and long-term, detrimental impacts to nearby recreators due to noise and aesthetic effects of construction (such impacts would end when construction is complete) and the continued maintenance of a long-term ROW within Headlands International Dark Sky Park during operations. Impacts would depend on the type of recreation and tolerance of the individual. Headlands International Dark Sky Park, French Farm Lake	Short- and long-term, detrimental impacts to recreation activities would be similar to those described for Sub-Alt 1, although extent and location of impacts along the pipeline assembly area would differ, as it would be sited north of the Straits. Headlands International Dark Sky Park, McGulpin Point Lighthouse, Mackinaw Area Historic Society Heritage Village, Hiawatha National

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
	Colonial Michilimackinac Historic State Park, and the Straits of Mackinac may experience detrimental impacts from construction noise/aesthetic effects. Impacts would end when construction is complete. During construction, there would be detrimental impacts to the Headlands International Dark Sky Park due to lighting increases. Impacts would end when construction is complete. During operations, there would be no impacts to night sky tourism.	would end when construction is complete. No operations impacts expected. Vessels would be lit for navigational purposes during nighttime construction; however, lighting would not extend to the park. There would be no impacts to the Headlands International Dark Sky Park.	Flooding State Wildlife Management Area, McGulpin Point Lighthouse, Mackinaw Area Historic Society Heritage Village, Colonial Michilimackinac Historic State Park, and the Straits of Mackinac would experience short-term, detrimental impacts. The Applicant would maintain a ROW within Headlands International Dark Sky Park post-construction, resulting in long-term impacts during project operations. Recreation activities relating to viewing of the night sky would experience localized, short-term, detrimental impacts due to construction lighting directly within the Headlands International Dark Sky Park. During operations, there would be no impacts to night sky tourism.	Forest, and the Straits of Mackinac would experience short-term, detrimental impacts. The Applicant would maintain a ROW within Headlands International Dark Sky Park post-construction, resulting in long-term impacts during project operations. Recreation activities relating to viewing of the night sky would experience localized, short-term, detrimental impacts due to construction lighting directly within the Headlands International Dark Sky Park. During operations, there would be no impacts to night sky tourism.
Recreation – Water Based				
No impacts.	Short-term, detrimental impacts to recreationists near the shoreline (including along the Straits Area Blueway Water Trail) or water intake structure/pipe primarily due to aesthetic effects, although access to the area where the intake structure/pipe would be installed would be limited for the duration of	Short-term, detrimental impacts as recreational vessels would have to avoid the paths and anchored locations of construction vessels during construction. Recreationists may experience aesthetic impacts that could change recreational experience. Similar to aesthetics, the degree of short-term detrimental impact	Short-term, detrimental impacts to recreators near the shoreline (including along the Straits Area Blueway Water Trail) or water intake structures primarily due to aesthetic effects, although access to the areas where the water intake structures would be installed would be limited. Long-term, beneficial impact as a	Short-term, detrimental impacts during construction would be similar to those described for Sub-Alt 1. Recreation access to Freschette and Martin Lakes within Hiawatha National Forest may be impacted by activities within the pipeline assembly area. Long-term, beneficial impact as a result of operations,

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
	construction and impacts would end when construction is complete. Long-term, beneficial impact as a result of Project operations, as temporary and localized impacts to navigation due to recreational vessels needing to navigate around maintenance vessels and associated safety zones in the Straits would be reduced. The existing RNA would stay in place with no modifications due to the presence of other lakebed utilities.	would depend on the tolerance of the individual. Construction-related impacts would end when construction is complete. Long-term, intermittent, detrimental impacts when repairs to the cover are required. The degree of impact would depend on the tolerance of the individual. Monitoring and maintenance of the cover/pipelines would be similar to current operations. The existing RNA would remain in place with no modifications.	result of operations, as temporary and localized impacts to navigation due to recreational vessels needing to navigate around maintenance vessels and associated safety zones in the Straits would be reduced. The existing RNA would stay in place with no modifications due to the presence of other lakebed utilities.	as temporary and localized impacts to navigation due to recreational vessels needing to navigate around maintenance vessels and associated safety zones in the Straits would be reduced. The existing RNA would stay in place with no modifications due to the presence of other lakebed utilities.
Aesthetics				
Temporary changes to aesthetics could occur as a result of maintenance activities requiring minor ground disturbance, resulting in detrimental, short-term impacts.	Short-term, detrimental impacts to local visual resources could result during construction from the presence and use of construction equipment and staging and laydown areas. Cranes (up to 434 feet tall) extending above the tree line would be visible, especially in open areas not screened by trees or structures. The crane would appear smaller and less dominant in the viewscape with increasing distance. The degree of impact to the viewscape during construction would depend on individual location and perception.	Short-term, detrimental impacts during construction could result from the presence and use of construction equipment and barges, which would be visible in open areas not screened by trees. Compared to other action alternatives analyzed, less visual resources would be impacted by activities under this alternative due to the lower vertical profile of equipment. There would be no impacts during operations. Short-term, detrimental impacts to the soundscape would be localized and would be substantially lower than those identified under the Applicant's Preferred Alternative. Impacts to	Short-term, detrimental impacts associated with construction lighting, traffic increases, vegetation clearing (estimated at 52.5 acres), and use of temporary facilities and construction equipment (including cranes up to 100 feet tall). Tree clearing (estimated at 32.1 acres) would result in long-term detrimental impacts. Detrimental impacts to the localized soundscape would be probable for the duration of construction. Compared to the Applicant's Preferred Alternative, duration of impacts would be less though extent would be greater	Impacts would be similar to those described for Sub-Alt 1, although the pipeline assembly area would intersect residential areas and businesses along Old Portage Trail and US-2, which may result in more acute aesthetic impacts for people living and working in these areas. Vegetation clearing under this sub-alternative is estimated at 51.2 acres (of that, 11.4 acres of tree clearing). Detrimental impacts to the localized soundscape would be probable for the duration of construction. Compared to the Applicant's Preferred Alternative, duration of impacts

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
	Long-term, detrimental impacts to visual resources during operations from the establishment of permanent facilities, which could be visible from some shorelines. The degree of impact to the viewscape during operations would depend on individual location and perception, however, would overall be less during operations as permanent structures would be comparable heights to existing structures and vegetation. Tree clearing during construction would also result in long-term, detrimental impacts. Detrimental impacts to the localized soundscape would be probable for the duration of construction, ending following construction. The degree of impact to the soundscape would depend on individual perception.	residential properties near the south shoreline would be possible but temporary due to intermittent exceedances of 55 dBA (nighttime noise threshold). The degree of impact to the viewscape and soundscape would depend on individual perception.	due to the length of the pipeline assembly area.	would be less though extent would be greater due to the length of the pipeline assembly area.
Water Resources				
Groundwater				
No Impact	Detrimental impacts would occur for the duration of shaft/portal construction (6/8 months, respectively) and during TBM operations. Maximum drawdown during shaft/portal construction north of the Straits would be 2 feet within a 360-foot radius. While maximum drawdown	No Impact	Impacts related to groundwater drawdown would not be expected. Inadvertent drilling fluid losses could lead to drilling fluid traveling through factures in bedrock and interacting with groundwater. Drilling fluids would consist primarily of water and bentonite, an environmentally	Impacts related to groundwater drawdown would not be expected. Impacts to groundwater contamination would be similar to those described for Sub-Alt 1.

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
	during shaft/portal construction south of the Straits would be 2 feet within a 126-foot radius. Aquifer testing along the Tunnel alignment indicated that the aquifer would recover within a few days of TBM operations in a given location. Potential for detrimental impacts to groundwater quality, due to a potential release of drilling fluids during HDD/TBM use, a potential release of contaminants associated with onshore material storage, and use of heavy equipment/vehicles. The associated impacts would end following construction. The construction contractor would adhere to the Spill Plan, and monitoring of onsite and nearby wells would be conducted during construction and for 2 years after.		benign material. If drilling fluid additives were to be required, those additives that have been approved by the State of Michigan for use in drilling potable water wells would be used. See the EIS for planned mitigation measures. Release of drilling fluids during shallower HDD associated with the water intake structures/pipes and potential release of contaminants associated with onshore material storage and use of heavy equipment/vehicles. The construction contractor would adhere to the Spill Plan and monitoring of onsite and nearby wells would be conducted during construction and for 2 years after.	
Surface Water				
Continued maintenance activities could require occasional, temporary ground disturbance activities onshore, resulting in detrimental impacts associated with erosion and sedimentation.	Detrimental impacts associated with disturbance in the Straits of approximately 800 sf during installation of water intake structure/pipe. Approximately 20,000 gallons of drilling fluid (water and bentonite) would be released, and would be minimized to the extent practicable by stopping forward	Permanent disturbance would occur along the Straits lakebed from placement of gravel/rock. This would result in detrimental impact to approximately 38 acres of lake bottom, converting natural habitat from pebbles, sands, and silts to armored gravel/rock. Potential for detrimental impacts associated with release of	Detrimental impact associated with disturbance in Straits of approximately 1,600 sf during installation of water intake structures/pipes (one near south shore, one near north shore). Potential for detrimental impacts to surface water quality in and adjacent to construction footprints during construction,	Disturbance in Straits would be the same as Sub-Alt 1. Under Sub-Alt 2, Stream 01 and the Moran River would be crossed with clear span bridges (no disturbance to waterbody bed/banks). Impacts to surface water quality would be similar to those described for Sub-Alt 1 and the

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
	operation the moment the pipe emerges above the lakebed. Both features would be removed post-construction. During structure/pipe installation, effects of turbidity and sedimentation would be limited to the work area (contained by turbidity curtains). In-water work would last approximately 1 week. Approximately 31.4 acres total ground disturbance would occur within proposed construction footprints, which could result in detrimental impacts to surface waters adjacent to construction footprints due to erosion and sedimentation. Adherence to the SESC plan and required permits (including NPDES) would mitigate this. Long-term increases in stormwater associated with impervious surface increase would be managed by the permanent stormwater system. During construction, there would be potential for detrimental impacts associated with unintended release of contaminants, such as equipment fuel (see EIS for mitigation measures).	contaminants due to vessel fueling and use of material storage barges (see EIS for mitigation measures). Impact would occur during construction only.	ending following construction. Release of approximately 40,000 gallons of drilling fluids into the Straits during HDD (for installation of two water intake structures/pipes) which would be minimized to the extent practicable by stopping forward operation the moment the pipe emerges above the lakebed. It is considered highly unlikely that drilling fluids associated with the HDD excavation of the borehole below the lakebed (for the replacement pipeline) would reach Straits surface waters in an inadvertent return event, due to the depth of the anticipated borehole alignment (approximately 150 feet deep at its shallowest points and over 400 feet deep along the majority of the alignment). Impacts and impact minimization measures (associated with water intake structure installation and potential release of contaminants from onshore construction footprints) would be similar to as described for the Applicant's Preferred Alternative. HDD/pipeline tie-in/additional temporary workspaces (where the majority of ground disturbing activities would occur) total 9.4 acres in size. The Applicant has	Applicant's Preferred Alternative. Ground disturbance would be similar to Sub-Alt 1, although the pipeline assembly area under Sub-Alt 2 would cross two waterbodies that may be susceptible to erosion and/or stormwater runoff occurring nearby (waterbodies would be crossed by clear span bridges to avoid impacts to the waterbody bed/banks).

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	**Sub-Alternative 2: Pipeline Assembly Area North**
			indicated that ground disturbance within these workspaces would be limited to excavation associated with pipeline tie-in, placement of a temporary building on both sides of the Straits, and HDD entry/exit points (which would be located inside the temporary building). Isolated areas of grading may also be required within pipeline assembly area (no surface waters have been identified in the pipeline assembly area alignment for Sub-Alt 1).	
Wetlands				
Continued maintenance activities could require occasional, temporary ground disturbance activities onshore, resulting in detrimental impacts associated with erosion and sedimentation.	Detrimental impact to wetlands due to permanent wetland losses (1.53 acres within North Side construction footprint and 2.79 acres at EMPS/off-site laydown areas). detrimental impact due to fragmentation of wetland systems, and/or if loss of hydrology results in unanticipated additional permanent wetland losses. Erosion and sedimentation impacts to wetlands outside the construction footprint would be mitigated by implementing the SESC plan and complying with permits (including NPDES). See EIS for mitigation measures related to the risk of	No Impact	Detrimental impact associated with temporary wetland disturbance (including from ground disturbance and due to placement of matting) estimated to be approximately 11.07 acres; of that, approximately 0.29 acre of ground disturbance within wetlands. Wetlands would be restored post-construction. Potential for detrimental impacts to wetland quality in and adjacent to construction footprints during construction. Erosion and sedimentation impacts to wetlands outside the construction footprint would be mitigated by implementing the SESC plan and	Detrimental impact associated with temporary wetland disturbance (including from ground disturbance and due to placement of matting) estimated to be approximately 16.17 acres; of that, approximately 0.29 acre of ground disturbance within wetlands. Wetlands would be restored post-construction. Impacts to wetland quality would be similar to those described for Sub-Alt 1.

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
	contaminant exposure during construction.		complying with permits (including NPDES). See EIS for mitigation measures related to the risk of contaminant exposure during construction.	
Biological Resources				
Terrestrial Habitat				
Maintenance activities would continue to require occasional, temporary ground disturbance, resulting in detrimental impacts to natural communities and habitat within the Dual Pipelines ROW.	Short- and long-term, detrimental impacts to existing local natural communities would occur due to vegetation removal. Construction of new facilities and infrastructure would require ground disturbance and removal of up to 19 acres of existing vegetation, of which approximately 5.2 acres are forested. Potential for detrimental impacts to wildlife due to noise caused by HDD/TBM and associated blasting activities during site preparation, as well as from the use of construction equipment and presence of workers for the duration of construction. Wildlife may temporarily relocate, or experience changes in behavior during construction. Impacts would end following completion of the respective construction phases.	No Impact	Short- and long-term, detrimental impacts to existing local natural communities would occur due to vegetation removal. All disturbed areas would be replanted post-construction, but impacts to forested areas would be long-term, due to the slow regeneration rate of trees. While ground disturbance would not be expected within all footprints, vegetation clearing is estimated at 52.5 acres, with 32.1 acres of tree clearing. Potential for detrimental impacts to wildlife due to noise, loss of habitat, and presence of workers/equipment for the duration of construction.	Short- and long-term, detrimental impacts to existing local natural communities would occur due to vegetation removal. All disturbed areas would be replanted post-construction, but impacts to forested areas would be long-term, due to the slow regeneration rate of trees. While ground disturbance would not be expected within all footprints, vegetation clearing is estimated at 51.2 acres, with 11.4 acres of tree clearing. Potential for detrimental impacts to wildlife due to noise, loss of habitat, and presence of workers/equipment for the duration of construction.

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
Aquatic Habitat				
No Impact	Construction could result in vibrations along portions of the lakebed during construction activities. Potential for detrimental impacts to aquatic organisms due to noise and vibration caused by HDD/TBM and associated blasting activities during site preparation, as well as from the use of construction equipment and presence of workers for the duration of construction. Aquatic organisms may temporarily relocate, or experience changes in behavior during construction. Impacts would end following completion of the respective construction phases. Detrimental impacts to aquatic habitat associated with approximately 800 sf of disturbance to Straits sediments during installation of water intake structure/pipe. Detrimental impacts associated with turbidity and sedimentation would be localized to HDD work area (contained by turbidity curtains), ending following HDD installation (in-water work to take approximately 1 week).	Construction would require placement of rocks and gravel along approximately 38 acres of the lakebed. Addition of gravel/rock could result in detrimental impacts to aquatic organisms within the substrate; however, addition of gravel/rock could benefit certain species of fish that prefer rocky substrates. Potential for detrimental impacts to aquatic organisms resulting from underwater noise. Aquatic organisms may temporarily relocate or experience changes in behavior during construction. However, noise levels generated under this alternative would be lower and shorter duration than those resulting from implementation of the Applicant's Preferred Alternative. Temporary and detrimental impacts of extensive turbidity associated with placement of gravel/rock along the entire length of the Dual Pipelines exposed along the lakebed for the duration of construction, which would end following construction. Turbidity would be localized to the area of work at any given time.	The majority of the HDD Installation Alternative's main bore path would traverse the Straits at depths exceeding 400 feet below the lakebed, with a minimum depth below the lakebed of approximately 150 feet near the north shoreline. No vibrations are anticipated that would affect aquatic habitat. Vibrations from the smaller HDD for installation of water intake pipes could cause detrimental impacts to aquatic organisms. Construction of two water intake structures/pipes would result in disturbance to Straits sediments of approximately 1,600 sf. Temporary and detrimental impacts of turbidity localized to the area of HDD installations of water intake structures/pipes, ending following HDD installation. Turbidity curtains would be installed along both sides of the workspace, creating a uniform barrier. Potential for detrimental impacts to aquatic organisms during construction. Release of approximately 40,000 gallons of drilling fluids into the Straits during HDD installation of the water intake structures/pipes and	Impacts and impact minimization measures would be the same as described for Sub-Alt 1.

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
	Potential detrimental release of drilling fluids (approximately 20,000 gallons) into the Straits during HDD and potential release of contaminants associated with onshore material storage and use of heavy equipment/ vehicles.	Potential release of contaminants due to vessel fueling and use of material storage barges.	potential release of contaminants associated with onshore material storage and use of heavy equipment/ vehicles. The construction contractor would adhere to the Spill Plan. Discharges to Lake Michigan must be permitted by EGLE under its NPDES program.	
Protected Species				
No Impact	Long-term, detrimental impacts associated with the loss of approximately 7.7[1] acres of suitable summer habitat for northern long-eared bat and tricolored bat, including a total of 287 potential roost trees. The Applicant has committed to tree clearing outside the pup season (June/July). Approximately 7.95 acres of habitat with known DLI and HG populations would be cleared. Coordination with USFWS and MDNR regarding plant mitigation is ongoing.	A search of USFWS IPaC did not identify federally-protected aquatic organisms in the vicinity of the Dual Pipelines. If the Applicant were to pursue this alternative, further study and/or coordination with USFWS may be required.	Potential for detrimental impacts to protected species due to vegetation clearing, noise, and habitat loss during construction. Additional surveys may be required to further quantify impacts to protected species and Section 7 (of the ESA) consultation with the USFWS may be required, if the HDD Installation Alternative were to be pursued by the Applicant.	Impacts would be similar to those described for Sub-Alt 1. Additionally, a band eagle nest has been identified within the pipeline assembly area alignment associated with this sub-alternative. See the EIS for additional information on measures to minimize impacts to this nest. The Applicant would be responsible for complying with the Bald and Golden Eagle Protection Act.
Cultural Resources				
Ground disturbance during maintenance activities could affect archaeological resources, depending on the location of the disturbance.	Construction and operation would result in adverse effects to NRHP-eligible archaeological sites, an archaeological district, and a TCL. Activities such as site grading, excavation, fill, and use of construction equipment for the duration of construction activities would remove or destroy	Construction could affect resources of cultural importance to Tribal Nations. Impacts to these resources, including aquatic organisms, could include temporary turbidity, noise, and disruption of fish spawning. Placement of the rock cover could result in detrimental impacts to	Construction would likely cause adverse effects to NRHP-eligible terrestrial archaeological sites, an archaeological district, a TCL, and potentially nearby architectural resources. Activities such as site grading, excavation, fill, and the use of construction equipment for the duration of	Impacts would be similar to those described for Sub-Alt 1.

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
	archaeological resources within the construction footprints. Noise generated during construction may affect nearby architectural resources. USACE consulted with Consulting Parties to prepare detailed documentation on identification and evaluation of impacts to historic properties under Section 106 separately from the EIS. Its findings will be incorporated in the ROD.	aquatic organisms within the substrate; however, the rock cover could increase availability of suitable spawning habitat for some species that prefer rocky substrates, thereby constituting a long-term beneficial impact to fish. The presence of construction equipment (e.g., barges and cranes) within the Straits could also produce noise and visual intrusion that might temporarily lessen the attractiveness of lands and waters in the vicinity for the exercise of ceremonial practices and other Tribal traditional cultural activities associated with the TCL.	construction activities would remove or destroy archaeological resources within the construction footprints. Noise generated during construction may affect nearby architectural resources. Within the pipeline assembly area and associated timber storage areas, potential disturbance to archaeological and natural cultural resources may occur due to the flush-cutting of trees and the placement/removal of matting. Because field surveys have not been conducted and detailed plans have not been developed, the number of resources that may be affected is not known. If the Applicant were to pursue the HDD Installation Alternative, site-specific surveys may be required, and identification of architectural resources, archaeological sites and other cultural resources could result in development of site-specific avoidance, minimization, and mitigation measures through Section 106 consultation.	
Treaty Rights				
To Be Determined in the Record of Decision				

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
Geology				
No Impact	Approximately 532,000 BCYs (665,000 CYs) of rock would be excavated and permanently removed. While no known karst features are mapped within the area of analysis, the potential for development of karst conditions can lead to challenges with ensuring excavation stability. Vibrations given off by the TBM during excavation activities have the potential to cause shifts in the geology, specifically in areas surrounding the installed precast concrete tunnel lining (see EIS for planned mitigation measures).	Approximately 47,600 metric tons of 1- to 5-inch gravel/rock aggregate from existing nearby quarries would be required. These quarries include existing marine loading dock facilities that would continue to be in use regardless of the alternatives.	An estimated 6,000 CYs of excavated bedrock would be excavated and hauled off-site to designated EMPSs. While no known karst features are mapped within the area of analysis,, there is potential for karst features to develop and be encountered, which can lead to challenges with ensuring excavation stability. Vibrations from drilling could cause shifts in the geology around the alignment horizon. Inadvertent drilling fluid losses could lead to drilling fluid traveling through factures in bedrock and interacting with groundwater. There is a higher risk of inadvertent returns near HDD entry/exit points where there is less rock/overburden cover, as well as in poor quality or porous bedrock such as limestone, or in the presence of karst conditions (see EIS for planned mitigation measures).	Potential impacts would be the same as those described for Sub-Alt 1, as the alignment and HDD process would be the same under both HDD Installation sub-alternatives.
Soil Resources				
Continued maintenance activities would be expected to result in occasional, temporary ground disturbances within the	Approximately 31.4 acres of ground disturbance within proposed construction footprints. Impacts to soils in these locations would occur in previously disturbed areas where	Disturbance to Straits sediments would occur within a 72-foot-wide corridor along each Dual Pipeline alignment. Permanent placement of rock within the Straits would occur over a total of 38 acres.	HDD/pipeline tie-in/additional temporary workspaces (where the majority of ground disturbing activities would occur) total 9.4 acres in size. The Applicant has indicated that ground disturbance	HDD/pipeline tie-in/additional temporary workspaces (where the majority of ground disturbing activities would occur) total 9.4 acres in size. The Applicant has indicated that ground

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
existing Dual Pipelines ROW.	natural soil horizons are less likely to occur. Adherence to the SESC plan and required permits (including NPDES) would limit erosion and sedimentation. Potential ground disturbance at EMPS/off-site laydown areas would vary – minor grading may be required in some areas. Soil quality within construction footprints could be affected by contaminants – see EIS for mitigation measures related to spills. Potential disturbance to Straits sediments would be limited to the location of the proposed water intake structure/pipe (approximately 800 sf). Turbidity would be limited to the work area (isolated by turbidity curtains). Once removed, accumulated sediments would disperse rapidly with Straits currents (see EIS for supporting studies).	Accretion of Straits sediments would occur during gravel/rock placement; impacts would not be long-term, as sediments would be expected to rapidly disperse with Straits currents (see EIS for supporting studies). Lakebed sediments could be affected by spills/leaks from construction equipment and material storage barges (see EIS for mitigation measures).	within these workspaces would be limited to excavation associated with pipeline tie-in, placement of a temporary building on both sides of the Straits, and HDD entry/exit points (which would be located inside the temporary building). Ground disturbance at EMPS/pipeline assembly area would only be required in localized upland areas where existing topographical variations are more severe, in order to create a level working surface, and at the road crossings for Headlands Road and Trails End Road. Disturbance to Straits sediments would be limited to the location of the proposed water intake structures/pipes (approximately 1,600 sf total). Erosion impacts would vary and would be mitigated by implementing the approved SESC plan, complying with issued permits, and following industry standard BMPs. Slight accretion of Straits sediments would occur during installation of the water intake structures/pipes; Impacts would not be long-term. Impacts to soil quality would vary and could result from ground disturbing activities and	disturbance within these workspaces would be limited to excavation associated with pipeline tie-in, placement of a temporary building on both sides of the Straits, and HDD entry/exit points (which would be located inside the temporary building). Ground disturbance at EMPS/pipeline assembly area would only be required in localized upland areas where existing topographical variations are more severe, in order to create a level working surface, and at the road crossing for US-2. Disturbance to Straits sediments would be limited to the location of the proposed water intake structures/pipes (approximately 1,600 sf total). Impacts to erosion and soil quality would be similar to those described for Sub-Alt 1, although location of impacts associated with pipeline assembly area activities/timber storage would differ.

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
			spills/leaks from construction equipment	
Transportation and Navigation				
Transportation				
No Impact	Detrimental effects to surface transportation are probable. Up to 162 (South Side) and 120 (North Side) daily truck roundtrips and up to 200 (South Side) and 155 (North Side) worker vehicle roundtrips would increase traffic safety risks, delays, and rate of surface deterioration on public roadways; however, road capacities would not be exceeded. Additionally, existing left-turn delays and safety risks for roads intersecting US-2 along haul route and congestion at I-75 toll could be exacerbated. These impacts would be most pronounced during the peak recreational seasons and holidays. These impacts would occur throughout construction period (approximately 2.5 years south of Straits and 6 months north of Straits for trucks transporting excavated materials; and 6 years for other miscellaneous trucks) and end following construction.	Detrimental effects to surface transportation from trucks are unlikely as trucks associated with the transport of equipment would be limited to the beginning and end of the construction phase (one construction season). Up to 50 workers would result in short-term, detrimental effects due to increase in traffic safety risks on public roadways; however, magnitude and extent would be substantially lower than under the Applicant's Preferred Alternative due to a shorter construction period (one construction season) and lower number of construction workers.	Detrimental effects are probable and would be similar to or less detrimental than the Applicant's Preferred Alternative, and occurring over a shorter duration (approximately 1.5 years for transport of excavated materials and 2.5 years for miscellaneous trucks) and having a greater extent south of the Straits. Approximately 75 (south of Straits) and 25 (north of Straits) daily truck roundtrips would increase traffic safety risks, delays, and rate of road surface deterioration on public roadways. Approximately 125 (south of Straits) and 100 (north of Straits) workers would increase traffic safety risks and degrade LOS on public roadways, especially during the peak a.m. and p.m. commuting hours and peak recreational seasons and holidays. Temporary, detrimental effects are possible from traffic disruption from full road closure (approximately 1 week) at Wilderness Park Drive aerial	Detrimental effects are probable and would be similar to or less detrimental than the Applicant's Preferred Alternative, and occurring over a shorter timeframe (approximately 1.5 years for transport of excavated materials and 2.5 years for miscellaneous trucks) and having a greater extent north of the Straits. Approximately 25 (south of Straits) and 75 (north of Straits) daily truck roundtrips would increase traffic safety risks, delays, and rate of road surface deterioration on public roadways. Approximately 100 (south of Straits) and 125 (north of Straits) workers would increase traffic safety risks and degrade LOS on public roadways, especially during the peak a.m. and p.m. commuting hours and peak recreational seasons and holidays. Temporary, detrimental effects are possible from traffic disruption from full road closure at Old Portage Trail aerial

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	**Sub-Alternative 2: Pipeline Assembly Area North**
			crossing during initial setup. It is anticipated that Headlands Road and Trails End Road would remain open to traffic while pipe crossings are installed via trench and bridge method.	crossing during initial setup; underground pipeline crossing at US-2 could result in limited traffic delays due to reduced speed, but no closure would be expected.
Navigation				
Long-term, detrimental effects would remain due to the risk of an anchor strike to the existing Dual Pipelines. The continued presence of the pipelines would remain a reason for the navigational restrictions in the RNA (although the RNA also exists to protect other utilities located in the Straits); however, the Applicant's measures, including implementation of the ESMOC, to address potential anchor strikes would continue to minimize risks. Intermittent occurrences of temporary obstructions to navigation would continue to occur during pipeline maintenance and inspection activities.	Detrimental effects on navigation from construction, use, and removal of temporary water intake structure unlikely, as obstruction to navigation would be limited to the area adjacent to the shoreline, away from the main navigation channel. Detrimental effects on navigation from excavation or operation of Tunnel unlikely as Tunnel failure would not be considered a reasonably foreseeable event. Construction activities would not pose a credible risk to existing Dual Pipelines and, therefore, potential impacts from an oil spill due to construction activities are not analyzed in the EIS. Dual Pipelines would be decommissioned either in-place or removed. There would be a long-term, beneficial impact as a result of Project operations, as temporary and localized impacts to navigation due to the need to navigate around maintenance vessels and associated safety	Temporary, detrimental effects probable due to a work area of approximately 230 acres within the Straits (including 1,500-foot work safety zone buffers), resulting in a temporary obstruction to navigation and reduction of navigation over one construction season. Additional marine traffic (500 total barge roundtrips) would temporarily increase risk of vessel collisions on the Straits. The activity of placing rock on top of the existing Dual Pipelines could increase the potential for an oil spill compared to the No Action Alternative; however, risk of pipeline damage is considered unlikely. Under a worst-case scenario of a spill , detrimental effects on navigation would occur due to cleanup activities, including marine traffic disruption and delays and possible closures on the channel. After construction, the cover would reduce the risk of a vessel anchor strike to the	Detrimental effects on navigation from construction, use, and removal of two water intake structures/pipes unlikely as obstruction to navigation would be limited to area adjacent to the shorelines, away from the main navigation channel. Detrimental effect on navigation from borehole excavation underneath the Straits considered unlikely due to depth of alignment. Construction activities would not pose a credible risk to existing Dual Pipelines and, therefore, potential impacts to navigation from an oil spill due to construction activities are not analyzed in the EIS. Dual Pipelines would be decommissioned either in-place or removed. There would be a long-term, beneficial impact as a result of operations, as temporary and localized impacts to navigation due to the need to navigate around maintenance vessels and associated safety	Impacts would be similar to those described for Sub-Alt 1. RNA would remain in place due to the presence of other utilities in the Straits.

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
	zones in the Straits would be reduced. Due to the presence of other utilities in the Straits, the RNA would remain in place with no modifications.	pipelines, thereby decreasing the risk of an oil spill, compared to baseline conditions. Detrimental effect from reduced effective water depth over the cover would be unlikely, as clearance would be maintained to prevent vessel grounding. Long-term, detrimental effect from intermittent occurrences of obstruction to navigation associated with maintenance and inspection activities would remain.	zones in the Straits would be reduced. Due to the presence of other utilities in the Straits, the RNA would remain in place with no modifications.	
Air Quality				
No Impact	Construction equipment, generator sets, employee commuting, deliveries, and excavated materials create short-term, detrimental impacts to local air emissions for the duration of construction, ending following construction. Grading, site preparation, and motor vehicle movement would cause PM_{10} and $PM_{2.5}$ emissions. Blasting would not generate emissions beyond the construction footprint. There would be short-term local detrimental impacts to HAPs as a result of gasoline or diesel equipment and vehicles. Impacts would mainly be limited to the Project site and immediate surrounding areas, and would not extend beyond the AQCR	Construction activities would result in short-term, detrimental impacts to local air quality. Emissions would result from construction barges, other construction vessels, and employee commuting. Emissions as a result of the Gravel/Rock Protective Cover Alternative would be comparatively lower than the HDD Installation Alternative than the Applicant's Preferred Alternative. Impacts would mainly be limited to the work area and immediate surrounding areas, and would not extend beyond the AQCR boundary.	Construction equipment, generator sets, employee commuting, tree clearing equipment, and deliveries would cause short-term, detrimental impacts to local air quality. Impacts would not extend beyond the AQCR boundary. Emissions as a result of the HDD Installation Alternative would be comparatively lower than the Applicant's Preferred Alternative and comparatively higher than the Engineered Gravel/Rock Protective Cover Alternative.	Impacts would be similar to those described for Sub-Alt 1.

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
	boundary. Emissions as a result of the Applicant's Preferred Alternative would be comparatively higher than the Gravel/Rock Protective Cover and HDD Installation Alternatives.			
Noise and Vibration				
Noise				
No Impact	Local detrimental effects from general construction noise probable over duration of construction period. Modeled general construction noise levels at approximately 44 residences near the South Side construction footprint and for visitors at northern portion of Headlands International Dark Sky Park, McGulpin Point Lighthouse, and Straits shorelines (South Side and North Side) would exceed noise impact thresholds. Noise limits used by various industries and governmental organizations were considered when establishing thresholds - see Appendix G Attachment 1 and Section 4.12.3.1.1 of EIS for further discussion on noise thresholds. Use of HDD during construction of water intake and pipeline tie-in activities could temporarily exceed noise impact thresholds	Temporary, local detrimental effects possible during construction. Projected noise levels could exceed nighttime noise impact threshold (see Appendix G Attachment 1 and Section 4.12.3.1.1 of EIS for discussion of impact thresholds) at 13 residences at the south end of the existing Dual Pipelines but would be temporary, occurring over one construction season (5 to 6 months). Detrimental effects on recreational users on the Straits unlikely as impact threshold would not be exceeded. The degree of noise impact during construction would depend on the receptor's tolerance and location (indoors vs. outdoors). To minimize noise impact, construction activities that generate the most noise would be performed during the hours between 7 a.m. and 10 p.m.	**HDD/pipeline tie-in workspaces**. Short-term and local detrimental effects are probable during site preparation activities and installation of temporary facilities; impacts would be similar to those described for general construction under the Applicant's Preferred Alternative but over a shorter period (first 3 months). After completion of site preparation and HDD workspaces finalized, short-term and local detrimental effects are possible during drilling/pullback south of the Straits (17 months) as one residence and visitors at Headlands International Dark Sky Park could experience nighttime impact exceedances (see Appendix G Attachment 1 and Section 4.12.3.1.1 of EIS for discussion of impact thresholds).	**HDD/pipeline tie-in workspaces**. Impacts would be similar to those described for Sub-Alt 1, although pipeline pullback would occur north of the Straits rather than south of the Straits under Sub-Alt 2. **Water Intake Structure/Pipe Activities (in Straits).** Impacts would be the same as those described for Sub-Alt 1. **Pipeline assembly area (and timber storage).** Short-term and local detrimental effects are probable as the 55-dBA nighttime threshold could be exceeded at approximately 80 residences and two motels during overnight work over approximately 2 months. Outdoor recreational areas that would experience exceedances of impact thresholds include a campground and Straits shoreline (north).

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
	at Headlands International Dark Sky Park and Straits shorelines (South Side and North Side). During access road improvements for EMPSs S1 and N1, approximately 11 residences near S1 and three residences near N1 could experience temporary, intermittent exceedances over daytime noise impact thresholds. Detrimental noise effect from use of EMPSs during Tunnel construction would be unlikely as noise beyond EMPS site boundaries is expected to be indistinguishable from current levels. Temporary, localized detrimental effects from intermittent blasting would be probable. Approximately 45 and ten residences near the South Side and North Side, respectively, and visitors at the McGulpin Point Lighthouse and Headlands International Dark Sky Park could experience temporary noise disturbances but levels would be below established noise threshold for impulsive sounds. The degree of noise impact during construction would depend on the receptor's tolerance and location (indoors vs. outdoors). Implementation of	Proposed number of construction vehicles would be substantially lower than the Applicant's Preferred Alternative (no projected routine daily trucks expected); therefore, no detrimental traffic noise effects on roadways would occur. Temporary, local, detrimental effects possible for recreational users on Straits of Mackinac from material barge transport noise.	**Water Intake Structure/Pipe Activities (in Straits).** Short-term detrimental effects probable for visitors at portions of Headlands International Dark Sky Park and Straits shorelines (south and north) from use of HDD for construction of water intake structures/pipes. **Pipeline assembly area (and timber storage)**. Short-term and local detrimental effects are probable during pipeline pullback as the 55-dBA nighttime threshold could be exceeded at approximately 70 residences during overnight work over approximately 2 months. Outdoor recreational areas that would experience exceedances of impact thresholds include Headlands International Dark Sky Park, French Farm Lake Flooding State Wildlife Management Area, and Straits shoreline (south). **EMPS**. Increase in noise expected to occur at similar level to those estimated under Applicant's Preferred Alternative; therefore, detrimental noise effects unlikely. Short-term and local detrimental effects from construction traffic noise probable as projected	**EMPS**. Impacts would be similar to those described for Sub-Alt 1. Short-term and local detrimental effects from construction traffic noise probable along the same roads as discussed for Sub-Alt 1. Additionally, projected noise level would exceed impact threshold on Cheeseman Road and impact sensitive receptors located along this road. The degree of noise impact during construction would depend on the receptor's tolerance and location (indoors vs. outdoors). Implementation of noise control measures, such as community notification, noise barriers, project scheduling and equipment noise controls would be implemented to reduce impacts (see Section 4.12.7.3 of EIS for further details on mitigation for this alternative).

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
	noise control measures, such as community notification, noise barriers, project scheduling and equipment noise controls would be implemented to reduce impacts (see Section 4.12.7.1 of EIS for further details on mitigation for this alternative). Local detrimental effects probable over duration of construction from construction traffic noise as projected noise levels on Headlands Road, Boulevard Drive, Densmore Avenue, Martin Lake Road, and East Martin Lake Road would exceed the established traffic noise impact threshold. Potentially impacted receptors include McGulpin Point Lighthouse, a hotel, and residences. During operations, detrimental effects unlikely. Proposed ventilation fans at the South Side and North Side would be a new source of noise and contribute to local increases in noise levels but would be used intermittently during maintenance and testing. No exceedance of noise impact thresholds for residences or outdoor recreational areas would occur.		noise levels on Headlands Road, Densmore Avenue, Boulevard Drive, Martin Lake Road, and East Martin Lake Road would exceed impact thresholds and impact sensitive receptors (same as those noted under Applicant's Preferred Alternative) located along these roads. The degree of noise impact during construction would depend on the receptor's tolerance and location (indoors vs. outdoors). Implementation of noise control measures, such as community notification, noise barriers, project scheduling and equipment noise controls would be implemented to reduce impacts (see Section 4.12.7.3 of EIS for further details on mitigation for this alternative).	

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
Vibration				
No Impact	Detrimental effects unlikely. Projected continuous vibration levels from general construction, including HDD (used for water intake structure/pipe installation and pipeline tie-in) and access road improvements at EMPS S1 and N1, are not expected to exceed established impact thresholds associated with human disturbance or structural damage (see Section 4.12.3.1.2 of EIS for vibration impact thresholds). Detrimental effects unlikely from blasting as vibration levels are not expected to exceed established impact thresholds associated with human disturbance or structural damage. TBM-induced vibration levels are below established impact thresholds and no detrimental effects to human receptors or structures (including the Dual Pipelines and Mackinac Bridge) expected. Detrimental effects to aquatic organisms possible from TBM-induced vibration (see Section 4.5.3.1.3 of EIS). Detrimental effects from construction traffic unlikely as vibrations from trucks are not	No construction activities onshore; therefore, no detrimental construction vibration effects to land structures or human receptors would be expected. Detrimental vibration effects on Dual Pipelines during placement of gravel/rock considered unlikely as placement would be conducted in a controlled manner to prevent damage to pipeline coatings and, therefore, minimize impactful forces. Detrimental impact to aquatic organisms is possible (see Section 4.5.3.1.3 of EIS). Detrimental effects unlikely from construction traffic as proposed number of vehicles would be substantially lower than the Applicant's Preferred Alternative.	**HDD/pipeline tie-in workspaces.** HDD-induced vibration levels are below established impact thresholds and no detrimental effects to human receptors or structures (including the Dual Pipelines and Mackinac Bridge) would be expected from general construction or drilling under the Straits. **Water Intake Structure/Pipe Activities (in Straits).** Detrimental vibration effect unlikely to human receptors or structures (Dual Pipelines) from use of an HDD for construction of water intake structures. **Pipeline assembly area (and timber storage).** Detrimental vibration effect unlikely as no vibration sensitive receptors are located within 25 feet of workspace boundary. **EMPS.** Detrimental vibration effect unlikely as levels would not exceed impact thresholds. Similar to Applicant's Preferred Alternative, detrimental vibration effects from construction traffic unlikely as levels would not exceed impact thresholds.	**HDD/pipeline tie-in workspaces.** Impacts would be similar to those described for Sub-Alt 1, although pipeline pullback would occur north of the Straits rather than south of the Straits under Sub-Alt 2. **Water Intake Structure/Pipe Activities (in Straits).** Impacts would be the same as described for Sub-Alt 1. **Pipeline assembly area (and timber storage).** Short-term and local detrimental effects possible as four residential properties, utility poles, and one building are located inside the workspace boundary or within 25 feet. Risk of damage to US-2 from auger bore. State and local requirements would minimize risk of damage to US-2. **EMPS**. Impacts would be similar to those described for Sub-Alt 1. Similar to Applicant's Preferred Alternative, detrimental vibration effects from construction traffic unlikely as levels would not exceed impact thresholds.

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
	expected to exceed established vibration impact thresholds.			
Socioeconomics				
Population, Housing, Community Services, Unemployment, Income, Taxes, and Tourism				
No Impact	Up to 204 workers would be required for peak periods of construction, many of which would relocate to the area of analysis. This would have detrimental impacts on population, housing, community services, and tourism, as the increase in population would reduce the availability of housing for residents and tourists and may strain police, fire, health, and emergency medical services. As the region is accustomed to large increases in population and has amenities that can readily absorb an influx of temporary workers due to the nature of the area as a tourist destination, Project construction is not expected to affect population growth or demographic patterns in ways that alter the overall character of the area of analysis; affect the ability of individuals living on a fixed income to pay rent; or detrimentally affect the ability to provide funding for social services, health services, or schools. There would also be beneficial impacts on	Up to 50 workers would be required for construction in addition to 14 personnel supporting diving spread operations. Impacts would be similar to those described for the Applicant's Preferred Alternative, but with a shorter duration and smaller impact.	Up to 150 workers could be required for construction and may relocate to the area of analysis. This would have detrimental impacts on population, housing, community services, and tourism, as the increase in population would reduce the availability of housing for residents and tourists and may strain police, fire, health, and emergency medical services. As the region is accustomed to large increases in population and has amenities that can readily absorb an influx of temporary workers due to the nature of the area as a tourist destination, construction is not expected to affect population growth or demographic patterns in ways that alter the overall character of the area of analysis; affect the ability of individuals living on a fixed income to pay rent; or detrimentally affect the ability to provide funding for social services, health services, or schools. There would also be beneficial impacts on unemployment, income, and	Impacts would be the same as Sub-Alt 1.

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
	unemployment, income, and taxes for the duration of construction, as construction would increase employment opportunities, wage spending, and tax revenues in the area. Short-term, detrimental impacts to housing values and tourism may occur during construction due to construction noise and anticipated visual effects. The extent of these impacts would depend on how disruptive construction noise and visual effects are and the individual's tolerance of these effects. Impacts would end following construction.		taxes for the duration of construction, as construction would increase employment opportunities, wage spending, and tax revenues in the area. Short-term, detrimental impacts to housing values, and tourism may occur during construction due to construction noise and anticipated visual effects. The extent of these impacts would depend on how disruptive construction noise and visual effects are and the individual's tolerance of these effects. The pipeline assembly area would pass through different areas utilized for a variety of purposes, resulting in short-term, detrimental impacts to housing, short- and long-term, detrimental impacts to tourism (due to tree clearing), and short-and long-term, beneficial and detrimental impacts to hunting.	
Supply Chain and Economy				
No Impact	50 percent of Project materials would be sourced from regional and state-sourced supply chains providing a beneficial impact to the regional and state economy, with beneficial job creation by the construction firm making purchases from local vendors.	Approximately 100 percent of rock materials are anticipated to come from local quarries providing a beneficial impact to the regional economy, with beneficial job creation by the construction firm making purchases from local vendors.	The percentage of materials that would be sourced from regional and state-sourced supply chains is unknown. Any materials sourced from these supply chains would provide a beneficial impact to the regional and state economy, along with beneficial job creation by the construction	Impacts would be the same as Sub-Alt 1.

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
			firm making purchases from local vendors.	
Energy Demand				
No Impact	Construction of the Tunnel would require an estimated 17,638.3 MWh of energy per year, while operation of the Tunnel would require an estimated 404.1 MWh of energy per year. To meet this demand, transformers and temporary truck-mounted power plants would be installed, in addition to several existing power poles being relocated. There would be no impact on the local energy grid's ability to meet demand. An estimated 4,588,825 gallons of fuel would be used by commuting construction workers, truck hauling, and construction equipment.	An estimated 1,243,589 gallons of fuel would be used by commuting construction workers and vessels utilized for the placement of the protective cover.	The anticipated maximum electrical consumption for the HDD Installation Alternative is 1500 MWh per year, which would power lights, heating and related utilities. The utility power line along Boulevard Drive on the north side of the Straits may need to be relocated to clear the area for the construction workspace. No other currently known utilities would be impacted. If current utilities need to be relocated or if additional utilities are required, the Applicant would coordinate with the appropriate utility provider to meet the energy demands. Impacts on the local energy grid are not expected. While the amount of fuel required for commuting construction workers, truck hauling, and operation of construction equipment is unknown, it would likely be less than that anticipated for the Applicant's Preferred Alternative, as construction would take place within a shorter timeframe and involve fewer workers. Annual energy demand from operation of the replacement pipeline would	Impacts would be the same as Sub-Alt 1.

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
			be similar to operation of the Applicant's Preferred Alternative, although energy needs associated with the Tunnel and new onshore facilities proposed under that alternative would not be required.	
Reliability and Safety				
		Worker Injury or Illness		
No Impact	Approximately 5.0 recordable injuries or illnesses may be expected during Tunnel construction, and approximately 1.5 recordable injuries or illnesses may occur during pipeline construction.	Approximately 0.6 recordable injuries or illnesses may be expected during construction.	Approximately 1.8 recordable injuries or illnesses may be expected during pipeline construction.	Approximately 1.8 recordable injuries or illnesses may be expected during pipeline construction.
		Construction Risk		
No Impact	Potential to encounter unstable geology (i.e. prone to changes and ground movements) during drilling. The TBM would be equipped with sensors to monitor pressure and with the ability to inject grout to stabilize the geology. Potential to encounter hazardous gases that could pose a risk of explosion or asphyxiation. The Applicant would mitigate this risk through ventilation and air monitoring.	Potential for rock and gravel to damage the existing Dual Pipelines. The Applicant would reduce potential effects by placing gravel/rock via a fall-pipe that could control material placement. In addition, the Applicant would perform an ROV survey to ensure the pipelines are fully covered and assess stress on the pipelines.	If pockets of hazardous gas (e.g., methane) exist along the HDD alignment, the potential to encounter those pockets is greater for the HDD Installation Alternative than for the Applicant's Preferred Alternative, because the TBM proposed for the Tunnel Project would have sensors on the drilling head. This technology is not available for HDD. The potential human health effects associated with exposure to hazardous gases would be reduced, however, because no workers would be present within the borehole during construction. If hazardous gas escaped from	Impacts would be the same as Sub-Alt 1.

No-Action	Applicant's Preferred Alternative	Engineered Gravel / Rock Protective Cover	HDD Installation Alternative	
			Sub-Alternative 1: Pipeline Assembly Area South	Sub-Alternative 2: Pipeline Assembly Area North
			the borehole at the point of construction (entry/exit points), the gas would be expected to disperse quickly in the air; as such, hazardous gases would not concentrate to their LEL and would not present a hazard to construction workers at the ground surface.	
Secondary Containment				
This alternative would not provide secondary containment.	The Tunnel would provide secondary containment for NGLs and oil product in the event of a release.	This alternative would not provide secondary containment.	This alternative would not provide secondary containment.	This alternative would not provide secondary containment.
Anchor Stike Probability				
Operation of the Applicant's EMP3 system would continue; combined risk of intentional or unintentional anchor strike is approximately once every 1,300 years.	The replacement of the existing Dual Pipelines with a replacement pipeline within a tunnel below the lakebed would eliminate the safety risks currently associated with a potential anchor strike, as the existing pipelines would either be decommissioned in-place (product would no longer run through the pipeline) or removed from the lakebed fully or in part, depending on decommissioning sub-alternative.	The potential failure rate of the engineered gravel/rock cover due to anchor strike is estimated at approximately once every 128,000 years.	The replacement of the Dual Pipelines with a pipeline below the lakebed would eliminate the risks currently associated with an anchor strike, as the existing pipelines would be decommissioned (either in-place or partially or fully removed, depending on decommissioning sub-alternative).	The replacement of the Dual Pipelines with a pipeline below the lakebed would eliminate the risks currently associated with an anchor strike, as the existing pipelines would be decommissioned (either in-place or partially or fully removed, depending on decommissioning sub-alternative).

[1] The Revised Biological Assessment (Stantec 2025) identifies the Action Area as the areas directly and indirectly affected by the Project (Applicant's Preferred Alternative), to include all Project components plus a 100-foot buffer. Therefore, the 7.7 acres shown in the table, based off the Biological Assessment, is greater than the 5.2 acres of forested habitat anticipated to be removed during construction within the construction footprint. The Applicant's Biological Assessment does not account for construction/operation footprints or elements associated with alternatives/sub-alternatives to the Applicant's Preferred Alternative.

AQCR = Air Quality Control Region; BCY = bank cubic yard; BMP = best management practice; bpd = barrels per day; CY = cubic yard; dBA = A-weighted decibel; DLI = dwarf lake iris; EGLE = Michigan Department of Environment, Great Lakes, and Energy; EIS = Environmental Impact Statement; EMPS = excavated material

placement site; ESA = Endangered Species Act; ESMOC = Enbridge Straits Maritime Operations Center; HAP = hazardous air pollutant; HDD = horizontal directional drilling; HG = Houghton's goldenrod; IPaC = Information for Planning and Consultation; LEL = lower explosive limit; LOS = Level of Service; MDNR = Michigan Department of Natural Resources; MWh = megawatt hour; NGL = natural gas liquid; NPDES = National Pollutant Discharge Elimination System; NRHP = National Register of Historic Places; $PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter; PM_{10} = particulate matter less than 10 micrometers in diameter; RNA = Regulated Navigation Area; ROD = Record of Decision; ROW = right-of-way; SESC = Soil Erosion and Sedimentation Control; sf = square feet; Sub-Alt = Sub-Alternative; TBM = tunnel-boring machine; TCL = Traditional Cultural Landscape; US = United States; USACE = United States Army Corps of Engineers; USFWS = United States Fish and Wildlife Service

Table ES-2. High-Level Summary of Impacts by Decommissioning Sub-Alternatives

Sub-Alternative 1	Sub-Alternative 2a	Sub-Alternative 2b	Sub-Alternative 2c
Land Use and Recreation			
Land Ownership and Land Use			
No impact.	State authorization required for work on Straits bottomlands.	State authorization required for work on Straits bottomlands. Temporary easement required from the Cloverland Electric Co-operative for onshore workspace. Short- and long-term, detrimental impacts to land use due to tree/vegetation clearing for onshore workspace.	State authorization required for work on Straits bottomlands. Temporary easement required from the Cloverland Electric Co-operative for onshore workspace. Short- and long-term, detrimental impacts to land use due to tree/vegetation clearing for onshore workspace.
Recreation – Land Based			
Passive recreationists (e.g., birders and shoreline walkers) could experience short-term, detrimental impacts from increased vehicle use/activity in the vicinity of existing onshore facilities. The degree of short-term detrimental impact would depend on the tolerance of the individual.	Impacts to passive recreationists (e.g., birders and shoreline walkers) along Straits shorelines would be the same as for Sub-Alt 1.	Short- and long-term, detrimental impacts to land recreation due to required onshore workspace. Nearby recreationists (including those at McGulpin Point Lighthouse) may experience construction noise/visual effects. The degree of detrimental impact would depend on the tolerance of the individual. Long-term impacts would result in areas of tree clearing, due to the slow regeneration rate of trees.	Ground disturbance and increased land requirements for temporary workspace would result in greater detrimental impacts to recreationists along Straits shorelines than described for Sub-Alt 2b. Impacts would end when decommissioning activities are complete, with the exception of long-term impacts associated with tree clearing. The degree of short-term detrimental impact would depend on the tolerance of the individual.
Recreation – Water Based			
Long-term, beneficial impact on water recreation as maintenance vessels and associated safety zones in Straits would be reduced. The existing RNA would	Short-term, detrimental impacts to water recreation as recreational vessels would have to avoid the paths and anchored locations of construction vessels. Increased	Short-term, detrimental impacts to water recreation similar to Sub-Alt 2a, but occurring over a longer duration and within a larger area. Due to removal of	Short-term, detrimental impacts to water recreation would be the same as described under Sub-Alt 2b. Long-term,

Sub-Alternative 1	Sub-Alternative 2a	Sub-Alternative 2b	Sub-Alternative 2c
stay in place due to the presence of other lakebed utilities.	noise and visual effects of decommissioning activities would result in short-term, detrimental impacts to water recreationists. The degree of impact would depend on the tolerance of the individual. Long-term, beneficial impacts on water recreation would be the same as Sub-Alt 1.	nearshore pipe, the Straits Area Blueway Water Trail would be affected. Temporary closures of the public launch at Headlands Road may occur. Long-term, beneficial impacts on water recreation would be the same as Sub-Alt 1.	beneficial impacts on water recreation would be the same as Sub-Alt 1.
Aesthetics			
Short-term, detrimental impacts to local visual resources could result from the use of construction equipment and/or vehicles in addition to increased employee commuting. Short-term, detrimental impacts to the local soundscape due to construction equipment usage and/or vehicles and increased employee commuting. All impacts would end when decommissioning is complete (3 to 4 months). The degree of impact to the viewscape and soundscape during decommissioning would depend on individual perception.	Short-term, detrimental impacts to local visual resources could result from the presence and use of construction equipment and/or vehicles, increased employee commuting, staging and laydown areas, and barges operating on the Straits. Barge activity would be visible from points along the Straits not screened by trees. Short-term, detrimental impacts to the local soundscape could result due to equipment/barge usage. All impacts would end once decommissioning activities are complete (2 to 3 years). The degree of impact to the viewscape and soundscape during decommissioning would depend on individual perception.	Short-term, detrimental impacts to local visual resources could result from the presence and use of construction equipment and/or vehicles, increased employee commuting, staging and laydown areas, and barges operating on the Straits. Short-term, detrimental impacts to the local soundscape due to construction equipment and/or vehicle usage, increased employee commuting, and barges operating on the Straits. Impacts would occur over a longer duration (3 to 4 years) than under Sub-Alt 2a. Impacts would end once decommissioning activities are complete, with the exception of impacts associated with tree clearing onshore, due to the slow regeneration rate of trees. The degree of impact to the viewscape would depend on individual location and perception.	Impacts would include those described for Sub-Alt 2b; additionally, removal of onshore portions of the Dual Pipelines would cause additional detrimental impacts within the existing Line 5 ROW extending from the shoreline to the North Straits Facility and the Mackinaw Station. Impacts would end once decommissioning activities are complete (3 to 4 years), with the exception of impacts associated with tree clearing onshore, due to the slow regeneration rate of trees. The degree of impact to the viewscape would depend on individual location and perception.
Water Resources			
Groundwater			
No Impact	No Impact	Potential detrimental impact associated with increased susceptibility to contaminant exposure (e.g., spills/leaks of fuels or oils, etc.) if excavation equipment interacts with shallow groundwater.	Potential detrimental impact associated with increased susceptibility to contaminant exposure (e.g., spills/leaks of fuels or oils, etc.) if excavation equipment interacts with shallow groundwater.

Sub-Alternative 1	Sub-Alternative 2a	Sub-Alternative 2b	Sub-Alternative 2c
Surface Water			
No Impact	Detrimental impact associated with disturbance in the Straits/coastal zone along the Dual Pipelines where they are exposed along the lakebed (approximately 12,200 feet along the western pipeline and 11,100 feet along the eastern pipeline). Turbidity would be localized to the immediate area where work is occurring and would dissipate when work is completed in that location. Potential for detrimental impacts to the Straits/coastal zone due to potential release of contaminants associated with use of material barges and onshore material storage/use of heavy equipment/vehicles (see Chapter 5 of the EIS for mitigation measures). Impact would occur during construction only.	Detrimental impact associated with disturbance in the Straits/coastal zone/CBRS along the Dual Pipelines between the OHWM (approximately 19,473 feet along western pipeline and 19,154 feet along eastern pipeline). Excavation of buried pipeline in Straits would result in disturbance to 566,160 sf. Turbidity would be localized to the immediate area where work is occurring and would dissipate when work is completed in that location. Potential for detrimental impacts to the Straits/coastal zone/CBRS due to potential release of contaminants, as described for Sub-Alt 2a, but over a greater time period and larger area within the Straits. Impact would occur during construction only.	Detrimental impacts to onshore surface waters/wetlands due to ground disturbance and equipment use. Impact would end post-construction. Onshore ground disturbance associated with removal of buried, onshore pipeline segments would result in detrimental impact to up to 500 linear feet of Stream 01. Disturbed areas would be restored post-construction. Potential for detrimental impacts to the Straits/coastal zone/CBRS would be the same as Sub-Alt 2b but likely greater due to onshore ground disturbance.
Wetlands			
No Impact	No Impact	Vegetation clearing (and potentially material storage) would occur within 0.47 acre of wetland.	Onshore ground disturbance associated with removal of buried, onshore pipeline segments would result in detrimental impact to approximately 1.88 acres of wetlands.
Biological Resources			
Terrestrial Habitat			
No Impact	No Impact	Required onshore workspace would have a temporary, detrimental impact to approximately 6 acres of terrestrial natural communities and wildlife habitat due to vegetation removal. These areas would be restored post- construction; however, impacts to forested areas due to tree removal would be long-term.	Required onshore workspace would have a temporary, detrimental impact to up to 15.5 acres of terrestrial communities and wildlife habitat due to ground disturbance and vegetation removal during removal of onshore portions of the Dual Pipeline. These areas would be restored post-construction; however, impacts to

Sub-Alternative 1	Sub-Alternative 2a	Sub-Alternative 2b	Sub-Alternative 2c
			forested areas due to tree removal would be long-term.
Aquatic Habitat			
No Impact	Detrimental disturbance to aquatic habitat in the Straits would occur along exposed portions of the Dual Pipelines (approximately 12,200 feet along the western pipeline and 11,100 feet along the eastern pipeline). These impacts would be localized to the immediate area where work is occurring. Aquatic organisms may temporarily relocate or experience changes in behavior during construction due to turbidity. Turbidity would dissipate when work is completed in that location. Increased potential of accidental detrimental release of contaminants associated with use of material barges during construction. This risk would be mitigated by the construction contractor adhering to the Spill Plan and implementing proper storage, containment, and handling. Impacts would end when decommissioning activities are complete.	Detrimental disturbance to aquatic habitat in the Straits would occur along the Dual Pipelines between the OHWM (approximately 19,473 feet along the western pipeline and 19,154 feet along the eastern pipeline). These impacts would be localized to the immediate area where work is occurring. Aquatic organisms may temporarily relocate or experience changes in behavior during construction due to turbidity. Turbidity would dissipate when work is completed in that location. Impacts to aquatic communities and local fisheries would occur over a larger area and for a longer duration (3 to 4 years) than those discussed under Sub-Alt 2a. Sub-Alt 2b would involve construction activities in waters that potentially support fish spawning areas. Such activities would affect additional species beyond those affected by Sub-Alt 2a. Potential for contaminant release from material barges similar to Sub-Alt 2a, but a greater potential area for detrimental impacts through release of contaminants associated with onshore workspaces. Impacts would end when decommissioning activities are complete.	Detrimental disturbance to aquatic habitat and species in the Straits and impacts from turbidity would be the same as under Sub-Alt 2b. Potential for contaminant release from material barges would be similar to Sub-Alt 2b. Impacts would end when decommissioning activities are complete.
Protected Species			
No Impact	No Impact	Due to nearby documented occurrences of protected species (see column for Applicant's Preferred Alternative), it is possible that impacts could occur. If the	Due to nearby documented occurrences of protected species (see column for Applicant's Preferred Alternative), it is possible that impacts could occur. If the

Sub-Alternative 1	Sub-Alternative 2a	Sub-Alternative 2b	Sub-Alternative 2c
		Applicant were to pursue this sub-alt, coordination would be required.	Applicant were to pursue this sub-alt, coordination would be required.
Cultural Resources			
No Impact	The removal of pipe would introduce vessels and personnel into the TCL, possibly lessening the available area for traditional ceremonial practices. In-water construction activities and associated turbidity due to the removal of pipe would also disturb fish and their habitat, which contribute to the significance and integrity of the TCL. These effects to fish and habitat would end following construction.	Similar to Sub-Alt 2a, with greater segment removal resulting in greater disturbance to fish habitat. Additional impacts to terrestrial habitat due to temporary onshore workspaces along the shoreline which would result in disturbance to archaeological sites and loss of plants and wildlife of Tribal importance in the construction workspaces.	Similar to Sub-Alt 2b but with greater terrestrial impacts due to a larger onshore workspace and the addition of ground disturbance.
Treaty Rights			
To Be Determined in the Record of Decision			
Geology			
No Impact	No Impact	No Impact	No Impact
Soil Resources			
Minimal increases in erosion possible due to temporary increases in truck use/equipment. Soil quality could be affected by spills/leaks from trucks/equipment (see EIS for mitigation measures).	Activity within the Straits would displace and suspend sediments along the Dual Pipelines where exposed along the lakebed (approximately 12,200 feet along the western pipeline and 11,100 feet along the eastern pipeline). Sediment accretion would occur; however, sediments would be expected to rapidly disperse with Straits currents (see EIS for supporting studies). Minimal increases in erosion possible due to heavy equipment use. Soil quality could be affected by spills/leaks from construction equipment (see EIS for mitigation measures).	Similar impacts as described for Sub-Alt 2a but over a larger area and longer period of time. Excavation of pipeline buried beneath the lakebed would result in approximately 566,160 sf of sediment disturbance. Impacts associated with sediment accretion would be the same as under Sub-Alt 2a. Minimal increases in erosion possible due to onshore vegetation removal (6 acres) and use of heavy equipment. Soil quality could be affected by spills/leaks from construction equipment (see EIS for mitigation measures).	Impacts to Straits sediments would be the same as Sub-Alt 2b. Approximately 15.5 acres of onshore ground disturbance would be required to remove onshore, buried pipeline segments. Soil quality could be affected by spills/leaks from construction equipment (see EIS for mitigation measures).
Transportation and Navigation			
Transportation			
Temporary, detrimental effects probable from 200 truck deliveries and 20 workers	Temporary, detrimental effects probable from 264 trucks and 75 to 85 workers	Temporary, detrimental effects probable from 307 trucks and workers (similar	Similar temporary, detrimental effects as Sub-Alt 2b, but with an increased

Sub-Alternative 1	Sub-Alternative 2a	Sub-Alternative 2b	Sub-Alternative 2c
increasing traffic safety risks and rates of road surface deterioration over 3 to 4 months. No notable impacts to roadway LOS are anticipated.	increasing traffic safety risks and rates of road surface deterioration over 2 to 3 years. No notable impacts to roadway LOS are anticipated.	number as Sub-Alt 2a) increasing traffic safety risks and rates of road surface deterioration over 3 to 4 years. No notable impacts to roadway LOS are anticipated.	number of trucks (320 trucks) and with an additional 40 workers occurring over 3 to 4 years. No notable impacts to roadway LOS are anticipated.
Navigation			
Long-term, detrimental effect probable on navigation as risk of anchor entanglement would continue. There would be a long-term, beneficial impact as temporary and localized impacts to navigation due to the need to navigate around maintenance vessels and associated safety zones in the Straits would be reduced. Due to the presence of other utilities in the Straits, the RNA would remain in place with no modifications. The risk of oil spill resulting from anchor strike would be eliminated as product would no longer flow through the Dual Pipelines.	Temporary, detrimental effect on navigation probable from 226-acre work area in Straits obstructing navigation over 2 to 3 years. There would be a long-term, beneficial impact, as temporary and localized impacts to navigation due to the need to navigate around maintenance vessels and associated safety zones in the Straits would be reduced. Due to the presence of other utilities in the Straits, the RNA would remain in place with no modifications. The potential for anchor entanglement would be eliminated.	Generally, the same detrimental effects as Sub-Alt 2a but over a longer period of time near shorelines, over 3 to 4 years. There would be a long-term, beneficial impact, as temporary and localized impacts to navigation due to the need to navigate around maintenance vessels and associated safety zones in the Straits would be reduced. Due to the presence of other utilities in the Straits, the RNA would remain in place with no modifications. The potential for anchor entanglement would be eliminated.	Generally, the same detrimental effects as Sub-Alt 2a but over a longer period of time near shorelines, over 3 to 4 years. There would be a long-term, beneficial impact, as temporary and localized impacts to navigation due to the need to navigate around maintenance vessels and associated safety zones in the Straits would be reduced. Due to the presence of other utilities in the Straits, the RNA would remain in place with no modifications. The potential for anchor entanglement would be eliminated.
Air Quality			
Short-term, local, detrimental impacts to air quality probable. Emissions would result from employee commuting and construction equipment usage. Impacts would not extend beyond the AQCR boundary.	Short-term and detrimental impacts to air quality. Emissions would result from employee commuting, and construction vessels removing and hauling pipeline. Impacts would mainly be limited to the work area and immediate surrounding areas, and would not extend beyond the AQCR boundary.	Impacts would be similar to Sub-Alt 2a but may be higher due to the increased amount of pipeline removed requiring longer construction duration.	Impacts would be similar to Sub-Alt 2b but may be higher due to onshore disturbance. Impacts under this alternative would be comparatively the highest of all the sub-alternatives, but would mainly be limited to the work area and immediate surrounding areas, and would not extend beyond the AQCR boundary.
Noise and Vibration			
Noise			
Temporary, localized detrimental effects possible. Projected noise levels could exceed daytime noise impact threshold (see Appendix G Attachment 1 and	Temporary, localized detrimental effects possible. Projected noise levels would exceed nighttime noise impact threshold (see Appendix G Attachment 1 and	Temporary, localized detrimental effects probable. Projected noise levels would exceed nighttime noise impact threshold (see Appendix G Attachment 1 and	Temporary, localized detrimental effects probable. Projected noise levels would exceed nighttime noise impact threshold (see Appendix G Attachment 1 and

Sub-Alternative 1	Sub-Alternative 2a	Sub-Alternative 2b	Sub-Alternative 2c
Section 4.12.3.1.1 of EIS for discussion of noise impact thresholds) at 5 residences located near south end of pipelines but would be short-term, occurring over 3 to 4 months. Minimal projected truck volumes associated with pipeline cleaning (200 trucks total over two weeks); therefore, no detrimental effects from traffic noise expected along public roads.	Section 4.12.3.1.1 of EIS for discussion of noise impact thresholds) at 13 residences located near south end of the pipelines, but would be short-term, occurring over one construction season (5 to 6 months). In addition to the trucks associated with pipeline cleaning (noted in Sub-Alt 1), there would be trucks associated with transport of pipeline segments (64 trucks total) but no detrimental effects from traffic noise expected. Detrimental, localized effects to recreational users on Straits from barge transport of extracted pipeline possible but temporary and intermittent.	Section 4.12.3.1.1 of EIS for discussion of noise impact thresholds) at approximately 76 residences located near south and north ends of pipelines; noise disturbances to visitors at McGulpin Rock, McGulpin Point Lighthouse, and Headlands International Dark Sky Park could occur. Potential detrimental noise effects would occur over two to three construction seasons. In addition to the trucks associated with pipeline cleaning (noted in Sub-Alt 1), there would be trucks associated with transport of pipeline segments (107 trucks total). Same detrimental noise effects as Sub-Alt 2a on recreational users on Straits.	Section 4.12.3.1.1 of EIS for discussion of noise impact thresholds) at approximately 81 residences located near south and north ends of the pipelines; noise disturbances to visitors at McGulpin Rock, McGulpin Point Lighthouse, and Headlands International Dark Sky Park could occur. Potential detrimental noise effects would occur over two to three construction seasons. In addition to the trucks associated with pipeline cleaning (noted in Sub-Alt 1), there would be a similar number of trucks as Sub-Alt 2b associated with transport of pipeline segments (121 trucks total); no detrimental traffic noise expected along public roads. Same detrimental noise effects as Sub-Alt 2a on recreational users on Straits.
Vibration			
No Impact	No detrimental vibration effects to land structures or human receptors expected as removal activities would not occur on land.	No detrimental vibration effects to land structures or human receptors expected as projected vibration levels would not exceed impact thresholds at closest receptor.	Temporary, localized detrimental effect possible. Projected vibration levels at three residential properties would be at or approach impact threshold for fragile structures but below impact threshold for non-fragile structures (see Appendix G Attachment 1 and Section 4.12.3.1.2 of EIS for vibration impact thresholds).
Socioeconomics			
Population, Housing, Community Services, Unemployment, Income, Taxes, and Tourism			
Up to 10 workers would be required to clean and cap the pipelines. Impacts would be similar to those described for the Applicant's Preferred Alternative, but with a shorter duration and smaller impact.	Up to 85 construction workers would be required for construction. This would have impacts similar to those described for Sub-Alt 1 but with a greater impact, as more construction workers would be present in the area and the length of construction would be longer. Impacts would not be as great as those described for the	Construction personnel and their impacts would be similar to those described for Sub-Alt 2a, but with a longer duration.	Up to 85 construction workers would be required for construction in addition to a crew of approximately 20 people on each side of the Straits to support the removal of the onshore pipeline. Impacts from construction personnel would be similar to those described for Sub-Alt 2b but with a slightly greater impact, as

Sub-Alternative 1	Sub-Alternative 2a	Sub-Alternative 2b	Sub-Alternative 2c
	construction of the Applicant's Preferred Alternative.		more construction workers would be present in the area.
Supply Chain and Economy			
No Impact	No Impact	No Impact	No Impact
Energy Demand			
No Impact	An estimated 112,875 gallons of fuel would be used by commuting construction workers and vessels utilized for pipeline removal.	Fuel usage numbers would be similar to those described for Sub-Alt 2a.	Fuel usage numbers would be similar to those described for Sub-Alt 2a.
Reliability and Safety			
Worker Injury or Illness			
Approximately 0.045 recordable injury or illness may be anticipated.	Approximately 4.6 recordable injuries or illnesses could be anticipated during removal of the exposed portions of the Dual Pipelines along the lakebed, in addition to the 0.045 recordable injury or illness that may occur during decommissioning.	Approximately 6.1 recordable injuries or illnesses may occur during construction activities, in addition to the 0.045 recordable injury or illness that may occur during decommissioning.	Similar to Sub-Alt 2b, but with an additional 0.03 recordable injury or illness during removal of the onshore pipeline.
Construction Risk			
No Impact	No Impact	No Impact	No Impact
Secondary Containment			
Not Applicable	Not Applicable	Not Applicable	Not Applicable
Anchor Stike Probability			
Not Applicable	Not Applicable	Not Applicable	Not Applicable

AQCR = Air Quality Control Region; BCY = bank cubic yards; bpd = barrels per day; CBRS = Coastal Barrier Resources System; CY = cubic yard; dBA = A-weighted decibel; DLI = dwarf leaf iris; EIS = Environmental Impact Statement; EMPS = excavated material placement site; ESA = Endangered Species Act; ESMOC = Enbridge Straits Maritime Operations Center; HAP = hazardous air pollutant; HDD = horizontal direction drilling; HG = Houghton's goldenrod; IPaC = Information for Planning and Consultation; LEL = lower explosive limit; LOS = level of service; MDNR = Michigan Department of Natural Resources; NGL = natural gas liquid; NPDES = National Pollutant Discharge Elimination System; NRHP = National Register of Historic Places; OHWM = ordinary high water mark; $PM_{2.5}$ = particulate matter under 2.5 micrometers; PM_{10} = particulate matter under 10 micrometers; RNA = Regulated Navigation Area; ROD = Record of Decision; ROV = remote-operated vehicle; ROW = right-of-way; SESC = Soil Erosion and Sedimentation Control; sf = square feet; TBM = tunnel-boring machine; Sub-Alt = Sub-Alternative; TCL = Traditional Cultural Landscape; USACE = United States Army Corps of Engineers; USFWS = United States Fish and Wildlife Service

3.1 ENVIRONMENTAL CONSEQUENCES KEY POINTS

Long-term detrimental effects associated with alternatives/sub-alternatives analyzed in the EIS include vegetation removal and ground disturbance, where that disturbance would permanently alter vegetation communities, wetlands, or soil characteristics (due to the construction of permanent infrastructure under some of the alternatives analyzed). The HDD Installation Alternative would result in the greatest amount of vegetation removal/impact due to the extent of the expected pipeline assembly area alignment; however, impacts to vegetation, wetlands, and soils associated with the HDD Installation Alternative would primarily be short-term (lasting only for the duration of construction). Under implementation of the HDD Installation Alternative, all disturbed areas would be revegetated and restored to baseline conditions to the extent practicable. Areas of tree clearing could experience long-term impacts due to the slow regeneration rate of trees. Additionally, it is possible that cleared forest in wetland areas may regenerate with emergent vegetation, which would represent a permanent change in wetland composition. Under the Applicant's Preferred Alternative, vegetation would be restored to the extent possible following construction; however, some change in land use (conversion from vegetation to industrial use), permanent wetland loss, vegetation loss, and increased impervious area (due to new structures/buildings) would result, creating impacts that would remain following construction of the Applicant's Preferred Alternative. Under the Applicant's Preferred Alternative, it is anticipated that vegetation removal would primarily occur on Applicant owned land and, aside from the acquisition of a small piece of land owned by Cloverland Electric Cooperative, no change in land ownership is anticipated (although the Applicant may purchase portions of the EMPSs/off-site laydown areas proposed for use). Under the HDD Installation Alternative, much of the anticipated vegetation removal would occur on land owned by private or public entities, including park land and federal property. While changes to land ownership would not be expected, the Applicant would need to acquire temporary easements to access and conduct work in these areas. Post-construction (of the HDD Installation Alternative), disturbed areas would be revegetated and returned to baseline conditions to the extent practicable (no new aboveground infrastructure would be required). Both the Applicant's Preferred Alternative and the HDD Installation Alternative would result in the permanent removal of geologic material from below the Straits lakebed. The Applicant's Preferred Alternative would result in the removal of a greater quantity of geologic material for construction of the proposed Tunnel.

Ground disturbance under the Applicant's Preferred Alternative, the HDD Installation Alternative, and Decommissioning Sub-Alternative 2c would result in adverse impacts to cultural resources, including to a National Register of Historic Places (NRHP)-eligible Traditional Cultural Landscape which includes and extends beyond all the alternatives, as well as impacts to an NRHP-eligible archaeological historic district. In comparison, the Engineered Gravel/Rock Protective Cover Alternative would result in a permanent change in lakebed substrate due to introduction of gravel and rock fill, but would not result in any onshore ground disturbance or vegetation removal.

Most other environmental consequences would be short-term with the effects resolving once construction is completed. Construction-related consequences primarily involve increased traffic due to construction vehicles, construction-related noise, disruption to terrestrial and aquatic life, sedimentation to receiving waters, localized changes to surface hydrology, disruptions in the waterway due to construction activities, disruption to shoreline and water-based recreation, and construction-related lighting impacts. Construction induced vibration levels, whether from the TBM, HDD, or other construction activities, are primarily predicted to be below impact thresholds for human disturbance and structural damage (fragile and non-fragile structures, including the existing Dual Pipelines). Under HDD Installation Sub-Alternative 2, construction vibration from the pipeline assembly area could result in short-term and localized detrimental effects as four residential properties and one building are located inside or within 25 feet of the workspace

boundary. Additionally, risk of damage to US-2 under this sub-alternative is possible from auger bore vibrations; however, adherence to state and local requirements would minimize risk. Under Decommissioning Sub-Alternative 2c, it is also possible that vibration levels would approach the vibration impact threshold for fragile structures. The Mackinac Straits Corridor Authority (MSCA) has an oversight role to monitor construction activities and assure adherence to safety standards.

With proper construction techniques, in accordance with established MSCA requirements, failure of the Tunnel whether via a collapse or explosion during construction is not reasonably foreseeable.

Short-term beneficial effects would result from increased demand for local services and supplies during construction.

Under implementation of both the Applicant's Preferred Alternative and the HDD Installation Alternative, the need for in-water maintenance associated with the existing Dual Pipelines would be eliminated. This would result in a long-term, beneficial impact on water recreation and overall navigation in the Straits during Project operations of either alternative (likewise, the decommissioning sub-alternatives, in combination with either the Applicant's Preferred Alternative or the HDD Installation Alternative, would result in long-term, beneficial impacts on water recreation and overall navigation). Ongoing maintenance and inspection of the existing Dual Pipelines would continue under the No Action Alternative and the Engineered Gravel/Rock Protective Cover Alternative. Under the Applicant's Preferred Alternative, the Tunnel would serve as secondary containment in the event of a leak from the pipeline, and the potential for vessel anchor strike that could damage the pipeline would be eliminated. Under implementation of the Engineered Gravel/Rock Protective Cover Alternative or the HDD Installation Alternative, the potential for a vessel anchor strike that could damage the pipeline would be reduced or eliminated, although no secondary containment would be provided. The No Action Alternative would result in no change in the current condition of the Line 5 Dual Pipelines. The potential for vessel anchor strikes would remain.

When reviewing Table ES-1, it is important to note that consequences from the decommissioning sub-alternatives would only occur if the Applicant's Preferred Alternative or the HDD Installation Alternative is selected/pursued, and would occur in addition to the consequences identified under implementation of the Applicant's Preferred Alternative and/or the HDD Installation Alternative. Effects related to the decommissioning sub-alternatives generally increase in severity from Sub-Alternative 1 through Sub-Alternative 2c due to the amount of construction work that would be necessary to either decommission in-place, partially or fully remove the pipelines.

Cumulative impacts would occur for any Project consequences that are projected to be long-term and would interact or add to the impacts associated with past, ongoing, or reasonably foreseeable future actions within the area of analysis that would also impact the affected resource. Short-term impacts would resolve upon completion of construction and therefore would not be cumulative. The Project's long-term effects would combine with the effects of past actions that have resulted in the current environment, as well as impacts from ongoing and reasonably foreseeable future projects to have an incremental impact on certain resources. However, no specific ongoing or reasonably foreseeable future projects were identified within the project action area (see Appendix H of the EIS). Detrimental cumulative effects from the Applicant's Preferred Alternative would be anticipated to land use and to wildlife habitat due to permanent loss of vegetation and increased impervious area, which would result in aesthetic changes, increased runoff potential, and decreases in available wildlife habitat. The Applicant's Preferred Alternative would also contribute to a cumulative effect on wetlands due to permanent wetland losses. The Engineered Gravel/Rock Protective Cover Alternative would result in cumulative detrimental impacts to land use due to the addition of the engineered gravel/rock cover on the lakebed of the Straits, where

other utilities and manmade structures have been placed over the years. Impacts associated with the HDD Installation Alternative would primarily be temporary and would not result in cumulative impacts.

4 SUMMARY OF MITIGATION MEASURES

Chapter 5 of the EIS documents mitigation measures, project elements, or other environmental protections that are proposed to reduce or avoid impacts. Chapter 5 also discusses compensatory mitigation under the CWA and Endangered Species Act. Any mitigation required for cultural resources and/or treaty rights will be documented under separate processes and presented in the ROD.

The Applicant would comply with applicable design and safety standards and procedures related to all project elements, for any alternative or sub-alternative implemented. This would minimize the potential for any construction-related failures.

In general, mitigation and minimization measures are proposed to reduce short-term, construction-related effects through containment measures (erosion and sedimentation controls, stormwater controls, dust control), spill and leak prevention measures and fast response procedures, and use of well-maintained, quieter (if possible) construction equipment, along with limiting the noisiest activities to daytime hours. Revegetation of disturbed areas would be completed where possible following construction using native seed mixes and plant species. Construction activities would be completed during specific times of year to avoid impacts on biological species (i.e., tree clearing to avoid impacts on protected bat species). Additional studies would be conducted as required (such as geotechnical testing under the Applicant's Preferred Alternative) prior to construction to best inform final design and construction activities. Any TBM and/or HDD activities proposed under implementation of the Applicant's Preferred Alternative or the HDD Installation Alternative would include proven and tested construction monitoring methods and technologies. Construction activities under any implemented alternative would be conducted in accordance with federal, state, and local requirements, laws, and regulations. In addition, the Applicant has committed to minimizing construction impacts on private property and transportation facilities to the extent possible. Compensatory mitigation for wetland and protected species impacts would be commensurate with the amount and type of impact and may be achieved by purchasing credits through mitigation banks or in-lieu fee programs, by permittee-responsible mitigation, or by a combination of the three. The Applicant would obtain any required permits prior to construction and would implement and comply with permit requirements throughout construction activities.

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