October 14, 2022

Katie L. Otanez
U.S. Army Corps of Engineers – Detroit District
477 Michigan Avenue
Detroit, Michigan 48226

RE: Enbridge Line 5 Tunnel Environmental Impact Statement (EIS) Scoping Comments

Dear Ms. Otanez:

On behalf of Tip of the Mitt Watershed Council and the Michigan Environmental Council, we would like to thank you for preparing an Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) for the Enbridge Energy Line 5 Great Lakes Tunnel project. The waters and shoreline areas of Lakes Michigan and Huron, including those surrounding and adjacent to the Mackinac Straits contain abundant natural and cultural resources that are of great ecological and economic value. Ensuring all alternatives and public factors are thorough and adequately evaluated is essential to protecting the Great Lakes, public inland waterways and the quality of the human environment.

Introduction

Tip of the Mitt Watershed Council is a nonprofit organization founded in 1979. We speak on behalf of our members including full-time and seasonal residents, lake associations, and businesses. We work to maintain the environmental integrity and economic and aesthetic values of lakes, streams, wetlands, and groundwater in Northern Michigan, as well as statewide and throughout the Great Lakes Basin. As a lead organization for water resources protection in Antrim, Charlevoix, Cheboygan, and Emmet Counties, the Watershed Council is working to preserve the heritage of Northern Michigan – a tradition built around our magnificent waters.

The Watershed Council has staff that previously served on the Michigan Pipeline Safety Advisory Board, being appointed by former Governor Rick Snyder. We also serve on the Emmet County Local Emergency Planning Committee and the Northern Michigan Area Committee, both of which work on improving emergency response for Line 5. We have participated in exercises with Enbridge, the U.S. Environmental Protection Agency (EPA), the U.S. Coast Guard (USCG), the Tribes, and local first responders, and have been engaged on Line 5 for more than a decade.

The Michigan Environmental Council (MEC) is a nonprofit organization founded in 1980. MEC is a coalition of over 80 environmental and conservation organizations from around the state of Michigan. We serve as a leading environmental voice in Lansing to educate officials and further protections of natural resources in Michigan. We have been involved with the policy and regulation of Line 5 for a number of years and have longed worked to protect the Great Lakes from potential harm, whether it be from nutrient pollution or an oil spill.

We offer the following comments to identify significant environmental issues for in-depth analysis, as well as provide input on the alternative analysis and issues of concern with the stated project purpose.

Alternative Analysis

According to the August 23, 1993 Environmental Protection Agency (EPA)/United States Army Corps of Engineers (USACE) Memorandum to the Field concerning the Appropriate Level of Analysis Required for Evaluating Compliance with the Section 404(b0(1) Guideline Alternatives Requirements, the amount and detail of information in an alternatives analysis and the level of scrutiny required by the Guidelines is commensurate with the severity of the environmental impact (as determined by the functions of the aquatic resource and the nature of the proposed activity) and the scope/cost of the project. Analysis of projects proposing greater adverse environmental effects need to be more detailed and explore a wider range of alternatives. Given the severity of the of environmental impacts and cost of the Great Lakes Tunnel, the alternatives analysis needs to be extremely detailed and explore a wide range of alternative, much broader than the few alternatives Enbridge has already offered, which are all limited to replacement of the Line 5 pipeline in the Straits of Mackinac.

The Purpose and Need for the Line 5 Tunnel EIS is stated as to provide transportation of light crude oil, light synthetic crude oil, light sweet crude oil, and natural gas liquids between Enbridge's existing North Straits Facility and Mackinaw Station, and to approximately maintain the existing capacity of the Line 5 pipeline while minimizing environmental risks." However, this purpose and need statement is not consistent with the Section 404(B)(1) guidelines of the Clean Water Act. The project purpose cannot not be defined in such a restrictive manner to unduly restrict or preclude other alternatives, including off-site alternatives. Additionally, USACE must develop its own project purpose statement while considering the applicant's as well as the public's perspective.

At a minimum, alternatives must consider the No Action Alternative(s), off-site locations, including those that might involve less adverse impact to Waters of the U.S., or less impact to special aquatic sites or less impact to higher quality aquatic resources, and onsite alternatives, particularly those that would involve less adverse impact to Waters of the U.S.

The No Action Alternative analysis should assess both continued operation of the current dual pipelines in the Straits of Mackinac, but also decommissioning of Line 5.

Furthermore, per 40 CFR Section 230.10(a)(3), "Where the activity associated with a discharge which is proposed for a special aquatic site (as defined in subpart E of the Guidelines) does not require access or proximity to or sighting within the special aquatic site in question to fulfill its basic purpose (i.e., is not "water dependent"), practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise. In addition, where a discharge is proposed for a

special aquatic site, all practicable alternatives to the proposed discharge, which do not involve a discharge into a special aquatic site are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise."
A hazardous liquids pipeline is not water dependent. Therefore, at a minimum, one on-site alternative should be included that does not involve placement in Lake Michigan. In addition, off-site alternatives should include a thorough evaluation of multimodal transportation of commodities, as well as consideration of utilization of existing infrastructure.

The alternative analysis should also reconsider the need to maintain and transport the existing capacity of the Line 5 pipeline in light of global and regional transforming energy markets and climate change. Evaluation should consider not only the current and future needs for energy resources, but also the implications of federal (United States and Canada), state, and local governments passing decarbonization legislation or adopting policies that may influence the market demand for pipelines.

Issues for In-depth Analysis

Impacts to Great Lakes Coastal Wetlands

Great Lakes coastal wetlands are considered to be some of the most valuable ecological areas in the Great Lakes and are critical to the Great Lakes ecosystem as a whole. Across the Great Lakes, an estimated two-thirds of coastal wetlands have been dredged, drained, or converted to other uses since pre-settlement times. The remaining coastal wetlands provide untold functions and values, and are ecologically indispensable. They provide critical habitat for fish and wildlife, erosion control, water quality protection, and recreational opportunities.

According to the Great Lakes Coastal Wetland Monitoring Program, the proposed tunnel site is within one of the most pristine Great Lakes coastal wetlands in Lakes Michigan and Huron. The site is used as a benchmark. Site 1598 Point St. Ignace Wetland is a lacustrine wetland located at lat. 45.84599 long -84.74360. As part of the basin wide Great Lakes Coastal Wetland Monitoring Program (GLCWMP) the site has been monitored chemically, physically, and biologically in 2011, 2016, 2017, 2018, 2019, and 2020. This site is among the most pristine in Lake Michigan and is used as a GLCWMP 'benchmark.' This benchmark is essentially a yardstick representing the best conditions that can be expected among those wetlands that remain in the lake today. The figures below were taken from www.greatlakeswetlands.org Decision Support Tool which accesses the GLCWMP database and analyzes these data in light of wetland across the Basin. The first figure represents a water quality index titled 'RankSum.' RankSum combines water quality data with surrounding land use/cover data to establish a relative score indicating overall water quality. Site 1598 scores among the best in Northern Lake Michigan (NLM). The second figure represents vegetation index of biotic integrity (IBI). Site 1598 scores among the best in NLM. The third figure represents largemouth bass young of the year (YOY) catch per unit effort (CPUE). Site 1598 scores among the best in Northern Lake Michigan (NLM). The fourth figure represent specific conductance representing the total amount of ions found in the water. This measure can be related to the amount of pollution in the water. Site 1598 scores among the best in Northern Lake Michigan (NLM). The fifth figure represents total nitrogen concentrations. Site 1598 scores among the best in Northern Lake Michigan (NLM).

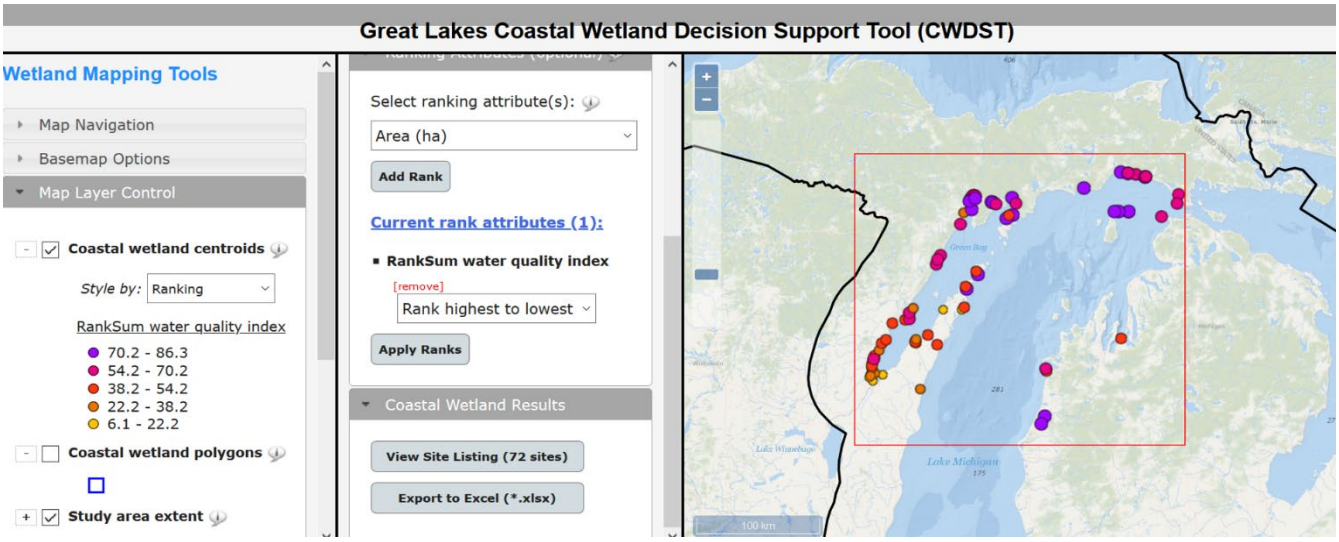

Figure 1. Overall Water Quality

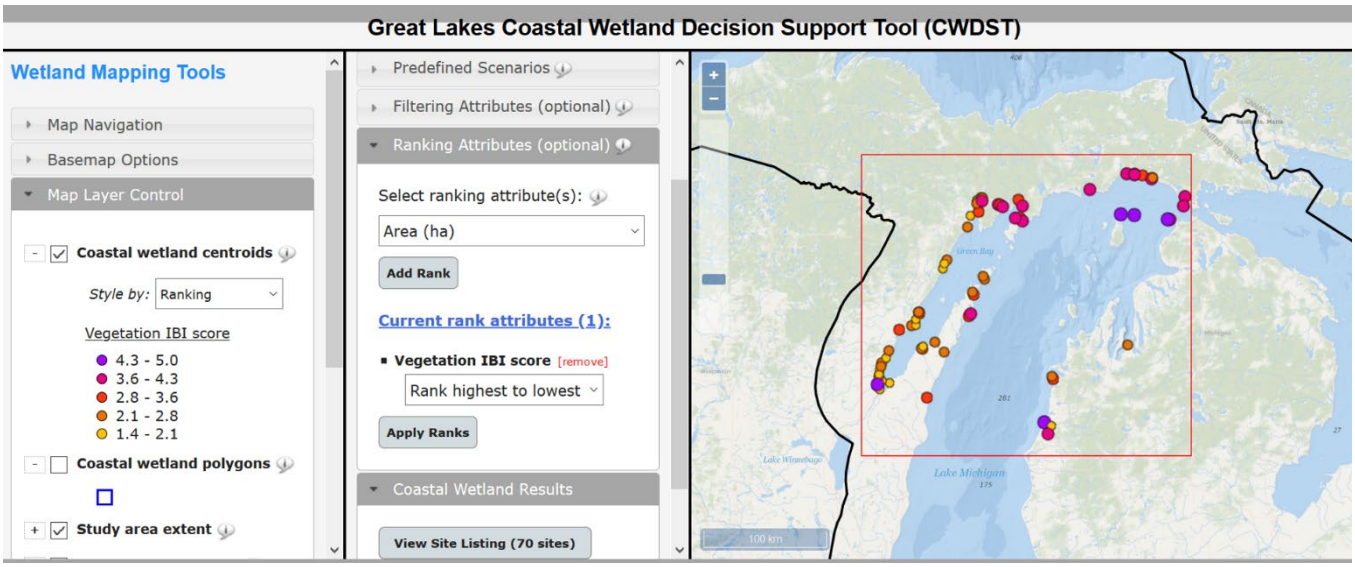

Figure 2. Vegetation Index of Biotic Integrity (IBI)

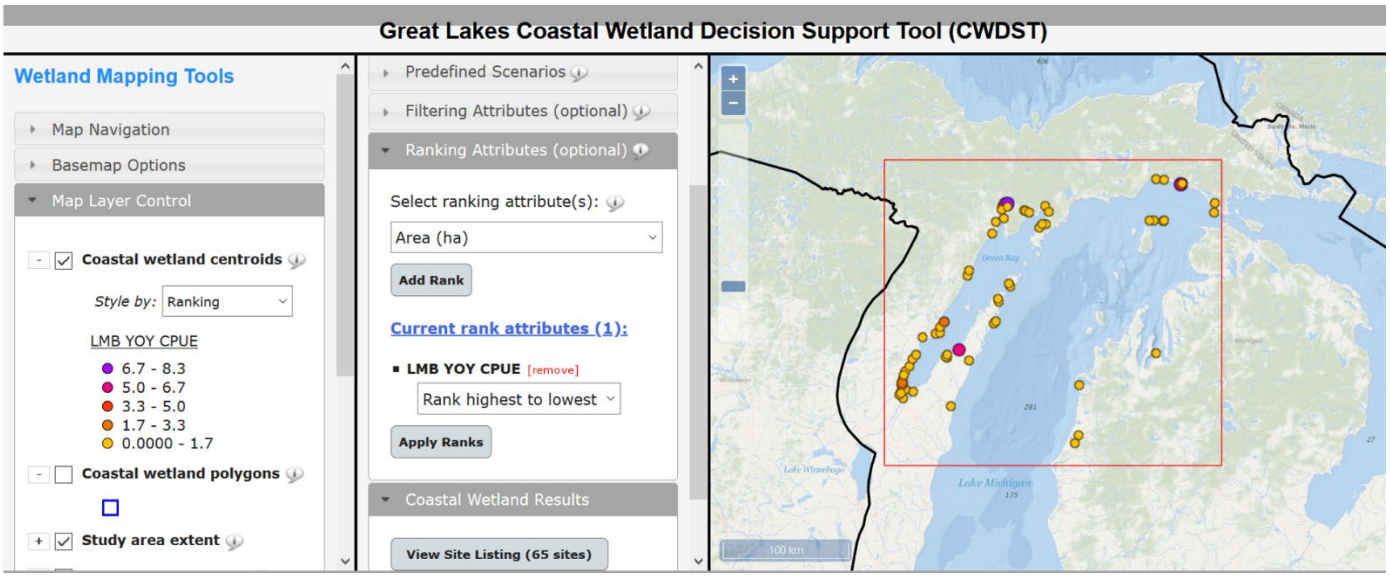

Figure 3. Large Mouth Bass Young of the Year (YOY) Catch Per Unit Effort (CPUE)

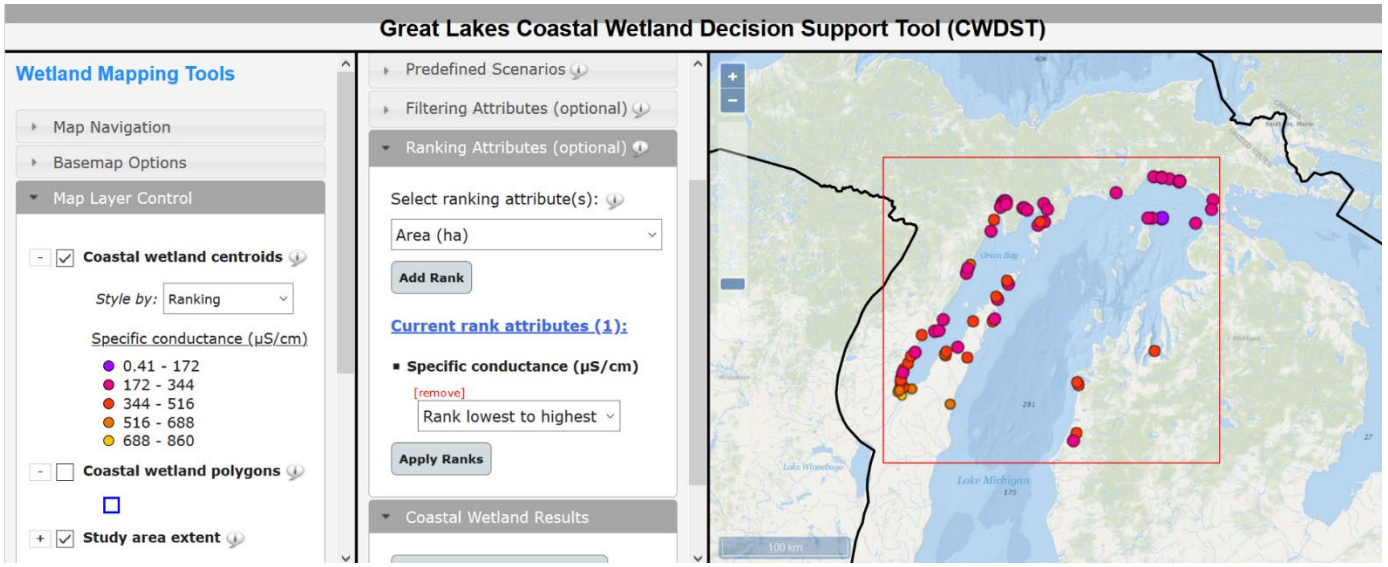

Figure 4. Specific Conductance

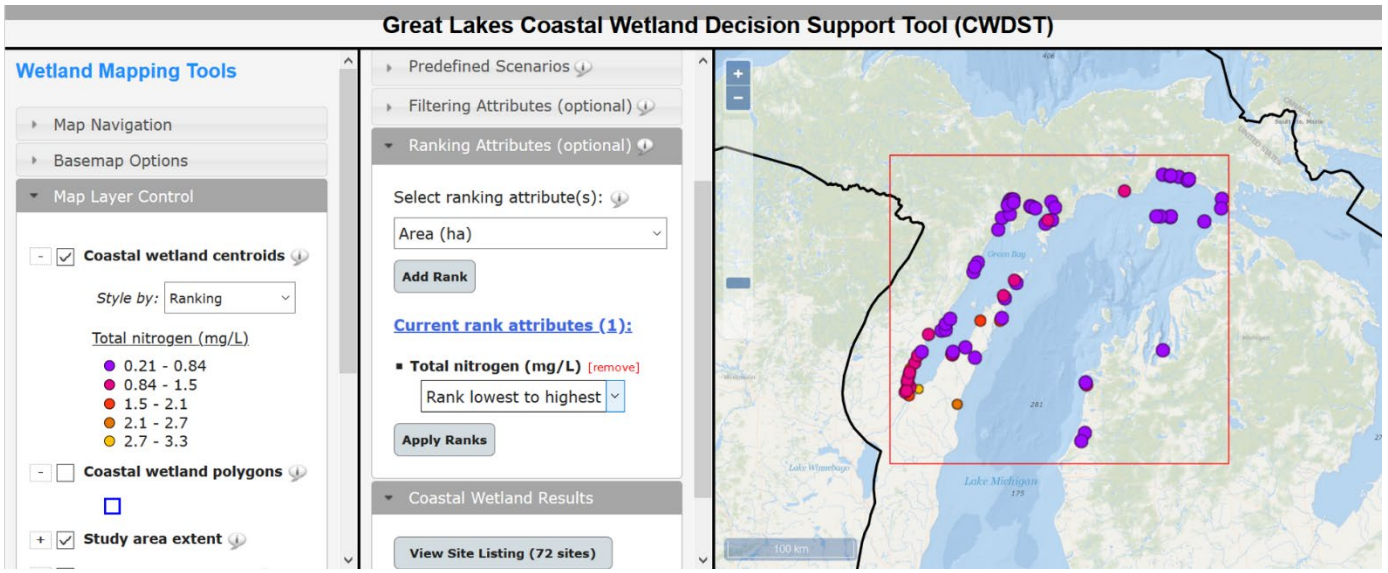

Figure 5. Total Nitrogen Concentrations

Threatened and Endangered Species

Houghton's goldenrod (HG) is found mostly within the Straits region, usually occurring near shore in linear interdunal areas and former embayments. According to the Michigan Natural Features Inventory, the county with the most occurrences of Houghton's goldenrod is Mackinac County, with only 32 occurrences in 2016, where the proposed project and impact will occur.

Dwarf lake iris (DLI) is endemic to Great Lakes shorelines, where it is found in coastal cedar-fir-spruce forests and limestone pavement/grassland (especially along Garden Peninsula Niagaran escarpment formation). Again, the most occurrences were in Mackinac County, with 21 occurrences in 2020. However, dwarf lake iris often persists for decades under northern-white cedar, where it may not flower until a storm opens up the canopy. It is known that along the proposed stretch of road, some portions of the dwarf lake iris occur under cedar. In addition, dwarf lake iris has been recently observed along the roadway in adjacent rock outcrops, wet meadow edge, and cedar swamp forest.

Furthermore, based on a 2019 survey, approximately 3,777 Houghton's goldenrod plants and 7,757 dwarf lake iris plants will be impacted by the project. This was not, nor is it, the right time to conduct surveys of either plant because of high water, but either or both of these plants are probably capable of persisting as rhizomes even though they may not produce abundant above-ground or above-water vegetation for easy identification. In its sterile state, dwarf lake iris resembles Tofieldia glutinosa, so it could be misidentified when partially submerged unless rhizomes were dug, which is not recommended for threatened and endangered species.

Furthermore, Enbridge proposes to relocate only 50% of these plants to mitigate for the loss.[1] "Approximately 3,900 plants of DLI and 1,900 plants of HG are anticipated to be relocated based on the 2019 population estimates." This is not mitigating to the "extent possible" and is insufficient given the importance and status of the species.

Furthermore, not listed in the application is the Piping Plover and Hine's emerald dragonfly. The Piping Plover is listed as endangered under the ESA and by the State of Michigan, and the U.S. Fish and Wildlife Service (USFWS) has identified critical habitat for the Great Lakes breeding population in Mackinac County, where the proposed project will occur. The Piping Plover nests and feeds at the shore, strand line, and wetlands along the Great Lakes and the species and its habitat could be destroyed by the shoreline activities proposed.

The Hines emerald dragonfly is known to occur in the wetland ecosystems of Mackinac County. The most significant threats to the existence of this species have been identified as habitat destruction or alteration, and contamination. Types of direct habitat loss include commercial and residential development, constructing pipelines, and filling of wetlands.

In addition to the Straits of Mackinac, Line 5 also crosses Saunder's Creek, which is a tributary of the Black River. The Black River is one of the five streams in Northern Michigan where the Hungerford's crawling water beetle has been found. This area is considered to be an unusually sensitive environmental area under 49 C.F.R.195.6, as it is an area containing a critically imperiled species and is a multi-species assemblage area. This tiny aquatic beetle is one of Michigan's rarest species, designated as a critically imperiled species, G1, on The Nature Conservancy's Global Conservation Status Rank.

Migratory Birds Impacts

The Straits of Mackinac are also continentally important for waterbird migration, with tens to hundreds of thousands of individuals passing through the area each spring and fall. These include the orders Anseriformes [waterfowl], Podicipediformes [grebes], Gaviiformes [loons], and Suliformes [cormorants]). Waterbirds, including waterfowl game species, provide ecosystem services that directly or indirectly benefit humans. These include provisioning (e.g., meat, feathers, eggs), cultural services for western and indigenous societies, and as predators, herbivores, and vectors of seeds and nutrients (Green & Elmberg, 2014). Many of these migrating birds rest and feed in large numbers in the Straits near the Mackinac Bridge and the Line 5 pipeline area. The Mackinac Straits lie on two natural nexi for migrating birds. In the spring and fall, waterbirds, including loons, grebes, cormorants, and waterfowl, generally move along a north-south path that favors routes passing over water. Access to water during migration provides resting sites, a refuge from predators, and opportunities to forage. Northbound waterbirds that travel up from lower portions of Lakes Michigan and Huron are naturally concentrated by the narrowing geography of the two lakes as they near the Straits. Similarly, landbirds moving north in the spring favor overland routes that provide cover, foraging opportunities, and thermals that aid the soaring birds (e.g., Bald Eagle). They are concentrated by the tapering shape of the northern Lower Peninsula.

1. GLTP_Correction Req_Plant Mitigation Plan_20200522.pdfV5. https://miwaters.deq.state.mi.us/nsite/map/results/detail/2746869251480183093/documents

Species commonly seen in this area (some of which are seasonally very abundant) include more than 25 species of waterfowl, common loons, grebes, and cormorants, many of which have both high ecological value and also great economic value as game species. In addition, over 50,000 raptors, including Bald and Golden Eagles migrate over the Straits region each year, hunting and scavenging during their passage. In addition to spring and fall migrating birds, summer breeding birds include some federally endangered species such as the Piping Plover and other species with special value and protected status (Bald Eagles).

Lack of Emergency Response Capabilities

There are many maritime conditions in the Straits of Mackinac that would prevent or significantly impair the effective containment and recovery of spilled oil or exacerbate the spread of spilled oil, including wave height, wind, ice cover, and surface and subsurface currents.

In 2016, Enbridge committed to acquiring (and did acquire) 8 NOFI Current Buster 2 and Current Buster 4 oil containment systems for open water. The equipment brochure states that this equipment can be deployed in open water in conditions up to Beaufort Wind Scale of 4 – wind below 19 mph and wave height below 3.4 feet. (see enclosure) Given this is currently the most sophisticated and effective system available for open water response in the Straits of Mackinac, the known limits of the Current Busters set 18 mph winds and 3.3 foot waves as the limiting maritime conditions for oil response effectiveness.

Unfortunately, those are not the general conditions experienced in the Straits. For the period December 9, 2016 to December 8, 2017, the NOAA Great Lakes Coastal Forecasting System (GLCFS) Nowcast wave model forecast Significant Wave Height exceeded 3.3 feet (the Current Buster's operational limit) for 359 hours in the vicinity of Line 5. The Nowcast forecast for the year 2016 for the open water about two miles west of Line 5 indicates significant wave height exceeded 3.3 feet for 521 hours, 44% more hours than in the Straits. Thus, wave heights outside the Straits are better criterion for pipeline shutdown than wave heights within the Straits. (see enclosure)

In addition, sustained winds above 20 mph occur frequently in the Straits. Wind data for Mackinac City indicates between November and April, sustained winds (3 hours of more) above 20 mph are experienced from 6% to 14% of the time. (see enclosure)

Furthermore, there are limitations in responding to oil discharges in, on, or under ice. Not only is it more labor intensive, but it is extremely difficult to have high efficiency of recovery in broken or brash ice, the typical conditions that exist in the Straits due to the fact that it is kept open for maritime navigation.

Cumulative Impacts

Based on 2018 Report to the State of Michigan *Enhancing safety and reducing potential impacts at Line 5 water crossings*,[2] Line 5 crosses nearly 400 waterbodies in Michigan, including many Waters of the U.S.

2. https://mipetroleumpipelines.org/document/enhancing-safety-and-reducing-potential-impacts-line-5-water-crossings

The water crossings identified include many tributaries to Lake Michigan, Lake Huron, and the Indian River, which is part of the nearly 40 mile-long Inland Waterway that runs through Pickerel Lake, Crooked Lake, Crooked River, Burt Lake, Mullett Lake, the Cheboygan River, and Huron River. The EIS must assess the cumulative impacts across the entire length of Line 5, not just the section crossing the Straits of Mackinac.

U.S. Coast Guard (USCG) personnel and emergency managers both point to the stretch of the pipeline along U.S. Highway 2 near Lake Michigan's northern shore as their worst-case scenario. Concerns revolve around a combination of less robust technology such as pipeline wall thickness and monitoring equipment, as well as higher vulnerability to an errant strike and potential access problems for containment and cleanup equipment, in addition to difficult terrain and environment for cleanup activities.[3]

Furthermore, as previously noted, Line 5 also crosses Saunder's Creek, which is a tributary of the Black River. The Black River is one of the five streams in Northern Michigan where the Hungerford's crawling water beetle has been found. This area is considered to be an unusually sensitive environmental area under 49 C.F.R.195.6, as it is an area containing a critically imperiled species and is a multi-species assemblage area. This tiny aquatic beetle is one of Michigan's rarest species, designated as a critically imperiled species, G1, on The Nature Conservancy's Global Conservation Status Rank.

Climate Change

According to expert testimony submitted to the Michigan Public Service Commission by Stockholm Environment Institute emissions expert Peter Erickson, the proposed Great Lakes tunnel is associated with approximately 87 million metric tons of carbon – dioxide equivalent annually. When compared to a scenario in which existing Line 5 pipeline no longer operates, construction and operation of the proposed project would lead to an increase of about 27 million metric tons, or 59.5 billion pounds, of additional carbon dioxide annually in global greenhouse emissions from the production and combustion of oil. By enabling the continued, long-term production and combustion of oil, construction of the project would work against, and therefore be inconsistent with the goals of the global Paris Agreement and Michigan's Healthy Climate Plan.[4] In addition, this project would also be contradictory to Executive Order 14008: Tackling the Climate Crisis at Home and Abroad.

Peter Howard, economics director at the Institute for Policy Integrity at New York University School of Law, testified that the emissions tied to the tunnel project would generate approximately $1 billion in global social economic costs each year from 2027 to 2070, as well as "significant unmonetized climate effects and other unquantified pollution costs to human health and the environment."[5]

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3. https://mipetroleumpipelines.org/sites/mipetroleumpipelines.org/files/document/pdf/Straits_Independent_Risk_Analysis_Final.pdf
4. https://mi-psc.force.com/sfc/servlet.shepherd/version/download/068t000000TV111AAD
5. https://policyintegrity.org/documents/Howard_Testimony_MI_Line_Five_Case_09.16.21.pdf

Insufficient Geotechnical Borings

Enbridge completed a $40 million geotechnical investigation in the Straits in November, 2019. The geotechnical boring work was to get sediment and rock samples from the lakebed to determine feasibility of a tunnel, and guide the design of the tunnel and tunnel boring machine.

However, this was deemed to be insufficient. According to an independent contractor, McMillen Jacobs, who was hired to analyze the geotechnical investigation and assess the level of tunneling risk based upon the investigation, it does not adequately characterize the anticipated ground conditions on site.[6] A significant span of the tunnel alignment does not have any borings that reach proposed tunnel depth. Only ten borings reached the proposed tunnel depth, resulting in an average spacing of approximately 2,100 feet.

"For the Enbridge summary document, in short it alone does not adequately characterize the anticipated ground conditions on site. It provides an overview of the number of borings and amount of testing as well as generally describing the anticipated rock formations. It also provides a profile of the tunnel alignment relative to rock formations. However, the document does not summarize the detailed findings of the investigation. In order to fully understand the ground conditions, it is important to view the data in relation to the vertical alignment, as well as methods anticipated to excavate the tunnel, in order to identify any high risk areas."

Enbridge Line 5 Operating in Violation of State Law

According to the State of Michigan, Enbridge has failed for decades to meet its compliance and due-care obligations under the Easement, and it remains in violation of those obligations. There is nothing Enbridge can do to change its past behavior and callous disregard for its duties under the Easement, and its breaches of the Easement's terms and conditions cannot be corrected or otherwise cured. Therefore, Enbridge has not and is not exercising due care in operating the pipelines. The state terminated the easement based on Enbridge's persistent and incurable violations of the easement's terms and conditions. As a result, Enbridge is ordered to cease operations of Line 5 in the Straits by May 12, 2021.[7] To date, Enbridge has not ceased operations of the Line 5 dual pipelines in the Straits of Mackinac. Therefore, Enbridge is now intentionally trespassing on the state bottomlands.

Prior Incidents

On April 1, 2018, , the articulated tug and barge Clyde S VanEnkevort/ Erie Trader was westbound in the Straits of Mackinac, Michigan, when the barge's starboard anchor, which had unknowingly released and was dragging on the bottom, struck and damaged three underwater electrical transmission cables and two oil pipelines. About 800 gallons of dielectric mineral oil leaked into the water from the cables. The anchor also struck both legs of Enbridge's Line 5 dual pipeline, causing a dents and removal of the protective outer coating.

6.https://www.michigan.gov/-/media/Project/Websites/egle/Documents/Multi-Division/Line-5/MDOT_Question_on_Geotechnical_Investigation_Jan_2021.pdf?rev=2fe08f3e6cf64563869bf19780b1ccac

7.https://content.govdelivery.com/attachments/MIEOG/2020/11/13/file_attachments/1600920/Notice%20of%20%20Revocation%20and%20Termination%20of%20%20Easement%20%2811.13.20%29.pdf

On Thursday, June 18, 2020 Enbridge alerted the State of Michigan an anchor support on one of the dual pipelines running along the bottomlands of the Straits of Mackinac had incurred significant damage.[8] This support lies approximately 150 feet from a section of the pipeline where damage to the pipeline coating was discovered on or around May 26, 2020. Both legs of Line 5 were voluntarily shut down by Enbridge, and operations on the east leg remained ceased for over three months. The U.S. Coast Guard determined one of Enbridge's own contracted vessels likely inflicted the damage.

Tribal Treaty and Fishery Rights

In Michigan, there were eight main treaties signed between 1807 and 1842. Perhaps most crucial and most relevant to Line 5 is the 1836 Treaty of Washington, as the nexus of its treaty territory lies at the Straits of Mackinac.

That treaty, signed 185 years ago in Washington, D.C., was an agreement between the United States and representatives of the Odawa and Ojibwe tribes. The Odawa and Ojibwe people at the time agreed to cede an area of nearly 14 million acres of land and 13 million acres of water throughout Michigan's Upper Peninsula and the northern region of the state's Lower Peninsula. In return, the American government guaranteed hunting, fishing and gathering rights to the tribes in those ceded lands — for as long as the grass grows, the winds blow and the rivers flow. Those rights were defined and confirmed with two consent decrees, which are regularly renegotiated.

All 12 federally recognized tribes in Michigan have formally opposed Line 5. The Tribes say the pipeline threatens the Great Lakes and numerous precious rivers and streams, impacting Tribal Nations' reserved fishing, hunting, and gathering rights under the 1836 Treaty of Washington. The Bay Mills Indian Community Executive Council even passed a resolution to banish the Line 5 dual pipelines from all Tribal lands, including the Straits.[9] Banishment is not taken lightly. According to the Native American Rights Fund, "Tribes exercise banishment only to address especially egregious acts of harm to the community."[10]

Thirteen federally recognized Tribes opposed the Great Lakes Tunnel project in either written comments or in consultation meetings with the USACE. In addition, the Straits of Mackinac are considered a Traditional Cultural Landscape and Property that is eligible for inclusion in the National Register of Historic Places based on its associations with the cultural practices, traditions, histories, beliefs, lifeways, arts, and social institutions of tribal community.

8. https://www.enbridge.com/-/media/Enb/Documents/Media-Center/Governor-Whitmer-letter-June-20-2020.pdf?rev=5be50418913849038f387ccded3d07b5&hash=E6B13B822999BB07306BAD0CCDFF12AA
9. https://narf.org/nill/documents/20210510BayMills_banish_Enbridge.pdf
10. https://narf.org/cases/enbridges-line-5-pipeline/

The proposed project occurs within the area of the 1836 Treaty Territory for Michigan Tribes. Five of the twelve federally-recognized Indian tribes in Michigan are parties to the 1836 Treaty of Washington. This reserves off-reservation hunting and fishing rights throughout the ceded territory, which comprises approximately 40 percent of present-day Michigan. The Straits of Mackinac are located in the center of that ceded territory. There are many members of the five treaty tribes who are commercial fishermen, and depend upon the Great Lakes fishery for their livelihood. A substantial proportion of the 1836 Treaty Tribes' fish harvest comes from the Straits of Mackinac. Many of those tribes have tourism-based economies that depend on the Great Lakes.

Cultural Resources

According to Professor John O'Shea, Curator of Great Lakes Archaeology, significant concerns exist regarding the cultural resources assessment conducted for the proposed Great Lakes Tunnel. No new survey was conducted, but instead the assessment was based on sonar imagery collected previously for other purposes. In addition, the technician assigned to the job was told only to consider shipwrecks. O'Shea noted "the cultural deposits which are very likely present and visible in the second hand sonar imagery are about as significant as a site could be, given the small number of sites from this time period on land, and would be unique as the first instances to be documented off and beyond the Alpena-Amberly Ridge in Lake Huron. At the same time, the sites are extremely vulnerable to disturbance and would be obliterated without a trace by the proposed tunneling. These are a unique piece of Michigan's past that should not simply be brushed aside and destroyed."[11]

In addition, the Michigan State Historic Preservation Office (SHPO) provided the Michigan Department of Environment, Great Lakes, and Energy (EGLE) with a letter identifying concerns and gaps in existing data and requested additional information to be provided; specifically, a bottomland archaeological survey. The survey was not to be limited to the proposed footprint of the work, but sufficiently broad due to potential substantial impacts to nonrenewable cultural resources and place-based heritage. It was noted that survey for significant cultural resources in the Straits is incomplete and numerous additional resources to expected be present that have yet to be reported, documented, and evaluated.[12]

Risk of Explosion

The possibility of accidents causing a catastrophic underground explosion in the proposed tunnel has been raised by oil and gas experts. According to Richard Kuprewicz, who is a chemical engineer with nearly 50 years in the oil and gas industry, whose background includes extensive work in emergency response and pipeline incident command, there is a potential for a release into the Straits from the tunnel by way of a catastrophic explosion. According to Kuprewicz, "both propane and crude oil are highly hazardous and volatile substances and there is always a risk of explosion when handling these substances. When transporting these substances through a pipeline enclosed in a tunnel, the risk of an explosion is enhanced which in turn enhances the probability that the secondary containment vessel will fail.[13]

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11. Cultural Resources Survey of Line 5 Tunnel.pdf
https://miwaters.deq.state.mi.us/nsite/map/results/detail/2746869251480183093
12. SHPO Comments Enbridge Line 5 Straits of Mackinac.pdf
https://miwaters.deq.state.mi.us/nsite/map/results/detail/2746869251480183093
13. https://mi-psc.force.com/sfc/servlet.shepherd/version/download/0688y000001SsuUAAS

The risk of transporting crude oil, and especially propane is not negligible or eliminated for the Straits of Mackinac. Propane and crude oil are highly hazardous and volatile substances and together in a confined space like a tunnel can generate a tremendous amount of pressure, especially upon detonation. "A release in this unique environment carries the risk of both loss of human life and the release of crude oil and propane into the Great Lakes as an explosion in such a confined structure will most likely violate the tunnel's secondary containment intent."[13]

Cost to Taxpayers

This project was proposed to the citizens of Michigan with an understanding the Enbridge Energy, Limited Partnership would be responsible for all associated costs, that it would be a no cost solution to taxpayers. However, this has proven not the case. Lawmakers have already dedicated $4.5 million of taxpayer money towards planning, oversight and legal services related to the proposed Mackinac Straits utility tunnel project.[14] This budget expenditure came prior to any permits being applied work and any work initiated on the project. As a result, taxpayers' money will likely be taken again as this project continues and this will continue until it is either completed or abandoned. As a result, Michigan's citizens will be subsidizing a project for a private company that originally agreed to pay all expenses, which is not in the public's interest.

Economic Impact

In 2021, Enbridge paid approximately $66.5 million in property tax for their pipelines and related facilities in Michigan.[15] Property taxes are significant to local municipalities, particularly in Northern Michigan and the Upper Peninsula. However, what is provided in property taxes is hardly comparable to the $1.9 billion dollar cost estimate should a spill occur in the Straits. This estimate, which comes from Risk Analysis commissioned by the State of Michigan, covers the cost to government, recreational damages, and lost income for tourism and recreational businesses, all of which would devastate the counties in Northern Michigan and the UP. This cost doesn't even take into account the cost of irreversible damage to the natural resources, human health impacts, commercial fish products, subsistence fisheries, and more.[16]

In addition, USACE must consider the economic strain placed on local communities from the influx of workers in industry man camps. Studies have shown that man camps bring violence and localize violent crime in places where it would not otherwise be. The camps by nature create a rapid increase in the population of the area, which can strain community infrastructure, such as law enforcement and human services, especially in rural areas where law enforcement is charged with providing services to extensive swaths of land. The increase in population can lead to an increase in physical and sexual violence, including rape, sexual assault, sexual assault of minors, and sex trafficking in the affected communities.

13. https://mi-psc.force.com/sfc/servlet.shepherd/version/download/0688y000001SsuUAAS
14. https://www.mlive.com/news/grand-rapids/2018/11/state_requests_45_million_for.html
15. https://www.enbridge.com/-/media/Enb/Documents/Factsheets/ProvinceStateEconomicBenefits/FS_Michigan_economic_benefits.pdf?rev=1fb414f0a2fd4d6182dab245df2b022a&hash=392695948DFE9B060F5D730BDE95A73F
16. https://mipetroleumpipelines.org/sites/mipetroleumpipelines.org/files/document/pdf/Straits_Independent_Risk_Analysis_Final.pdf

In 2019, the U.S. Bureau of Justice Statistics completed a study on violent victimization known to law enforcement in the Bakken oil-producing region of Montana and North Dakota. Of particular note, the increase of violent victimization by strangers increased by 53% in the Bakken region, the violent victimization of Blacks and Native Americans was 2.5 times higher than corresponding rates for whites, and, while men experienced higher rates of violent crime as well, women experienced a 54% increase in the rate of unlawful sexual contact, which was due to a rise in reports of statutory rape.[17] This should be the of utmost concern given that potential for harm from the man camps is exacerbated when the locations of projects are on or near Native communities, which is the case for the Great Lakes Tunnel Project.

Jobs

In 2021 Enbridge employed a total of 113 Michigan-based permanent and temporary employees and contractors.[18] Enbridge is simply not a significant employer in the State of Michigan. The Line 5 Tunnel project will not bring a significant number of jobs to Northern Michigan either. According to Enbridge, during the construction stage of the project, it's estimated that between 1.8 million and 2 million hours of labor will be required—with an estimated average workforce of 200 to 255, an estimated peak workforce of 300 to 325.[19] It is important to note that a portion of the estimated 200 jobs will be highly specialized individuals from outside of the area to perform focused, technical skills such as operation of the tunnel boring machine. These types of jobs will not be afforded to local community members, nor union members in the region.

In addition, according to the Alternatives Analysis Report developed by Dynamic Risk Assessment Systems, Inc, decommissioning Line 5 would generate about 2,200 (full- and part-time) jobs in Michigan: about 1,000 directly, and another 1,200 indirectly from the indirect spending on materials and services by supply contractors to the project, and induced spending by employees of the project and its suppliers. Total employment earnings associated with operations are in the order of $104 million for all of Michigan. Total output from the abandonment construction expense would be $362 million, for a total value added of some $190 million.[20] Detailed results show that the corridor counties could account for as many as 1,400 of the total 2,200 (full- and part-time) jobs, and for as much as $69 million of the total employment earnings.

Also, it is important to remember that the Great Lakes support more than 1.3 million jobs that generate $82 billion in wages annually.[21] The three national parks and three national lakeshores located in coastal counties attracted approximately 6.5 million visitors in 2018.

17. https://www.ojp.gov/ncjrs/virtual-library/abstracts/violent-victimization-known-law-enforcement-bakken-oil-producing
18. https://www.enbridge.com/-/media/Enb/Documents/Factsheets/ProvinceStateEconomicBenefits/FS_Michigan_economic_benefits.pdf?rev=1fb414f0a2fd4d6182dab245df2b022a&hash=392695948DFE9B060F5D730BDE95A73F
19. https://www.enbridge.com/projects-and-infrastructure/public-awareness/line-5-fact-vs-fiction
20. https://mipetroleumpipelines.org/document/alternatives-analysis-straits-pipeline-final-report
21. https://drive.google.com/drive/folders/1CMN6DbP4L96LDWm5IKU9J-EH-4xxvzxb

Over 1.8 million recreational anglers enjoyed fishing the Great Lakes and spent nearly $2.2 billion on trip and equipment expenditures in 2016. In 2018, there were more than 4 million registered recreation vessels and 3.8 million paddle sports participants in the region. Great Lakes tourists are primarily domestic, and 75% of them take day trips for particular activities, such as festivals and outdoor recreation. These jobs and tourism opportunities are at risk should there be an oil spill from Line 5.

Propane

The EIS must consider if there is a need for propane from Line 5 for project Purpose and Need statement. There are multiple sources of propane in the both the Upper Peninsula (U.P.) and Lower Peninsula. In addition to Line 5, propane is supplied to the U.P., especially in the eastern U.P., from the NGL Supply Terminals facility in Kincheloe. It receives propane via direct rail car shipment from Edmonton, Alberta. In addition, some propane is supplied to the U.P. from other out-of-state sources including the Plains Midstream propane fractionator in Superior, Wisconsin. Other sources of supply for the Lower Peninsula include, but are not limited to, the Lambda Energy Resources natural gas processing plant in Kalkaska, the Marathon Oil Company Detroit refinery, and sources in neighboring states.

Furthermore, Michigan Governor Whitmer released a MI Propane Security Plan[22] to ensure resilience without Line 5. It is a comprehensive five-step plan, many already underway, to ensure that Michigan residents who heat their homes with propane will have a secure energy supply when Line 5 shuts down. This includes optimizing and enhancing propane storage capacity, reducing propane consumption through energy efficiency measures, and investments in rail infrastructure.

In addition, independent experts from London Economics International conducted an assessment on alternative methods of supplying propane to Michigan in the absence of Line 5.[23] The assessment concluded that Line 5 can be decommissioned without any noticeable or significant economic impact to the State, its citizens, or businesses. The study demonstrated that small price increase from using alternatives to Enbridge Line 5 would be lost in the noise of typical price volatility.

Gas Prices

According to Neil Earnest, an expert witness on behalf of Enbridge Energy in a federal lawsuit against the Bad River Band of Lake Superior Tribe of Chippewa Indians of the Bad River Reservation, "the estimated impact of a Line 5 shutdown on Wisconsin and Michigan gasoline, jet fuel, and diesel prices in an increase of 0.5 cents per gallon."[24]

22. https://www.michigan.gov/lara/-/media/Project/Websites/mpsc/consumer/propane/MI_Propane_Security_Plan_Overview.pdf?rev=90d4da17bbfb482a96fec64e2201b6c9&hash=F46D61725231EB89300AAB309AA2545E
23. https://www.londoneconomics.com/wp-content/uploads/2018/07/LEI-Enbridge-Line-5-Michigan-Propane_7_27_2018.pdf
24. https://www.wpr.org/sites/default/files/report-expert-enbridge-expert-neil-earnest-muse-stancil.pdf

Usage and Demand

The EIS must consider the relevant extent of the public need for the proposed work. To assess both the public benefit and public need of Line 5 and the proposed project purpose to transport light crude oil and liquid natural gas between the Upper and Lower Peninsulas of Michigan, it is crucial to consider how much of the commodities are used by citizens of Michigan and the residents of the region.

Much of Line 5's light crude oil is delivered to Sarnia, Ontario, then transported to refineries in eastern Canada and the United States, according to the 2017 Dynamic Risk study.[25] Line 5 carries about 540,000 barrels (22.7 million gallons) per day of product, consisting of about 432,000 barrels of crude oil and 108,000 barrels of natural gas liquids, which include propane. Of those 432,000 barrels of oil, about 70% or 302,400 barrels — along with nearly all of the gas liquids — go straight through Michigan and across the St. Clair River to Sarnia, Ontario, Enbridge confirmed. Only about 129,600 barrels of crude oil daily is piped to refineries in Detroit and northern Ohio. For each barrel of crude oil that enters a refinery, only about 86% is converted into transportation fuels.[26]

According to the U.S. Energy Information Administration, the oil Line 5 sends to Detroit/Ohio refineries daily would produce about 66,614 barrels of gasoline, 36,677 barrels of diesel fuel, and about 8,035 barrels of jet fuel. Detroit and Ohio refineries served by Line 5 send about 23,000 barrels of jet fuel daily to Ontario by rail, according to a 2017 report from the U.S. Energy Information Administration.

Furthermore, Enbridge filed a 2020 depreciation report[27] with the Federal Energy Regulatory Commission (FERC) in May of 2021 regarding its Lakehead Pipeline System. The report notes that the remaining lives of all asset groups within the Lakehead Pipeline System, which includes Line 5, reflect a truncation date of December 31, 2040, based on an economic life review of the Lakehead system. 2040 is a mere 15 years after the tunnel construction is anticipated to be done, should the Tunnel Project not experience further delays with permit appeals. There are several factors, considerations and uncertainties which support the use of a December 31, 2040 truncation date. These include current and anticipated competition to the Enbridge Mainline, actions by state and local governments and the uncertainty arising from the recent acceleration in the pace of Federal (United States and Canada), state/provincial and local governments passing decarbonization legislation or adopting policies that may influence the market demand for pipelines.

25. https://mipetroleumpipelines.org/document/alternatives-analysis-straits-pipeline-final-report
26. https://www.freep.com/story/news/local/michigan/2019/06/27/shut-down-enbridge-line-5-six-things-know/1545053001/
27. https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20210521-5119

Financial Assurances

American Risk Management Resources Network (ARMRN) provided report titled *An Analysis of The Enbridge Financial Assurances Offered to the State of Michigan On Matters Related To The Operation of The Enbridge Line 5 Pipeline At the Straits of Mackinac*[28] to the State of Michigan. ARMRN found that Enbridge, Inc. is not subject to the indemnity obligation or the financial assurance commitments under either the 1953 Easement or the Agreements negotiated with the Snyder Administration. This conclusion was based in large measure on sworn testimony provided by the Chief Financial Officer for Enbridge's U.S. operations, Mr. Chris Johnston. Mr. Johnston's testimony occurred in a "Certificate of Need/Routing Permit" proceeding to reconstruct Enbridge Line 3 that was held before the Minnesota Public Utilities Commission (PUC) in 2017-2018. In the Minnesota PUC Hearing, Mr. Johnston testified that Enbridge, Inc., as a Canadian parent company, is not contractually obligated to cover the indemnity and other financial assurance commitments of its subsidiaries. The signatories to the 1953 Easement and the Snyder Agreements are subsidiaries of Enbridge, Inc. (the "U.S. Subsidiaries"). The U.S. Subsidiaries are: Enbridge Energy, Limited Partnership; Enbridge Energy Company, Inc.; and Enbridge Energy Partners, L.P. Enbridge, Inc. is not a signatory to the 1953 Easement or the Snyder Agreements. Because Enbridge, Inc. is not obligated to cover the financial assurance commitments of its subsidiaries, the reference in the Second Agreement to "parent companies" maintaining financial assurance mechanisms is, as noted by ARMRN, a "purely voluntary endeavor for Enbridge, Inc." ARMRN concluded that, based on its review of available financial information, the U.S. Subsidiaries do not have $1.878 billion in liquid assets, credit facilities and insurance to cover losses and damages arising from a rupture of Line 5.

The State of Michigan requested a written agreement from Enbridge, Inc. to assume the indemnity and additional financial assurance obligations of its U.S. Subsidiaries under the 1953 Easement and the Agreements.[29] To date, this has not occurred.

28. https://www.michigan.gov/-/media/Project/Websites/AG/environment/enbridge/Master_Michigan_Enbridge_10_29_final_.pdf?rev=6d514dc437a946b1bc4c64ba1697de9b

29. https://content.govdelivery.com/attachments/MIDNR/2020/07/17/file_attachments/1497836/Financial%20Assurance%20for%20the%20Line%205%20Dual%20Pipelines%20in%20the%20Straits%20of%20Mackinac.pdf

Summary of Recommendations

- Revise the current Purpose and Need State as it is too restrictive to unduly restrict or preclude other alternatives, including off-site alternatives.
- Remove the statement to maintain the existing capacity of Line 5 from the Purpose and Need Statement as it too restrictive to unduly restrict or preclude other alternatives.
- The No Action Alternative analysis needs to assess both continued operation of the current dual pipelines in the Straits of Mackinac, but also decommissioning of Line 5.
- The alternative analysis must consider not only the current and future needs for energy resources, but also the implications of federal (United States and Canada), state, and local governments passing decarbonization legislation or adopting policies that may influence the market demand for pipelines.
- Assess how the project will impact the most pristine Great Lakes coastal wetlands system in Lakes Michigan and Huron, according to the Great Lakes Coastal Wetland Monitoring Program, and how Enbridge can avoid or minimize impacts to the resource.
- Assess if the 2019 survey for T&E species was appropriate due to high water conditions, and if the mitigation plan of relocating only 50% of the plants is sufficient or can be improved.
- Evaluate impacts of the project on other T&E species, notably the Hungerford's crawling water beetle found on Black River. Line 5 crosses a tributary to the Black River.
- Assess the impacts to migratory birds for which the Straits of Mackinac is a continental nexi.
- Evaluate the lack of emergency response capabilities in the Straits of Mackinac area, and how maritime conditions will impact the ability to effectively contain and recovery spilled oil in a sensitively unique ecosystem.
- Determine what emergency response measures would be needed for the project to proceed.
- Evaluate how the tunnel project would impact the remainder of the pipeline infrastructure, which crosses nearly 400 water bodies in Michigan, many of which are tributaries to Lakes Michigan and Huron or are Waters of the U.S.
- Assess the project's greenhouse gas emissions and how the emissions are/may be inconsistent to achieving state/federal/global climate policies.
- Include the associated public costs of the greenhouse gas emissions as part of the cost-benefit analysis.
- Review the geotechnical boring investigation to determine if the analysis was sufficient to characterize the anticipated ground condition to reduce and avoid adverse impacts to environmental resources, or what additional boring investigations are needed.
- Assess Enbridge's operational history in Michigan, including the fact Enbridge is currently trespassing on state bottomlands, prior incidents in the Straits of Mackinac, and incidents along the entire Line 5 infrastructure, including the oil discharge in Marshall in 2010.
- Evaluate impacts to Tribal Treaty resources, including hunting, fishing, and gathering rights.
- Recognize the importance of the Tribal Treaties and their opposition to the proposed project. Assess all potential impacts to Tribes, included, but not limited to: historical and cultural resources, traditional knowledge, increased violence and sexual assaults on Native communities, and formal consultation.
- Examine the concerns expressed regarding cultural resources and ensure data gaps are adequately filled in a broad manner to determine not only cultural resources within the Straits, but potential impacts to nonrenewable cultural resources and place-based heritage.

- Determine the risk of an explosion in the tunnel along with the breach of the secondary containment vessel. Identify methods, if any, to reduce the risk of explosion.
- Evaluate the cost to the public associated with construction of the tunnel project.
- Conduct a cost-benefit analysis that includes the cost estimate of a spill in the Straits, as well as economic strain on local communities from the influx of workers on infrastructure such as law enforcement and human services.
- Assess job creation between the proposed project and the No Action Alternative, specifically decommissioning of Line 5. Include a comparison of job creation of the proposed project to the current jobs provided by the Great Lakes.
- Determine if there is a need for Line 5 to provide propane for the Project Purpose and Need Statement. Include reference to the MI Propane Security Plan.
- Evaluate the various studies conducted that have determined there are alternatives to Line 5.
- Consider the relevant extent of the public need for the proposed work. Consider how much of the commodities are used by citizens of Michigan and the residents of the region.
- Review the Enbridge depreciation report and assess why the project is needed when Line 5 has a truncation date of December 31, 2040.
- Assess the financial assurances associated with Line 5, and consider requiring Enbridge to provide actual and additional financial assurances to protect the State of Michigan and the Waters of the U.S.

Conclusion

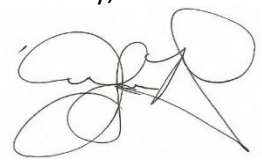
The waters and shoreline areas of Lakes Michigan and Huron as well as the areas surrounding and adjacent to the Straits of Mackinac contain abundant natural and cultural resources that are of vast ecological and economic value, including fish, wildlife, coastal wetlands, and a variety of aquatic and terrestrial plants. It is imperative that the U.S. Army Corps of Engineers conduct a thorough and detailed Environmental Impact Statement for the Enbridge Line 5 Great Lakes Tunnel project to ensure the project is compliant with the Federal Guidelines promulgated under Section 404(b)(1)of the Clean Water Act (CWA) at 40 CFR Part 230 to protect the public's interest and waters of the U.S.

Tip of the Mitt Watershed and Michigan Environmental Council are significantly concerned about the adverse impacts from the proposed project, including potential impacts on pristine Great Lakes coastal wetlands, threatened and endangered species, migratory birds, climate change, cultural resources, and Tribal treaties. Factors for consideration that could exacerbate impact the lack of emergency response capabilities, insufficient geotechnical boring investigations, Enbridge's prior operational history and current trespassing on state bottomlands. Additional considerations must include usage and need for the commodities, not only now, but in the future, especially in light of federal, state, and local policies to decarbonize and move away from fossil fuels.

Thank you for embracing the EIS process for the Line 5 Great Lakes Tunnel Project and for the opportunity to comment.

If you have any questions regarding the content of this letter, please contact Jennifer McKay, policy director at Tip of the Mitt Watershed Council, at jenniferm@watershedcouncil.org or 231-347-1181.

Sincerely,



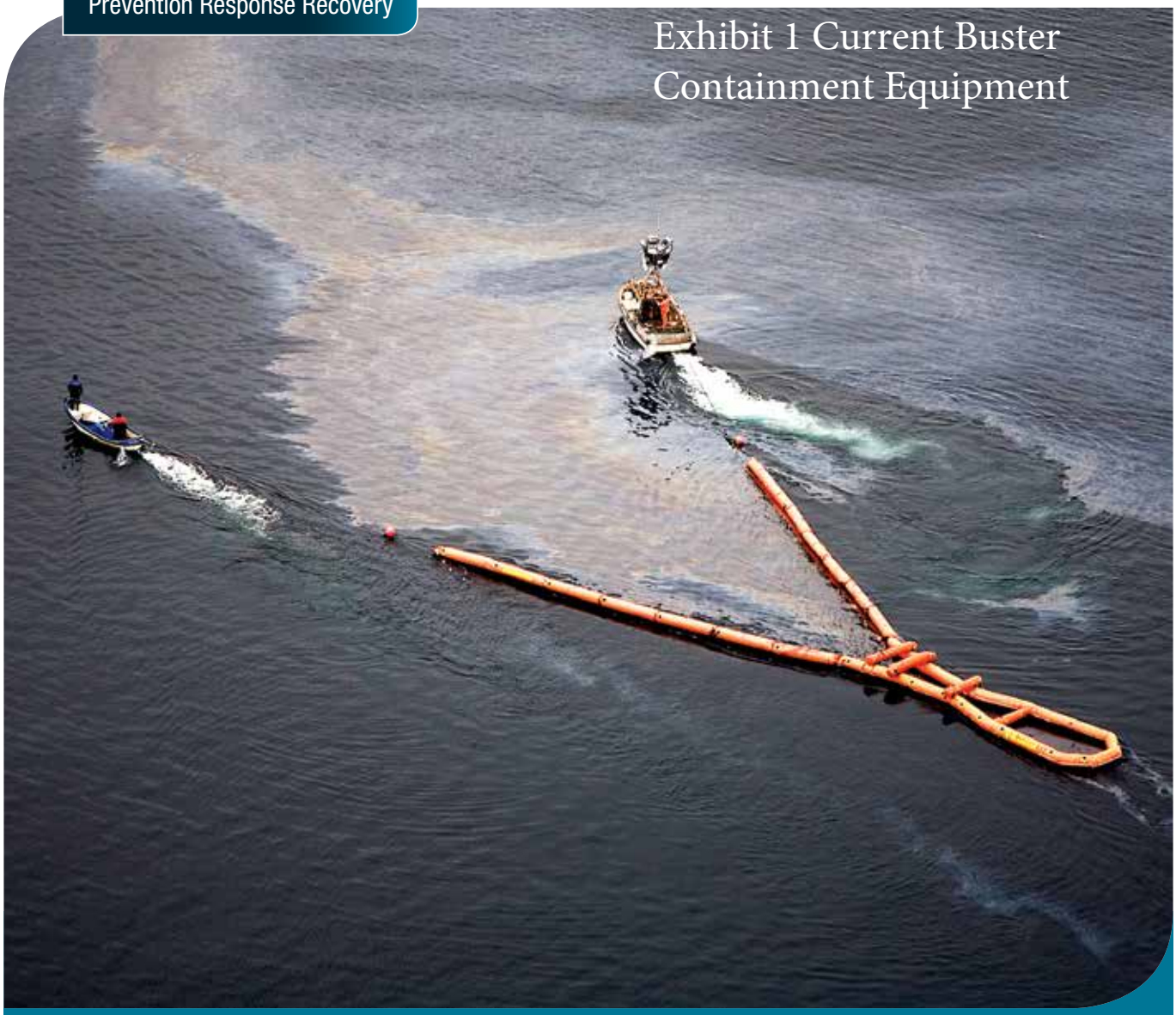
Jennifer McKay
Policy Director
Tip of the Mitt Watershed Council

Ross Gavin
Urban Land Use & Infrastructure Policy Director
Michigan Environmental Council

ENVIROPACIFIC
SERVICES

Prevention Response Recovery

Exhibit 1 Current Buster
Containment Equipment



Current Buster

Efficient, high speed oil containment

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enviropacific.com.au
products@enviropacific.com.au

RSP-ALM-C03

ENVIROPACIFIC SERVICES

Current Buster

Efficient, high speed oil containment

Product advantages

- Up to 5 knots without losses
- In built separation and temporary storage section
- Thick layer of oil produced for excellent recovery rates
- Single vessel tow when used with a vane system
- Suitable for most oils
- No adjustments required
- Four sizes available

The NOFI Current Buster is an internationally patented revolutionary oil spill contingency system regarded as the most efficient on the market. The system contains and controls oil spills at up to 5 knots towing speed with minimum losses, and is suitable for most types of oils.

Development of the Current Buster has been ongoing since 1995, and is used by a number of world leading oil spill contingency organisations. This proven system has undertaken extensive testing in controlled environments as well as real world oil and diesel spill incidents.

The Current Buster has the unique ability to collect and concentrate oil spills in current exposed waters and demanding conditions. The thick concentrated oil provides very efficient recovery rates, offering a great advantage when pumping into storage tanks.

The system has excellent maneuverability and can be towed conventionally between two vessels, or by only one vessel when used with a single vessel vane system. A high capacity separation and temporary storage section is incorporated in the Current Buster, which is available in four different sizes depending on application.

The Current Buster 2 and Current Buster 4 are designed for operations in areas from protected inlets and harbours, and can also be used in coastal areas and ocean currents.

The Current Buster 6 and Current Buster 8 are the heavier duty Current Buster products, designed for operations in open water, with strong currents, or in extreme weather up to Beaufort 7.

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ENVIROPACIFIC SERVICES

TECHNICAL SPECIFICATIONS

Current Buster

Efficient, high speed oil containment

Product compliance

- US Coast Guard OHMSETT tested (1999)
- Canadian Coast Guard tested (2000)
- US NAVY tested with diesel oil (2001)

Model	Current Buster 2	Current Buster 4	Current Buster 6	Current Buster 8
Application	Protected waters (Beaufort 4-6), offshore and coastal (Beaufort 4)	Protected waters (Beaufort 4-6), offshore and coastal (Beaufort 4)	Offshore (Beaufort 5), protected waters (Beaufort 7)	Offshore (Beaufort 5), protected waters (Beaufort 7)
Front opening	15 m	22 m	34 m	50 m
Total length	27 m	35 m	63 m	65 m
Temp. storage volume	15 m^3	32 m^3	70 m^3	70 m^3
Max towing speed	3 knots	4 knots	5 knots	5 knots
Buoyancy chamber material	1100 g/m^2 PU/PVC coated polyester	1100 g/m^2 PU/PVC coated polyester	1150 g/m^2 heavy duty PU/PVC coated polyester	1150 g/m^2 airtight PU/PVC Coated Polyester
External fabric	Heavy Duty PU/PVC coated polyester	Heavy Duty PU/PVC coated polyester	Heavy Duty PU/PVC coated polyester	Heavy Duty PU/PVC coated polyester
External fabric tensile and tear strength	7400 N/50 mm, 1900 N	7400 N/50 mm, 1900 N	7400 N/50 mm, 1900 N	7400 N/50 mm, 1900 N
Storage	Optional (reel, pallet, net)	Boom reel 500 mm min shaft dia.	Boom reel 500 mm min shaft dia.	Boom reel 500 mm min shaft dia.
Storage temp	-30 to 70°C	-30 to 70°C	-30 to 70°C	-25 to 70°C
Recomended deck space	3.2 x 5 m	5 x 5 m	5 x 5 m	5 x 5 m
Connectors	N/A (stand-alone operation)	NOFI DRC, (Dynamic Response Connector)	NOFI DRC (Dynamic Response Connector)	NOFI DRC (Dynamic Response Connector)
Inflation	By backpack blower or electric fan	By backpack blower or electric fan	By backpack blower or electric/ hydraulic fan	By backpack blower or electric/ hydraulic fan
Oil types	All types of diesel to high viscosity oil	All types of diesel to high viscosity oil	All types of diesel to high viscosity oil	All types of diesel to high viscosity oil
Reflectors	50 × 200 mm pads	50 × 200 mm pads	50 × 200 mm pads	50 × 200 mm pads
Product options	Boom reel, power pack, pump (skimmer), vane system	Boom reel, power pack, pump (skimmer), vane system	Boom reel, power pack, pump (skimmer), vane system	Boom reel, power pack, pump (skimmer), vane system

For further technical assistance, please contact us.

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EXHIBIT 2 BEAUFORT SCALE

BEAUFORT WIND FORCE SCALE:
Specifications and equivalent speeds for use at sea

FORCE	Equivalent miles/hr	Speed knots	Wave m	Height ft	Description	Map Symbols	U.S. Advisory Flags	SPECIFICATIONS FOR USE AT SEA
0	0-1	0-1	0	0	Calm			Sea like a mirror
1	1-3	1-3	.1	.33	Light Air			Ripples with the appearance of scales are formed, but without foam crests.
2	4-7	4-6	.2	.66	Light Breeze			Small wavelets, still short, but more pronounced. Crests have a glassy appearance and do not break.
3	8-12	7-10	.6	2	Gentle Breeze			Large wavelets. Crests begin to break. Foam of glassy appearance. Perhaps scattered white horses.
4	13-18	11-16	1	3.3	Moderate Breeze			Small waves, becoming larger; fairly frequent white horses.
5	19-24	17-21	2	6.6	Fresh Breeze			Moderate waves, taking a more pronounced long form; many white horses are formed. Chance of some spray.
6	25-31	22-27	3	9.9	Strong Breeze		Small Craft Advisory 	Large waves begin to form; the white foam crests are more extensive everywhere. Probably some spray.
7	32-38	28-33	4	13	Near Gale			Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind.
8	39-46	34-40	5.5	18	Gale		Gale Warning 	Moderately high waves of greater length; edges of crests begin to breakinto spindrift. The foam is blown in well-marked streaks slong the direction of the wind.
9	47-54	41-47	7	23	Severe Gale			High waves. Dense streaks of foam along the direction of the wind. Crests of waves begin to topple, tumble and roll over. Spray may affect visibility.
10	55-63	48-55	9	30	Storm		Storm Warning 	Very high waves with long over-hanging crests. The resulting foam, in great patches, is blown in dense white streaks along the direction of the wind. On the whole the surface of the sea takes on a white appearance. The 'tumbling' of the sea becomes heavy and shock-like. Visibility affected.
11	64-72	56-63	11.5	38	Violent Storm			Exceptionally high waves (small and medium-size ships might be for a time lost to view behind the waves). The sea is completely covered with long white patches of foam lying along the direction of the wind. Everywhere the edges of the wave crests are blown into froth. Visibility affected.
12	73-83	64-71	14+	46+	Hurricane		Hurricane Warning 	The air is filled with foam and spray. Sea completely white with driving spray; visibility very seriously affected.

"The scale was created in 1806 by Sir Francis Beaufort, a British naval officer. The initial scale did not have wind speeds, but listed a set of qualitative conditions from 0 to 12 by how a naval vessel would act under them - from 'just sufficient to give steerage' to 'that which no canvas could withstand'. The scale was made a standard part of log entries for Royal Navy vessels in the late 1830s." From Wikepedia

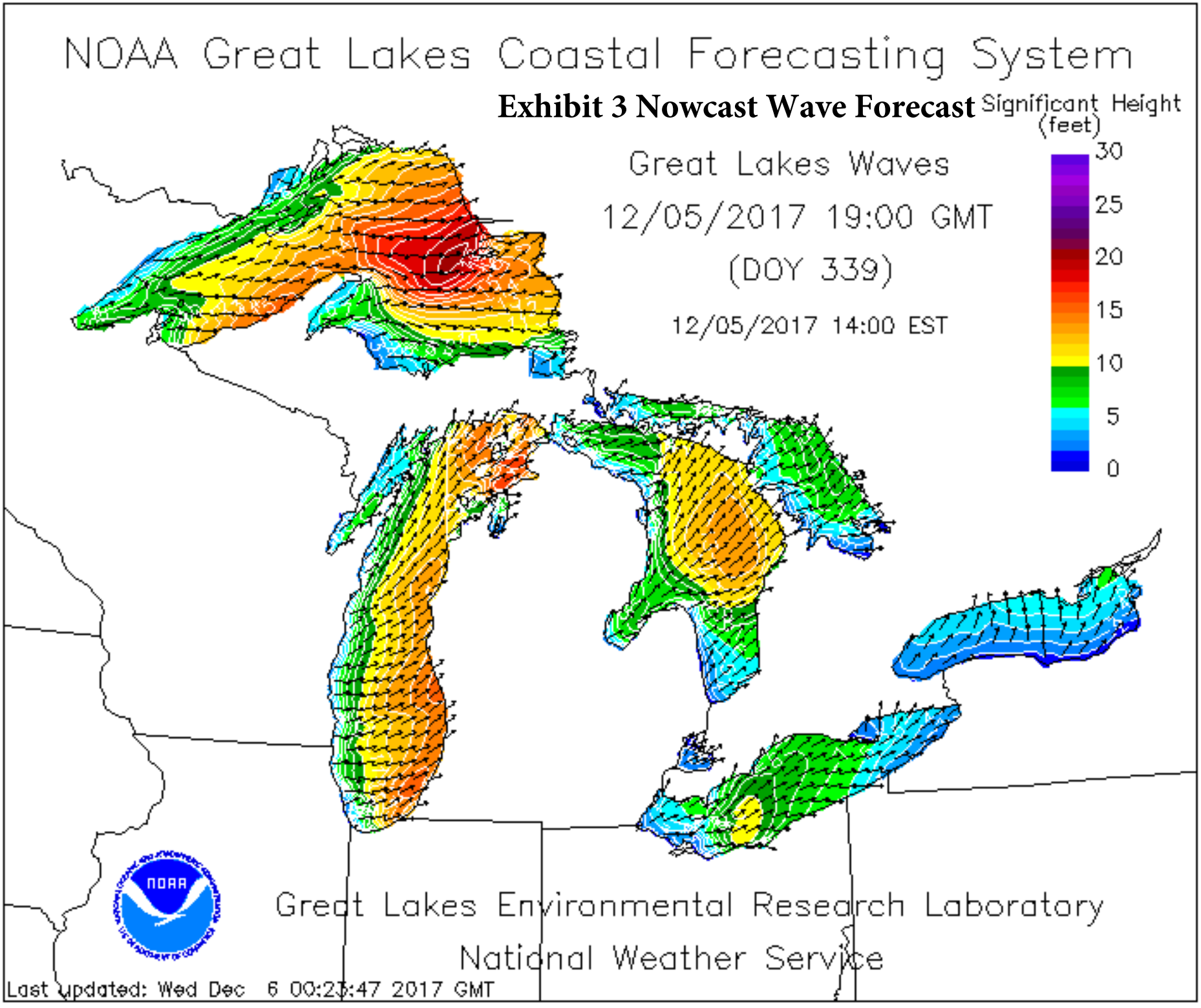
NOAA Great Lakes Coastal Forecasting System
Exhibit 3 Nowcast Wave Forecast
Significant Height (feet)
30
25
20
15
10
5
0
Great Lakes Waves
12/05/2017 19:00 GMT
(DOY 339)
12/05/2017 14:00 EST
NOAA
Great Lakes Environmental Research Laboratory
National Weather Service
Last updated: Wed Dec 6 00:25:47 2017 GMT

Exhibit 4
NOAA High Wind Data At Mackinac City

A Sustained Wind Event is a consecutive 3-hour period with winds above 20 mph

MACM4 Mackinac City

2016

Total Sustained Wind Events = 23 **Duration** (hrs) **Min:** 4 **Max:** 14 **Avg:** 7

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3-Hr. Periods exceed 20 mph	416	572	576	534	38	68	54	99	54	262	606	1060	4339
% 0f 3-Hr. Periods exceed 20 mph	6%	8%	8%	8%	1%	1%	1%	1%	1%	4%	9%	14%	5%

2015

Total Sustained Wind Events = 23 **Duration** (hrs) **Min:** 4 **Max:** 22 **Avg:** 8

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3-Hr. Periods exceed 20 mph	737	290	338	699	171	20	20	46	25	938	620	1026	4930
% 0f 3-Hr. Periods exceed 20 mph	10%	4%	5%	10%	2%	0%	0%	1%	0%	13%	9%	14%	6%

2014

Total Sustained Wind Events = 16 **Duration** (hrs) **Min:** 4 **Max:** 13 **Avg:** 7

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3-Hr. Periods exceed 20 mph	557	498	204	867	195	68	128	19	104	443	852	408	4343
% 0f 3-Hr. Periods exceed 20 mph	8%	7%	3%	12%	3%	1%	2%	0%	1%	6%	12%	6%	5%

2013

Total Sustained Wind Events = 18 Duration (hrs) Min: 4 Max: 27 Avg: 9

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3-Hr. Periods exceed 20 mph	620	592	249	842	290	14	63	89	47	458	949	1021	5234
% 0f 3-Hr. Periods exceed 20 mph	8%	9%	3%	12%	4%	0%	1%	1%	1%	6%	13%	14%	6%

2012

Total Sustained Wind Events = 19 Duration (hrs) Min: 4 Max: 22 Avg: 8

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3-Hr. Periods exceed 20 mph	654	424	698	310	133	160	57	312	233	606	612	769	4968
% 0f 3-Hr. Periods exceed 20 mph	9%	6%	9%	4%	2%	2%	1%	4%	3%	8%	9%	10%	6

Data from NOAA site **http://www.ndbc.noaa.gov/station_history.php?station=macm4**

Exhibit 5 Wind Conditions in the Straits 12/5/17