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Bay du Nord Development Project
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September 14, 2020

Re: WWF-Canada's Submission to the IAAC on the Bay du Nord Environmental Impact Statement submitted by Equinor Canada Ltd.

Dear Impact Assessment Agency of Canada:

Thank you for the opportunity to submit comments on the Bay du Nord Environmental Impact Statement (EIS) submitted by Equinor Canada Ltd. to the Impact Assessment Agency of Canada (IAAC) on July 10, 2020. WWF-Canada supports the federal environmental assessment process as it is an important component in ensuring that offshore oil and gas activities in Canada's Atlantic offshore are conducted safely with the lowest possible risk to human health and the environment.

World Wildlife Fund (WWF) is one of the largest independent conservation organizations in the world. WWF-Canada is part of the WWF global network, working in over 100 countries worldwide. WWF-Canada creates solutions to the environmental challenges that matter most for Canadians. We work in places that are unique and ecologically important, so that wildlife, nature and people thrive together. WWF-Canada believes healthy coastal communities depend on healthy oceans. We work with communities, Indigenous peoples and other groups to advocate for marine protected areas and sustainable oceans management, and to ensure the rules governing offshore oil and gas activities are consistent with international best practices for safety, accountability and environmental protection.

While we support the impact assessment process, we note that the 45-day comment period for the Bay du Nord EIS is likely far too short a time for many stakeholders to review the entirety of the EIS documentation submitted by Equinor, which is over 2000 pages in length, not including the EIS summary and the 17 appendices. The project proponent did not publicly present the EIS until August 11, which left only 22 business days to review and prepare comments on thousands of pages of documentation. This may have significantly impeded the ability of some organizations and individuals to submit thorough and sufficiently detailed public comments and we fear that the quality of this environmental assessment process may suffer as a result. Moreover, it should be noted that some of the statements and data presented by the proponent on August 11 are not consistent with claims made in the EIS, as described below.

With the limited time available to us during the public comment period, WWF-Canada has reviewed all 18 chapters of the Environmental Impact Statement, the EIS summary, and the 17 appendices.

Contents

I. Introduction and Summary

According to Equinor Canada's Environmental Impact Statement (EIS), the Bay du Nord (BdN) project is estimated to contain up to 300 million barrels of technically recoverable crude oil (or roughly 3 days of global oil consumption) with a project duration of up to 30 years. Upstream carbon dioxide (CO_2) emissions from the project are estimated to be between 176,000-258,000 tonnes per year, according to the proponent, which if true would be by far the lowest greenhouse gas (GHG) emissions of current production operations in the Newfoundland-Labrador offshore. The proponent acknowledged that activities such as geophysical surveys and exploration drilling may overlap with fishing in the project area and that seismic surveys have the potential for cumulative behavioural impacts on marine mammals, although these effects are claimed to be localized and short-term with the application of mitigation measures.

Overall cumulative effects of the BdN project are "predicted to be not significant" and potential environmental interactions and effects are "well understood" according to the proponent. The probability of a loss of well control (i.e. well blowout) has been estimated at 1 in 10,000 with no significant impacts to migratory birds expected to arise should a blowout occur, although it *was* acknowledged during the proponent's public presentation of the EIS on August 11, 2020 that there *would* be significant impacts to birds in the event of a blowout. Marine mammal observers will be used for vessel traffic to and from the project area (but not on seismic testing vessels) and the company says it will be implementing "robust" accident prevention and response measure to mitigate against the impact of any potential spills, although an oil spill response plan has yet to be developed. In the proponent's public EIS presentation, an Equinor representative responded to a question from WWF-Canada about the project's economic viability by stating that "whether the project proceeds has not yet been established" by the company.

We will consider each one of the above assertions in turn in our comments below, but the following is a high-level summary of our main points.

1. **Economic viability** – although the economic considerations of the BdN project do not constitute a significant part of the EIS, we note that the proponent does advocate for the potential economic benefits that may arise from the project and cites misleading data regarding the future demand for fossil fuels. As such, we are inclined to note in our comments that the viability of this project in a carbon-constrained world with oil prices under $50 USD per barrel for the foreseeable future is not promising. The development of this resource may well result in a stranded asset for the company and a significant loss of investment for both public and private investors. It is not true that global fossil fuel demand is destined to rise over the coming decades. This is highly disputed and we may have in fact already reached peak demand, making higher cost resources such as the deep water North Atlantic less viable.

2. **Marine impacts** – the evidence presented in the EIS is not sufficient to conclude that the cumulative effects of the project to marine wildlife are likely to be "localized and short-term" and "not significant".

3. **Greenhouse gas emissions** – it is not clear how the proponent calculated upstream CO_2 emissions for the BdN project at less than half of other offshore installations in the region. Even if true, BdN's GHG emissions *will* be significant to the province's overall GHG emissions targets, contrary to the proponent's claims, and it is important to note that

the figures cited in the EIS do not include downstream emissions when the oil is burned, which will increase overall CO_2 emissions of the project by roughly a factor of ten.

4. **Blowout risk** – the proponent has used a blowout risk calculation (1 in 10,000) during its public presentation on August 11, 2020 that is inconsistent with the probabilities cited in the EIS. The higher probabilities given in the EIS are nonetheless low in comparison to published data on the blowout history of offshore drilling. The proponent's risk calculation also does not factor in the severe consequences to marine wildlife and the fishing industry, should a blowout occur in a remote offshore region where spill response would be extremely challenging, which increases the project's overall risk.

5. **Blowout impact** – as we have seen with recent and frequent oil spills in the Newfoundland and Labrador offshore, there can be considerable impacts to migratory birds and other marine wildlife when these accidental spills occur, let alone were an uncontrolled blowout to occur. The proponent's assertion in their public EIS presentation that there would be no significant impacts to migratory birds should an accident occur is not substantiated by the evidence provided.

6. **Spill prevention and response** – given the significant environmental impacts in the event of a major spill or blowout, the proponent's proposed risk mitigation measures for accident prevention and response are not satisfactorily "robust" as claimed and are insufficient to ensure that project risk is reduced to a level that is as low as reasonably practicable. The proponent states in the EIS that they will not be able to cap an out-of-control well for up to 36 days and, should a relief drilling rig be required to plug a well, it may take up to 115 days. This is not acceptable.

7. **Protected and special areas** – the proponent states that well templates will not be placed over *Lophelia pertusa* corals, a species not present in the project area. In order to mitigate impacts on sensitive coral and sponge habitats, more appropriate indicator species need to be determined when creating mitigation measures, and areas with defined benthic conservation objectives and areas protected by the Northwest Atlantic Fisheries Organization should be avoided.

8. **Seismic testing** – the EIS downplays the potentially significant impacts to marine wildlife of seismic blasting programs and proposes no mitigation measures to reduce the impacts of seismic testing to marine wildlife, despite a mounting body of scientific evidence showing the sometime severe and fatal impacts of these surveys. The proponent has pledged to use marine mammal observers for the purposes of mitigating the impacts of vessel strikes, but this measure has been shown to be limited in its effectiveness.

II. Main Recommendations

1. The projected economic benefits provided by the project proponent and the economic viability of BdN should be scrutinized by the IAAC very carefully to understand the assumptions made in the estimates.
2. It is not clear to us how the BdN project will achieve a 50 per cent GHG emissions reduction compared with the other drilling rigs offshore of Newfoundland and Labrador and we recommend that the IAAC carry out a detailed analysis of this claim. The BdN project is not compatible with the province's emissions reduction targets.
3. It appears that the proponent is not yet certain about the need for 'high pressure, high temperature' wells. This is something that the IAAC will need to confirm with the proponent as it will alter the risk assessment and blowout probability for the project.
4. The IAAC must insist that the proponent provides detailed and adequate prevention measures before the EIS and the drilling program is approved. The proponent states that these have not yet been developed.
5. Before approving the EIS, the IAAC must insist that the proponent provide its comprehensive well capping and containment plan.
6. The IAAC should require the proponent to have immediate access (within 24 hours) to surface and subsea containment resources that would be adequate to promptly respond to a blowout or other loss of well control.
7. We strongly encourage the IAAC to require that a relief drilling rig be kept on site or in the vicinity of the project area. The proponent proposes a delay of up to 115 days for a relief drilling rig to arrive on site in the event of a well blowout.
8. The oil spill trajectory and impact modeling approach should be verified to assess its accuracy and reliability given some of the conclusions derived from it.
9. Given the high stakes, the methodology by which the proponent claims the impacts of a blowout on certain species would be "insignificant" merits closer scrutiny and verification. The evidence provided does not support this conclusion.
10. The IAAC should not permit seismic surveys in areas/seasons rich in marine life and sensitive species and should require the seismic source level to be lowered. The use of air gun alternatives such as Marine Vibroseis, which can drastically cut noise levels and limit the frequencies (pitches) of noise output, should be adopted.
11. Oil and gas activities should not be permitted within Vulnerable Marine Ecosystems (VMEs) and recommends that those portions of the Project Area that overlap with protected area, refuges, closures or other VMEs must be excluded from development in order to help conserve biodiversity and uphold Canada's commitments to marine conservation under NAFO. That these areas were set aside by all NAFO contracting parties, and made off limits to fish harvesters, to then be open for oil and gas development by Canada is not acceptable.

III. Economic Viability of Bay du Nord

The proponent makes the common error of citing U.S. Energy Information Administration (EIA) "forecasts" for increased energy demand (i.e. fossil fuel consumption) in the coming decades. However, the EIA clearly emphasizes in its reports that it does not make forecasts.[1] Their reports are *projections,* not *predictions,* based on energy policies that are currently in place around the world. "Reference case projections in each edition of the IEO are not predictions of what is most likely to happen, but rather they are modeled projections under various alternative assumptions" (page 7, EIA 2019). In other words, the EIA does not include projections for a world that meets carbon reduction targets under the Paris Agreement because current policies around the world are not yet in place to meet these targets. *If* governments were to take their Paris commitments seriously and put in policies to ensure targets are met, increasing global oil and gas demand until 2040 could not possibly take place and the case for offshore oil and gas in Newfoundland and Labrador is far less promising.

Put another way, one could argue that the future success of the offshore industry in Newfoundland and Labrador is predicated upon the global community not taking the actions necessary to limit global warming sufficiently, as the demand for higher cost North Atlantic oil is likely to be significantly reduced in a low carbon or Paris-compliant world.[2] Moreover, the Covid-19 pandemic may well have accelerated the decline of fossil fuel production with some analysts speculating that the world has already reached so-called "peak oil" and global demand may continue to fall as the price of renewable energy becomes increasingly cost competitive.[3] In June of this year, the ratings agency Moody's predicted that the economic slowdown and behavioural shifts that have emerged from the pandemic will likely accelerate the low-carbon energy transition and could deliver "lasting changes in energy consumption".[4]

A February 2018 report by Wood McKenzie speculated that the breakeven price for deep water oil offshore Newfoundland and Labrador is one of the highest in the world at roughly $50 USD per barrel, which is above the current market price.[5] Future oil prices are predicted to remain highly volatile in coming decades, further undermining the prospects for North Atlantic offshore oil and elevating the subsequent risks of investing in these projects.[6] It is notable that in March of this year, the Bay du Nord proponent announced they would be deferring the project to make it "more robust for low commodity prices."[7]

The oil giant BP wrote off $17.5 billion USD of its assets in June 2020 based on the company's predicted average future oil price of just $55 USD per barrel (to 2050), below the price required for most Canadian offshore Atlantic oil projects to be viable.[8] There is also increasing pressure on governments around the world to increase carbon pricing in response to the climate crisis, which would reduce global demand for fossil fuels and further undermine the economic case for North Atlantic oil. During the proponent's presentation of the EIS on August 11, 2020 an Equinor representative responded to a question from WWF-Canada about the project's economic viability by stating that "whether the project proceeds has not yet been established."

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[1] https://www.eia.gov/outlooks/ieo/pdf/ieo2019.pdf
[2] https://www.carbontracker.org/reports/breaking-the-habit/
[3] http://www.energyintel.com/pages/eig_article.aspx?DocID=1076248
[4] https://www.moodys.com/research/Moodys-Coronavirus-effects-likely-to-speed-energy-transition--PBC_1234616
[5] https://www.gov.nl.ca/nr/files/publications-energy-competitiveness-oil-gas-investment.pdf
[6] https://oilprice.com/Energy/Oil-Prices/Citigroup-Oil-Will-Never-Return-To-100.html
[7] https://www.cbc.ca/news/canada/newfoundland-labrador/bay-du-nord-deferred-1.5501559
[8] https://www.bp.com/en/global/corporate/news-and-insights/press-releases/bp-revises-long-term-price-assumptions.html

The EIS also claims that the project would generate $3.5 billion CAD in government revenue, but it is not clear how this figure was calculated and under what oil price scenario. Historically, we know that governments and corporations often underestimate the costs and overestimate the potential tax revenue, local employment and procurement, new infrastructure, and community investment that is predicted to result from industrial projects. Actual benefits do not typically live up to the promises made. **The projected economic benefits provided by the project proponent and the economic viability of BdN should be scrutinized by the IAAC very carefully to understand the assumptions made in the estimates.**

IV. Greenhouse Gas Emissions

On page 2-7 of the EIS, the proponent states that "The Project will be important in meeting future demand for energy sustainably, with low carbon dioxide (CO_2) intensity. This will assist in addressing provincial (NL Carbon Plan), Canadian (Pan-Canadian Framework on Clean Growth and Climate Change) and global (Paris Agreement) goals." Even if we accept the proponent's ambitious GHG emissions claims for the BdN project (discussed below), it is not credible to state that a new fossil fuel extraction project will somehow <u>assist</u> in addressing provincial and Canadian climate goals. By what metric does drilling for and burning *more* oil help with the reduction of GHG emissions? If there were some evidence provided that this project would be displacing more carbon intensive forms of energy, this may well be true, but no such evidence is provided.

The GHG emissions for the four currently operating drilling platforms offshore Newfoundland and Labrador emit an average of 500,000 tonnes of CO_2 annually.[9] However, in the EIS (page 8-20), the proponent states that the BdN project will only emit between 176,000 and 258,000 tonnes of CO_2 emissions, or less than half the average of the other four, depending on the power option chosen. Even if true, this figure is roughly equivalent to putting an additional 50,000 automobiles on the road each year.[10] We note that, on August 11, the proponent did not clarify during their public EIS presentation that the lower figure of 176,000 tonnes per year was calculated under a 'normal production operations' scenario that did <u>not</u> include drilling.

It is not clear to us how the BdN project will achieve a 50 per cent emissions reduction compared with the four other drilling rigs offshore of NL and we would recommend that the IAAC carry out a detailed analysis of this claim. Emissions mitigation measures are listed on page 8-7; however, these appear to be fairly standard measures for offshore drilling rigs (flaring, high efficiency burners, etc.). Even if correct, this relatively low emissions number would still contribute roughly 2 per cent of Newfoundland and Labrador's average annual emissions according to the proponent, which seems fairly small at first glance. However, this proportion will surely rise as the province strives to reduce its annual GHG emissions by 30 per cent below 2005 levels by 2030 and of course the estimate does not factor in the downstream emissions when the oil is burned. By some estimates, downstream emissions can increase a project's total GHG output by up to ten times. According to a 2017 analysis from the

[9] ECCC GHGRP. 2018. *Greenhouse Gas Reporting Program.* Environment and Climate Change Canada. Available at: https://climate-change.canada.ca/facility-emissions/, version 1.0.6656.24545

[10] U.S. Environmental Protection Agency. Greenhouse Gas Equivalencies Calculator. https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Climate Accountability Institute, downstream emissions account for 90 per cent of a project's total lifecycle emissions.[11,12]

Again, it is difficult to see how the BdN project could in any way assist the province and the country in reducing GHG emissions, as the proponent claims. In 2016, total CO_2 emissions in Newfoundland and Labrador were 10.8 million tonnes (Mt), with oil and gas operations in the province accounting for 25 per cent of the total, or 2.7 Mt.[13] In 2018, the provincial government set an aspirational target of reducing greenhouse gas emissions to 6.9 Mt by 2030.[14] This means GHG emissions from offshore oil production (which are projected to increase to 4.9 Mt annually by 2030) would account for 71 per cent of the province's total emissions in 2030, making it virtually impossible for the province to meet its 2030 GHG reduction target. By our calculations, upstream emissions from the BdN project alone will account for roughly 10-20 per cent of the total increase in emissions from the province's oil and gas sector by 2030. This is not an insignificant amount, as the proponent suggests in the EIS.

Unfortunately, there is no "climate test" in Canadian legislation or environmental assessments to ensure that fossil fuel development is compatible with national and international climate targets, both in terms of upstream and downstream emissions. Decisions about whether and under what conditions to allow offshore oil and gas activities can be made without fully accounting for compatibility with climate targets and the urgent need to transition to renewable sources of energy. If there were such a climate test in Canada's impact assessment process, it is likely that the BdN project would not be approved due to incompatibility with national and provincial emissions reduction targets.

The world's energy transition is driven by the global consensus that to avoid disaster, the Earth's overall rise in temperature must be no more than 2°C, according to the Paris Agreement, with a safer aspirational target of 1.5°C.[15] However, carbon emissions from the full production of currently operating oil and gas fields and coal mines across the world will almost certainly lead to global temperature rise beyond 2°C. To stay within this target, studies indicate that 68-80 per cent of existing global fossil fuel reserves must stay in the ground.[16] The lowest cost reserves will be exploited first, whereas higher priced oil, such as in the North Atlantic offshore, will be much less viable in a low carbon world.

V. Blowout Risk

Section 16.3.4 of the EIS states the following:

> "Analyses of international and national historical offshore well spill data verify that large blowouts (i.e., incidents involving loss of well control or uncontrolled flow) and non-blowout well releases (i.e., incidents involving the flow of oil or gas from some point in a well where flow was not intended) can be considered relatively rare

[11] Climate Accountability Institute. 2017. The Carbon Majors Database: CDP Carbon Majors Report 2017.

[12] Lee, M. 2017. Extracted Carbon: Re-examining Canada's Contribution to Climate Change through Fossil Fuel Exports. *Canadian Centre for Policy Alternatives*, p.5. https://www.policyalternatives.ca/publications/reports/extracted-carbon

[13] https://www.cer-rec.gc.ca/nrg/ntgrtd/mrkt/nrgsstmprfls/nl-eng.html?=undefined&wbdisable=true

[14] https://www.exec.gov.nl.ca/exec/occ/publications/The_Way_Forward_Climate_Change.pdf

[15] United Nations Climate Change. The Paris Agreement. https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

[16] See Carbon Tracker Initiative. 2011. Unburnable Carbon – Are the world's financial markets carrying a carbon bubble? https://www.carbontracker.org/reports/carbon-bubble/; M. Raupach et al. 2014. Sharing a quota on cumulative carbon emissions. *Nature Climate Change* 873; Oil Change International. Sept. 2016. The Sky's Limit: Why the Paris Climate Goals Require A Managed Decline of Fossil Fuel Production. (http://priceofoil.org/2016/09/22/the-skys-limit-report/

> events (i.e., with a probability of 2.8×10^{-4} per well for development drilling and 3.5×10^{-5} per well-year for wells in production)....The estimated probability that a specific individual development well from the proposed Project would have a blowout varies by location, with the difference being attributable to water depth, **with blowouts being 40 percent more likely for deeper sites...** The blowout probability of **2.8×10^{-4}** per well means that in the historical data there was one blowout recorded for every 3,571 development wells drilled." (Emphasis added.)

The blowout probability estimate mentioned in the excerpt above is not the same as the blowout probability presented by the proponent on August 11, 2020 in their public slide presentation, which states that a subsurface crude oil blowout was a "very low probability event (1×10^{-4})" or 1 in 10,000. It is not clear why the blowout probability stated in the EIS (2.8×10^{-4}) is three times higher.

In addition, even the proponent's blowout risk estimates in the EIS may not be accurate. BdN drilling will be taking place at water depths of 1,000 to 1,200 metres (deep water drilling). A Scandower report based on SINTEF data concludes that the blowout risk of "normal" wells in deep water is actually 3.1×10^{-4} (not 1×10^{-4})[17] and, if the BdN project entails drilling 'high pressure, high temperature' (HPHT) wells, the blowout frequency is 1.9×10^{-3} according to SINTEF, an order of magnitude higher than the estimate provided by the proponent. **It appears that the proponent is not yet certain about the need for HPHT wells, given that the EIS states on page 2-47 that geotechnical surveys would be required to measure pore pressure. This is something that the IAAC will need to confirm with the proponent.** Likewise, page 16-17 of the EIS states that "The severity of the kick depends on the porosity and the permeability of the formation." If HPHT drilling wells are required, the blowout risk will be much higher than stated in the EIS.

In any case, the probability of a well blowout is only one component of the risk assessment process. Risk is typically defined by the following:

Risk = Probability of Event X Consequence of Event[18]

In other words, when assessing the risk of a deep water well blowout, it is necessary to consider the possible *consequences* of an accident along with its potential *likelihood*. While it may be true, as stated in the EIS, that the likelihood of a blowout is small, the *consequences* of such an event would be much more devastating in the Atlantic offshore than elsewhere, due to the difficulty of ensuring adequate oil spill response in remote offshore locations (at least 500 km from shore) under sometimes extreme weather conditions, exceptionally cold water and potential sea ice.

For example, thirty years after the Exxon Valdez spilled 4.2 million liters of crude oil into Prince William Sound in Alaska, the fishing industry has not fully recovered[19] and many Alaskan beaches remain polluted to this day with an estimated 20,000 gallons (75,000 liters) of crude oil buried

[17] Officer of the Watch. August 6, 2013. *The Probability of an Offshore Accident.* https://officerofthewatch.com/2013/08/06/the-probability-of-an-offshore-accident/

[18] Oil Spill Response Joint Industry Project. 2013. *Oil spill risk assessment and response planning for offshore installations.* http://www.oilspillresponseproject.org/wp-content/uploads/2016/02/JIP-6-Oil-spill-risk-assessment.pdf

[19] Yardley, W. May 5, 2010. Recovery Still Incomplete After Valdez Spill. *New York Times.* https://www.nytimes.com/2010/05/06/us/06alaska.html

just inches below the surface. Challenging environmental conditions meant that only 15 to 25 per cent of oil was recovered by mechanical means and, in a study published in Scientific Reports in 2015, researchers found that the spill was even more ecologically catastrophic than originally predicted as even very low levels of oil contamination can disrupt normal ecosystem development.[20] Oil also degrades much more slowly in cold water because low temperatures change the chemical properties of spilled oil making it more viscous and thereby inhibiting the efficiency of oil-eating microbes, which are more effective when oil is broken up into small droplets.[21]

On page 16-128 of the EIS, the proponent acknowledges that "The extremely unlikely and unmitigated subsurface blowouts at Sites 1 and 2 are predicted to result in large areas where hydrocarbons at the surface are predicted to exceed the conservative ecological and socioeconomic thresholds. For the unmitigated spill event, these areas are predicted to extend to the Flemish Pass, Flemish Cap, Orphan Basin, southern Grand Banks and associated slope waters." The EIS errs in not considering how the extremely adverse consequences of a major spill would fundamentally change the overall risk assessment of the BdN project. Utilizing the standard risk matrix below, we can estimate that, although the probability of a major spill would be low, the high magnitude of such an event make the overall risk level medium to high.

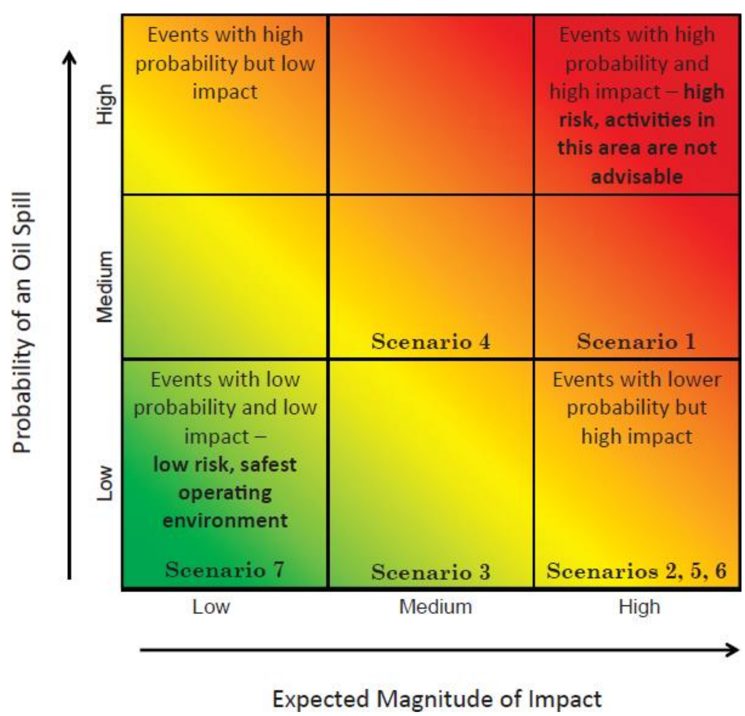

Figure 1: Oil spill risk matrix with low-probability/low-impact events in the lower left corner (low risk) and high-probability/high-impact events in the upper right corner (high risk).[22]

[20] Incardona, John P. et al. 2015. Very low embryonic crude oil exposures cause lasting cardiac defects in salmon and herring. *Scientific Reports* volume5, Article number: 13499 (2015) https://www.nature.com/articles/srep13499

[21] Aarhus University. February 21, 2018. Oil-eating microbes are challenged in the Arctic. *Phys.org.* https://phys.org/news/2018-02-oil-eating-microbes-arctic.html

[22] National Research Council of the National Academies. 2014. *Responding to oil spills in the U.S. Arctic.* https://www.nap.edu/read/18625/chapter/5#68

History of blowouts and major accidents

The probability of a blowout varies depending on many factors, including characteristics of the well, well pressure, water depth, weather and operating conditions and whether it is an exploration, appraisal, development or production well. It is worth noting here that some of the conditions that can increase the risk of a well blowout are present in the BdN project such as deep water, extreme weather and the need for some exploration and development drilling. For instance, the 2018 Husky Sea Rose FPSO accident off the coast of Newfoundland and Labrador, the largest spill in the province's history, was the result of a severe storm (not uncommon in the North Atlantic) and poor judgment by the operator to resume operations by attempting to reconnect a flowline in high sea state conditions – storm conditions deemed unsafe to deploy on-water response to the spill.

Offshore, deep water drilling can be risky and there have been many offshore rig accidents and blowouts over the past 40 years, including two well blowout events rated as extremely large (greater than 150,000 barrels): Ixtoc I in 1979 (3 million barrels) and Deepwater Horizon in 2010 (4 million barrels). Although not all accidents have resulted in significant oil spills, some involved considerable loss of life and/or environmental damage, and each had the *potential* to become major oil spill events. These include the following:

- The Ocean Ranger oil drilling rig disaster which occurred in the North Atlantic off the coast of Newfoundland in February 1982 is one of the deadliest offshore oil rig accidents in history. The offshore oil drill rig capsized and sank killing all 84 crew members onboard. The semi-submersible mobile offshore drilling rig owned by Ocean Drilling and Exploration Company (ODECO) was hired by Mobil Oil of Canada for drilling exploration at the Hibernia field at the time of accident. The rig capsized due to a very strong storm which produced 190km/h winds and up to 65ft (20m) high waves.
- The Piper Alpha rig explosion in 1988 was the deadliest offshore oil rig accident in history, resulting in the deaths of 167 workers. It was also the largest insured human-caused catastrophe in history up until that time. A huge amount of oil and gas would likely have been spilled into the North Sea had it not burned off in the explosion.
- In March 1989, the Exxon Valdez oil tanker struck a reef, tearing open the hull and releasing 4.2 million liters of oil into Prince William Sound in Alaska. Clean-up response efforts were insufficient to contain much of the spill, and a storm blew in soon after, spreading the oil widely. Eventually, more than 1,000 miles of coastline were fouled, and hundreds of thousands of animals perished. Many Alaskan beaches remain polluted to this day with crude oil buried just inches below the surface.
- The Alexander L. Kielland was a semi-submersible platform accommodating the workers of the bridge-linked Edda oil rig in the Ekofisk field, about 235 miles east of Dundee, Scotland, in the Norwegian continental Shelf. The Platform, operated by Phillips Petroleum, capsized in March 1980, killing 123 people. The platform capsized after the failure of one of the bracings attached to one leg of the five-legged platform structure, after strong winds created waves of up to 12m high on the day of the accident, conditions that are not uncommon in regions such as Baffin Bay and Davis Strait. An official investigation concluded that the root cause of the accident was an undetected fatigue crack in the weld of an instrument connection on the bracing.

- The Seacrest Drillship disaster in the South China Sea 430 km south of Bangkok, Thailand, killed 91 crew on November 3, 1989. The drillship was capsized by the Typhoon Gay which produced 40ft high waves on the day of the accident.
- The Glomar Java Sea Drillship disaster, which took place in October 1983 in the South China Sea, caused the death of 81 people when the drillship capsized and sank at depth of 317 feet about 63 nautical miles south-west of Hainan Island, China, 80 nautical miles east of Vietnam. Operations ceased prior to the arrival of tropical storm Lex as it approached from the east of the drilling site. Global Marine's office in Houston, Texas, reported that the drillship was experiencing 75kt (138.9km/h) winds over the bow, but the contact was abruptly lost.
- The Enchova Central Platform disaster in the Campos Basin near Rio de Janeiro, Brazil, killed 42 people in August 1984. The accident occurred due to a blowout which caused a fire and explosion at the central platform of the Enchova field operated by Petrobras. Another disaster struck the Enchova platform in April 1988 as one of its 21 wells blew out and eventually ignited. The well suffered a blow out while undergoing a work-over to convert it from oil production to gas production. The fire caused by the blowout on the platform led to massive damage topside, and the platform remained on fire for a month. Petrobras eventually had to drill two relief wells to control the blowout.
- The Mumbai High North disaster in July 2005 in the Arabian Sea, around 160km west of the Mumbai coast, killed 22 people. Mumbai High North, one of the producing platforms of the Mumbai High Field, owned and operated by India's state-owned Oil and Natural Gas Corporation (ONGC), caught fire after a collision with the multipurpose support vessel (MSV) Samudra Suraksha.
- The Usumacinta Jack-up disaster, which occurred in October 2007 in the Gulf of Mexico, claimed 22 lives after a collision with the PEMEX-operated Kab-101 platform in the Bay of Campeche. A storm with winds of 130 km/h and up to 8m waves created an oscillating movement, which eventually caused its cantilever deck to hit the production valve tree on the Kab-101 platform. The collision resulted in oil and gas leakage leading to the closure of the safety valves of two production wells at the platform. 21 people were declared to have died during the evacuation and one worker missing in the rescue operation was presumed dead. Approximately 5,000 barrels of oil was reported to have lost from the well without being recovered.

What connects all these major accidents is human error and the inherently unpredictable nature of offshore oil drilling, both of which can never be completely ruled out. Equipment malfunctions, extreme weather, deep water and mistakes are unavoidable risk factors that can be minimized to some extent but will always be present in offshore operations.

Although the amount of oil spilled annually in the world's oceans has trended downward in recent years, even as production has increased, the SINTEF Offshore Blowout Database includes 573 offshore blowouts/well releases that have occurred worldwide since 1955, suggesting that such incidents are not uncommon.[23] There is no clear trend regarding the frequency of well blowouts and amount of oil spilled from blowouts. However, oil exploration and extraction activities are moving into ever-deeper waters under higher pressure, in stormier and icier seas, in more remote

[23] SINTEF Offshore Blowout Database. https://www.sintef.no/en/projects/sintef-offshore-blowout-database/

areas, all of which increase potential risks as deep-water blowouts are much harder to cap, tend to last longer and result in the release of larger quantities of oil.[24]

According to the SINTEF database, an average of 2.3 well releases or blowouts per year occurred in the U.K. and Norwegian waters between 1980 and 2008. Even after the Deepwater Horizon catastrophe, there were seven losses of well control – the precursor to a blowout – in the Gulf of Mexico between 2010 and 2015. Operators are attempting increasingly technically ambitious operations; they are expanding their operations to new, often environmentally sensitive areas, such as the North Atlantic; and the industry continues to tackle ever more challenging projects. The BdN project will be drilling in 1,000–1,200 meters of water — just slightly less than the depth of the Deepwater Horizon accident in the Gulf of Mexico.

As noted, in terms of the probability of a well blowout (which is deemed "extremely unlikely" by the proponent), the estimate given in the EIS is not accurate in our view and, crucially, it does not consider how the risk calculus changes when the consequences of a major spill are extremely serious and the prospects for mounting an effective spill response 500 km offshore in severe weather conditions are uncertain.

VI. Spill Prevention and Response

In November 2018, the Husky Sea Rose drilling platform off the coast of Newfoundland spilled at least 225,000 liters of crude oil into the North Atlantic, the largest spill in the province's history, after Husky attempted to re-start operations during an extremely violent storm, which led to a flowline being disconnected. Currently in Canada, offshore oil and gas regulators do not have the authority to tell companies when it's safe to restart operations; rather it's left up to operators to decide for themselves.

Some experts have estimated that a "horrendous" number of sea birds, possibly over 100,000, may have been killed as a result of the Sea Rose spill.[25] This was the second serious incident by Husky Energy's SeaRose FPSO in the last few years. In May 2017, a huge iceberg came within 180 metres of the same vessel, so close that the crew were told to "brace for impact," yet oil production was not halted.[26]

That two serious incidents could occur over such a short time span indicates the hazards common in the North Atlantic and highlights the need for adequate preventative measures to ensure that a major spill never takes place and for an extremely effective oil spill response strategy on the part of the operator. Unfortunately, the proponent's contingency planning and emergency response plan detailed in the EIS do not inspire confidence.

Accident prevention is the most effective means of mitigating environmental damages, so it is startling to read in the EIS that "the project is in the early stages of design, and therefore specific spill prevention measures have not been finalized" (page 16-3). **In our view, IAAC must insist**

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[24] Jernelov, A. July 2010. The Threats from Oil Spills: Now, Then and in the Future. *Ambio*. 39(5-6): 353-366. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3357709/

[25] Stokes, C. Think few reported oiled seabirds is good news? Not so fast, says MUN biologist. *CBC News*. https://www.cbc.ca/news/canada/newfoundland-labrador/searose-spill-seabird-threat-1.4914730

[26] https://www.cbc.ca/news/canada/newfoundland-labrador/husky-energy-searose-production-federal-court-application-1.4658934

that the proponent provides detailed and adequate prevention measures before the EIS and the drilling program is approved.

The proponent states on page 16-3 that a number of measures will be put in place to maintain well control, including the installation of a blowout preventer, fluids, steel casing and monitoring procedures. These are all standard control measures that are found on virtually every offshore drill rig and the proponent therefore does not appear to be implementing any additional safety measures to account for the unique challenges and added risk of operating in the North Atlantic offshore. The operator should demonstrate in the EIS an understanding of how the unique North Atlantic environment will interact with the project and that this knowledge has been incorporated in the project design.

According to the EIS, the proponent will not be keeping any subsea containment resources (capping stacks, domes or relief drilling rigs) on the BdN site during drilling operations (nor is the operator required to do so under Canadian law). We only know from the EIS that the proponent will "prepare a Well Capping and Containment Plan that will describe the initiation, mobilization, and deployment of a capping stack and other containment equipment to the wellsite" (page 16-6). **Before approving the EIS, the IAAC must insist that the proponent provide its well capping and containment plan.**

The EIS also indicates that the capping stack would need to come from either Norway or Brazil by sea and it is anticipated that it could be "deployed and mobilized within 18-36 days of a blowout occurring". An uncontrolled well blowout for over a month, however unlikely, would be devastating to the marine environment and fishery resources within the region as most of the oil would likely never be cleaned up. It should be noted that in Alaska, operators are required to have a capping stack be onsite within 24 hours of a well blowout.[27] **The IAAC should similarly require the proponent to have immediate access to surface and subsea containment resources that would be adequate to promptly respond to a blowout or other loss of well control.**

As the proponent acknowledges, sometimes killing the well with a capping stack or some other containment method at the wellhead is not always successful. The only guaranteed method to stop a blowout is to drill a relief well but, again, the EIS indicates that the proponent will not be keeping a relief drilling rig on or near the BdN site, nor do government regulations require this. Instead, "another drilling installation would be required and mobilized to the site," and it would therefore take approximately 100 to 115 days to drill a relief well (page 16-7), an unacceptably long period of time. **We strongly encourage the IAAC to reject this plan and require that a relief drilling rig be kept on site or in the vicinity.**

As for the blowout preventer (BOP), a standard safety device, it is not foolproof and has a failure risk. The BOP is the last pressure barrier; if this barrier fails, an uncontrolled well blowout occurs. The BOP that was intended to shut off the flow of high-pressure oil and gas from the Macondo well in the Gulf of Mexico in 2010 failed to seal the well because the drill pipe buckled.[28] Even with a BOP in place, blowouts with a flow path to the sea bottom outside the casing cannot be controlled with BOPs and such blowouts are reported to constitute between 20 per cent and 55

[27] https://www.federalregister.gov/documents/2016/07/15/2016-15699/oil-and-gas-and-sulfur-operations-on-the-outer-continental-shelf-requirements-for-exploratory

[28] https://www.workboat.com/news/offshore/deepwater-horizon-blowout-preventer-failed-due-to-unrecognized-pipe-buckling-report-says/#:~:text=The%20blowout%20preventer%20(BOP)%20that,the%20offshore%20drilling%20industry%20remains

per cent of offshore drilling blowouts, thus more than half of drilling blowouts may not be susceptible to any BOP control or effects.[29]

The proponent cites several standard spill response tactics in the EIS including mechanical containment, natural degradation, chemical dispersion and in situ burning. All of these have drawbacks and limited effectiveness depending on the environmental conditions at the time. In the event of a major spill, it is likely that much of the oil would never be recovered given the remote location of the BdN project and the likelihood of adverse weather conditions.

Oil spill response in the North Atlantic is challenging because of extreme weather, sea ice and environmental conditions, logistical challenges and significant distances. Remote locations mean response times for large-scale cleanup and storage equipment can be much longer than in more southern locations. Cold air and water temperatures persist for much of the year in the region with rain, blowing snow, fog, gale-force winds and periods of darkness limiting visibility. The challenges of cleaning up the BP Deepwater Horizon oil spill in 2010 in the Gulf of Mexico—where the conditions were much more favorable than in the North Atlantic—demonstrate the extreme difficulty of oil spill recovery. Many of the techniques that were used to clean up oil in the Gulf of Mexico would be useless if a spill of similar magnitude were to occur in rough seas with inclement weather.[30] For instance, mechanical recovery methods such as oil controlling booms start to lose their effectiveness in meter-high waves (not uncommon in the BdN area) and stop working entirely when the waves reach two meters high.[31]

Research amassed to date through various studies suggest that oil behaves differently in icy, freezing water than in the warmer waters. Furthermore, the combination of natural variability and climate-forced changes in the northern marine system make it particularly challenging to predict the ice conditions from one year to the next. Sea ice adds a new dimension to the movement of oil, and therefore, understanding how far oil spilled in icy waters will spread is of particular importance.[32]

The presence of ice can also shelter oil from the wind and waves.[33] Thus, weathering processes such as evaporation and emulsification, and behaviors such as spreading and entrainment, are slowed. Field data show evaporation, dispersion, and emulsification significantly slowed in ice leads, contrary to some laboratory experiments. Wave-damping, the limitations on spreading dictated by the presence of sea ice, and temperature appear to be the primary factors governing observed spreading and weathering rates.[34]

As for dispersants, the applications of chemicals such as Corexit can be toxic, sometimes more so than oil, and cold weather and the presence of ice can make it difficult to apply dispersants to oil slicks, as dispersants rely on ocean waves to mix the oil and chemicals together. As one of several response techniques, the use of chemical dispersants may be necessary in certain circumstances,

[29] Bercha, Frank. G. 2010. Arctic and Northern Offshore Oil Spill Probabilities. *Proceedings in the International Conference and Exhibition on Performance of Ships and Structures in Ice (ICETECH 2010).* Anchorage, Alaska. September 20-23, 2010.

[30] Nuka Research, 2018.

[31] http://nukaresearch.com/download/projects/estimating-an-oil-spill-response-gap-for-the-us-arctic-ocean-revised.pdf

[32] Wilkinson, J. et al. 2017. Oil spill response capabilities and technologies for ice-covered Arctic marine waters: A review of recent developments and established practices. *Ambio* 46 (Supp 3): S423-S441.

[33] Drozdowski et al. 2011. Review of Oil Spill Trajectory Modelling. *Canadian Technical Report of Hydrography and Ocean Sciences* 274. Fisheries and Oceans Canada. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.452.8075&rep=rep1&type=pdf

[34] Sørstrøm, S.E., Brandvik, P.J., Buist, I., Daling, P.S., Dickins, D., Faksnes, L.-G., Potter, S., Rasmussen, J.F., and Singaas, I. 2010. Joint industry program on oil spill contingency for Arctic and ice-covered waters. Oil in Ice. JIP

however, their use must be a last resort, produce a net environmental benefit and must be constrained by socioeconomic and environmental considerations.

The environmental rationale for attempting to chemically disperse spilled oil is that removing the oil from the water surface and driving it into the water column as suspended droplets could prevent damage to shorelines, seabirds and marine mammals. The practical problem with this idea is that it can only work if a very high fraction of the oil can be driven into the water column. Otherwise, enough oil will remain on the surface to contaminate shorelines despite the dispersant application. It should also be noted that there are trade-offs involved in moving oil from the surface to the water column.

The potential ecological consequences of the physical and toxicological properties of dispersed oil are far from fully understood. What is clear, however, is that broadcasting dispersants can compound the ecological damage of oil spills.[35] The impacts to plankton communities, which are the foundation of marine food webs and the impacts to the seabed are detrimental.[36] Hence the use of dispersants has socioeconomic consequences as well as environmental and there are still many unknowns about their use. One recent study found that, given the potential for toxic chemical dispersants to cause environmental damage by increasing oil bioavailability and toxicity while suppressing its biodegradation, unrestricted dispersant application in response to deep-sea blowouts is highly questionable and more research is required to inform response plans in future oil spills.[37]

The use of dispersants in the North Atlantic marine environment should never be used in ecologically sensitive areas and would likely be limited in its effectiveness even when it is used. Once again, given the difficulty in adequately responding to an oil spill in this region, emphasis should be placed on the avoidance and prevention of accidents.

VII. Marine Environmental Impacts

The proponent describes the oil spill trajectory and impact modeling that was carried for the EIS as follows:

> "This modelling study employed a stochastic approach to determine the range of potential trajectories and fates of hypothetical hydrocarbon releases based upon the variable forcing conditions (e.g., wind and currents). Stochastic modelling provides a probabilistic view of the likelihood that a given region might experience effects from released hydrocarbons over many possible environmental conditions occurring within and across multiple years."

This modeling approach is described in more detail in the appendices and we would strongly recommend that the IAAC verify the accuracy and reliability of the proponent's approach given some of the conclusions derived from this modeling.

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[35] Paris, C. B. et al. 2018. BP Gulf Science Data Reveals Ineffectual Subsea Dispersant Injection for the Macondo Blowout. *Frontiers in Marine Science*. November 2018.

[36] Buskey, E., H. White, and A.J. Esbaugh. 2016. Impact of Oil Spills on Marine Life in the Gulf of Mexico: Effects on Plankton, Nekton, and Deep-Sea Benthos. *Oceanography* 29(3): 174-181. https://www.researchgate.net/publication/307518241_Impact_of_Oil_Spills_on_Marine_Life_in_the_Gulf_of_Mexico_Effects_on_Plankton_Nekton_and_Deep-Sea_Benthos

[37] Paris, C. B. et al. 2018. BP Gulf Science Data Reveals Ineffectual Subsea Dispersant Injection for the Macondo Blowout. *Frontiers in Marine Science*. November 2018.

For instance, the proponent states on page 7-67 of the Summary Statement that "Although there is the potential for effects on fish and their habitats in the RSA, these are, with appropriate mitigations, not likely to result in an overall detectable decline in overall fish abundance or change in the spatial and temporal distribution of fish populations in the overall RSA for multiple generations." In addition, on page 16-185 the proponent makes the following surprising assertion:

> "For areas identified as important features for fish species, marine mammals and sea turtles, effects from a subsurface blowout were assessed in Section 16.7.4 and 19.7.6 concluded that residual effects on these species would not be significant."

Given the stakes, the methodology by which the proponent has reached this conclusion merits closer scrutiny and verification. We trust that officials from the Department of Fisheries and Oceans Canada will also be providing input and comments on the Bay du Nord EIS to examine these claims. Furthermore, we note that during the proponent's EIS presentation on August 11, it was stated that there would be "no significant impact" from an oil spill on migratory birds, whereas page 7-69 of the EIS Summary stated that a well blowout is likely to have a "significant" impact on marine and migratory birds. **This discrepancy should be clarified by the IAAC.** Some experts have estimated that a "horrendous" number of sea birds, possibly over 100,000, may have been killed as a result of the Sea Rose spill in 2018.[38]

In terms of cumulative environmental effects from drilling, the EIS concludes on page 8-1 of the Summary that there would be no significant residual environmental effects from routine operations, accidental events, and cumulative effects on marine fish, birds, mammals and turtles, or commercial fisheries. Of course, this would be the fifth major production drilling project in the region and the province is planning for the drilling 100 new exploratory wells in the area by 2030. The EIS does not take into consideration how BdN project activities could contribute cumulatively to other ongoing and planned oil and gas activities in the region in the coming years.

VIII. Protected and Sensitive Areas

Canada, as a signatory to the Convention on Biological Diversity (CBD), committed to protecting 10 per cent of ocean and coastal spaces by 2020. Canada has additionally committed to protecting 25 per cent of its ocean by 2025, and 30 per cent by 2030, as outlined by Prime Minister Trudeau in his mandate letter to the Honourable Bernadette Jordan, Minister of Fisheries, Oceans and the Canadian Coast Guard.[39]

The International Union for Conservation of Nature (IUCN), which creates guidance for protected area practitioners that is used globally, states that management of marine protected areas and other effective-area based conservation measures should not have environmentally-damaging industrial activities and infrastructure development occurring in them.[40] This includes activities such as oil and gas extraction, consistent with IUCN Recommendation 102 adopted at the 2016 World Conservation Congress, based on scientific evidence that this type of industrial activity and

[38] Stokes, C. Think few reported oiled seabirds is good news? Not so fast, says MUN biologist. *CBC News.* https://www.cbc.ca/news/canada/newfoundland-labrador/searose-spill-seabird-threat-1.4914730

[39] https://pm.gc.ca/en/mandate-letters/2019/12/13/minister-fisheries-oceans-and-canadian-coast-guard-mandate-letter

[40] https://portals.iucn.org/library/sites/library/files/documents/PATRS-003-En.pdf

infrastructure development has adverse impacts on biodiversity and is never compatible with conservation.[41]

Canada, as a contracting party of the Northwest Atlantic Fisheries Organization (NAFO), has shared responsibility to "ensure long term conservation and sustainable use of the fishery resources in the Convention Area, and, in so doing, to safeguard the marine ecosystems in which these resources are found."[42] This responsibility includes protecting areas identified as being vulnerable to bottom contact gears. To date, 21 areas have been identified within the convention area as being Vulnerable Marine Ecosystems (VMEs) and have been closed to bottom fishing to protect the sensitive coral, sponge, sea pen or seamounts contained within them.[43]

In 2019 the Minister of Fisheries, Oceans and the Canadian Coast Guard announced that all new federal marine protected areas would prohibit oil and gas activities in order to strengthen the conservation of our oceans.[44] While this minimum standard does not currently apply to NAFO Fisheries Area Closures, WWF-Canada attests these areas should remain free of this type of development in order to safeguard the important benthic habitats and associated biodiversity contained within.

WWF-Canada has repeatedly requested, based on the best available scientific advice and in line with international guidance for the protection of biodiversity, that oil and gas activities not be permitted within protected areas, including marine refuges and other closures that aim to protect important benthic habitats.[45] It is noted that the core BdN development area overlaps with a VME for sea pens and is adjacent to a VME for sponges. It also intersects with the Northwest Flemish Cap (10) NAFO Fishery Closure Area, an area where bottom fishing is prohibited due to high sponge and coral concentrations. There are also special areas that overlap with potential Project Area Tiebacks, which, if put in place, would also impact the seabed. These areas were closed due to their importance and fragility, and should not be open to extractive, bottom contacting activities. **WWF-Canada does not agree that oil and gas activities are permissible within VMEs and recommends that the proponent set aside these portions of the Project Area from development in order to help conserve biodiversity and uphold Canada's commitments to marine conservation under NAFO. That these areas were set aside by all NAFO contracting parties, and made off limits to fish harvesters, to then be open for oil and gas development by Canada is not acceptable.**

The Canadian Science Advisory Secretariat document "Proceedings of the National Peer Review Meeting on the Assessment of the Effectiveness of Mitigation Measures in Reducing the Potential Impacts of Oil and Gas Exploration and Production on Areas with Defined Benthic Conservation Objectives" was recently released.[46] It stated that compared to exploration drilling, development drilling and production are generally considered to have increased risks of impacts to benthic species and habitats, with additional activities, greater seabed footprints and longer timeframes. It noted that few studies have been conducted on coral and sponge species in Canadian waters, and that little is known about coral and sponge reproductive biology. As such, it is difficult to assess how these species will respond to oil and gas activities, though it noted that potential impacts could include direct mortality to sub-lethal effects including tissue and/or physiological

[41] https://portals.iucn.org/library/sites/library/files/resrecfiles/wcc_2016_rec_102_en.pdf
[42] https://www.nafo.int/About-us/Overview-of-NAFO
[43] https://www.nafo.int/Fisheries/VME
[44] https://www.canada.ca/en/fisheries-oceans/news/2019/04/backgrounder-new-standards-to-protect-canadas-oceans.html
[45] http://www.wwf.ca/newsroom/?30661/northeast-newfoundland-marine-refuge-2019
[46] http://www.dfo-mpo.gc.ca/csas-sccs/Publications/Pro-Cr/2020/2020_021-eng.pdf

damage. Infrastructure can disturb sediments and crush organisms, cause habitat fragmentation, and, with coral and sponge species that need to be perfectly upright in order to feed, cause mortality with even slight disturbance. It was also noted that it is difficult to assess the impacts of drill muds and cuttings on areas with defined benthic conservation objectives, as most of the literature is based on studies done in laboratories or shallow waters environments, which doesn't necessarily translate to the deep-water species and environments present in the BdN project area, and that scale and magnitude of impacts may differ.

The Proceedings document also noted how difficult it was to assess the effectiveness of mitigation measures, as there is insufficient scientific literature on the topic. As such, it was recommended that for areas with defined benthic conservation areas that the mitigation hierarchy be applied: (1) avoid; (2) mitigate; and, (3) offset (though recognizing that offsetting will not be possible for areas with benthic conservation objectives as there is no way to offset these unique, structurally complex habitats). As the first mitigation measure should be to avoid significant benthic areas by eliminating the possibility of interaction, video surveys should be done to confirm the presence or absence of sensitive species and/or habitats, and minimum setbacks applied to planed well and infrastructure locations. The report suggested minimum proposed setbacks for areas with defined conservation objectives as 200 meters from seafloor infrastructure with no expected discharges, and 2 kilometers from any discharge points and/or surface (i.e. floating) infrastructure. It also suggested setback distances of 50 meters from corals and other sensitive benthic species and habitats for associated pipelines.

Another recently released report "Review of the Impact Assessment Agency's Draft Regional Assessment of Offshore Oil and Gas exploratory Drilling East of Newfoundland and Labrador"[47] noted that special areas such as significant benthic areas and vulnerable marine ecosystems have been identified in the Regional Assessment Area which has overlap with the BdN project area. These special areas, especially those with defined benthic conservation objectives, are highly sensitive to human impact and require additional special mitigations and be managed with a higher level of risk aversion.

The EIS states in Section 7 that "well templates will not be placed over *Lophelia pertusa* corals." It is important to note that current mitigation for sensitive benthic species and/or habitats is based on knowledge and best practices from Norwegian oil and gas exploration and production activities, which are not appropriate in the Canadian context. For example, *Lophelia* is a coral indicator species in Norway and has been applied to oil and gas activities in parts of Canada, but it is not a good indicator as this species is rare in Canadian waters. Norwegian guidelines also characterize coral aggregations as 5 colonies greater than 30 centimeters, which excludes Canadian sea pen fields.[48] To provide regionally appropriate guidance, regionally relevant guidelines similar to those provided by the Norwegian Oil and Gas Authority must be developed, including development of a regionally appropriate species list and criteria for setback distances to support determination of what level of coral and/or sponge occurrences/densities are consistent with significant concentrations in Canadian waters. Until that time, the significance of impacts and related mitigation for oil and gas exploration activities should be carefully determined using the precautionary approach and on a case-by-case basis to account for site-specific ecology and environmental conditions, with emphasis on avoiding sensitive areas.

[47] http://www.dfo-mpo.gc.ca/csas-sccs/Publications/ScR-RS/2020/2020_033-eng.pdf
[48] http://www.dfo-mpo.gc.ca/csas-sccs/Publications/Pro-Cr/2020/2020_021-eng.pdf

IX. Seismic Testing

As described in Section 9.3.5, the proponent is considering seismic surveys to provide data on the reservoir as production continues:

> "For 3D/4D surveys, multiple sound source arrays can be used, and the vessel could tow between eight and 16 streamers containing hydrophones, also called conventional seismic surveys. Conventional seismic surveys could be between two and four weeks and occur as frequently as once per year in early Project life, with reduced frequency in later years. Timing and duration of surveys are estimated and will be finalized during Project design… While the preferred option is to use fixed hydrophones, Equinor Canada has not made final decision regarding which option will be undertaken. For the purposes of EA, both options will be assessed."

The EIS provides only a limited and inaccurate discussion of the potential impacts of seismic testing to fish and invertebrates, stating on page 9-92 that the residual environmental effects of a Change in Fish and Invertebrate Presence and/or Abundance (Behavioural Effects) and Change in Food Availability and/or Quality associated with underwater sound emissions during Supporting Surveys are predicted to be "adverse, negligible in magnitude, with a geographic extent less than 1 km^2, of short-term duration, occurring continuously, and reversible." Current research on this topic simply does not support this claim, yet the proponent is not proposing any mitigation measures with respect to reducing the potential effects on fish and invertebrates associated with seismic testing and underwater sound.

For commercial fish stocks, the proponent acknowledges in section 13.4.5.2 and elsewhere that activities such as geophysical surveys and exploration drilling may overlap with fishing in the project area and that seismic surveys have the potential to "affect fish behaviour and avoidance" and potentially "indirectly affect commercial fishing activity." The EIS states on page 15-14 that benthic organisms may be negatively affected by cumulative impacts of the project, including seismic testing, but contrary to current science, the proponent incorrectly asserts on page 15-19 that impacts would be "localized and unlikely to result in significant adverse cumulative environmental effects" (see below).

For marine mammals, the EIS acknowledges the possibility for cumulative behavioural impacts. Although the proponent has confirmed that marine mammal observers will be used on vessels to mitigate against vessel strikes, observers will <u>not</u> be used on seismic testing vessels despite the well-documented impacts of these surveys on marine mammals and other wildlife. The proponent states on 15-41 that potential effects to marine mammals and sea turtles in the region include "hearing impairment and auditory injury from exposure to underwater sound" (including seismic testing), yet the likelihood of a marine mammal or sea turtle incurring permanent hearing impairment is considered to be low. Again, this claim is simply not substantiated by the evidence.

A 2015 report by Marine Conservation Research on the impacts of seismic testing on whales concluded that "It is indisputable that seismic noise has adverse impacts on marine life…From the research at hand, it is clear that noise from seismic activity impacts whales. It can damage their hearing, ability to communicate, disrupt diving behavior, feeding and migration patterns. There are increasing indications that this could cause <u>serious injury</u> to whales. It may also disrupt reproductive success and increase the risk of strandings and ice entrapments."[49] Notably, the report also concluded that there is a massive research gap in this field and that decision-makers should use "extreme caution" before allowing seismic activity.

The proponent ultimately asserts in the EIS that the effects from underwater noise, including seismic testing programs, are predicted to be localized and short-term and that the impact on commercial fisheries would be unlikely, concluding that:

> "In summary, with the application of mitigation measures, the residual environmental effects of Change in Abundance, Distribution and Quality of Marine Resources associated with underwater sound emissions from survey equipment used during Geophysical Activities should Project Area Tieback occur are predicted to be adverse, low in magnitude, with a geographic extent less between 1,000 km² and 10,000 km², of short-term duration, occurring continuously, and reversible. These predictions are made with a high level of confidence."

The proponent's assessment of the "short-term", "reversible" and "low in magnitude" impacts of seismic testing programs on the marine environment is simply incorrect according to the latest research and the estimate given of the geographic extent of impacts is far too small by many orders of magnitude. The science to date clearly suggests that there can be serious negative effects from seismic testing on some important species, including plankton, benthic organisms, whales, including narwhals, harbour porpoises, dolphins, invertebrates including squid, and fish. These impacts can linger for months or even a year after the surveys have ceased. To date, roughly 130 species have been documented to be impacted by human-caused underwater noise pollution.[50]

In addition, we know that underwater noise from vessel traffic can readily propagate over 100 kilometers (31,400 km² impact area) and the noise from seismic surveys can be heard almost continuously in some areas for distances of up to 4,000 km as seismic air gun surveys are among the loudest of human produced sounds, and sound travels fast and efficiently in water.[51] This corresponds to a potential seismic impact area of up to 50,000,000 km² (an immensely larger expanse than the 1,000-10,000 km² geographic range suggested by the proponent). While more research is needed, we know enough from studies so far, especially those involving seismic air gun surveys, to conclude that anthropogenic underwater noise is a serious and transboundary pollutant, which can degrade huge ocean areas and do harm to marine ecosystems.

When the National Energy Board (NEB) issued its Environmental Assessment Report for the Northeastern Canada Seismic Survey of Baffin Bay and Davis Strait, it acknowledged the sound produced by underwater air guns can lead to serious sensory and physical disturbances in birds, marine mammals and fish.[52] Following the Statement of Canadian Practice with respect to the Mitigation of Seismic Sound,[53] the Board's mitigation measures included a 500 meter radius "shut down zone" from the air gun should any mammals be detected within 500 meters of the blast,

[49] https://www.greenpeace.org/usa/wp-content/uploads/2015/08/A-Review-of-the-Impact-of-Seismic-Survey-Noise-on-Narwhal-and-other-Arctic-Cetaceans-.pdf

[50] Weilgart, L., 2018. *The impact of ocean noise pollution on fish and invertebrates*. Report for OceanCare, Switzerland.

[51] Nieukirk, S. L., Mellinger, D. K., Moore, S. E., et al. (2012). Sounds from airguns and fin whales recorded in the mid-Atlantic Ocean, 1999–2009. Journal of the Acoustical Society of America, 131, 1102–12.

[52] https://www.neb-one.gc.ca/nrth/dscvr/2011tgs/nvssssmnt/nvssssmnt-eng.html

[53] https://waves-vagues.dfo-mpo.gc.ca/Library/363838.pdf

which is much smaller than the 1500 meter safety zone for divers set out in section 12(3) of the Canada Oil and Gas Geophysical Operations Regulations.

The NEB identified the potential for adverse effects to marine mammals, traditional harvesting of marine mammals and fish, and commercial fish harvesting as "the main concerns associated with this project". The Board has also acknowledged that the sound produced by underwater air guns can lead to serious sensory and physical disturbances in birds, marine mammals and fish,[54] yet the NEB's claim that the mitigation policy of shutting down the blasting should any mammals be detected within 500 meters of the air gun is sufficient to safeguard marine life is not supported by scientific evidence. Still, even this very basic mitigation measure is not being proposed in the EIS.

There is no consensus regarding what constitutes a "safe" exposure, although research suggests that a 500 meter radius is insufficiently small to adequately protect marine mammals from seismic impacts. The safety radius is highly dependent on the sound transmission conditions which change with bathymetry, nature of the seafloor, and the sound speed profile which can change between seasons. Impacts from air guns also can vary based on past exposure, recovery time, species, age and sex, as well as context.[55]

Even if it were possible to determine a safe 'shut down zone' radius, it can be extremely difficult to detect marine wildlife within that zone. Survey activities and shipping activity often take place at night or in other limited-visibility conditions and many marine mammals and turtles are hard to sight as they are elusive and often underwater.[56] Most whales are rarely visible at the surface, especially the deep divers (Northern bottlenose whales) and especially in anything but perfect visibility. Quantitative analysis has shown that mitigation monitoring detects fewer than 2 per cent of beaked whales (e.g. Northern bottlenose whales) even if the animals are directly in the path of the ship.[57] Other species might be slightly easier to sight, but monitoring cannot be relied upon to be satisfactorily effective.

For some species and in certain situations, the weaker the behavioural response, the more serious the impact on the population.[58] Individuals with lower energy reserves or no alternative habitat cannot afford to flee repeatedly from disturbance but are forced to remain and continue feeding, apparently unresponsive to disruption.[59,60] Yet these individuals are in fact more vulnerable to disturbance. Animals do not always react in an outwardly observable or obvious manner even if they are seriously impacted.[61]

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[54] https://www.neb-one.gc.ca/nrth/dscvr/2011tgs/nvssssmnt/nvssssmnt-eng.html

[55] Gordon, J. et al. 2003. A Review of the Effects of Seismic Surveys on Marine Mammals. *Marine Technology Society Journal.* 37(4): 16-34

[56] Weilgart, L. 2019. Best Available Technology and Best Environmental Practice for Three Noise Sources: Shipping, Seismic Airgun Surveys and Pile Driving. The Journal of Ocean Technology. Vol. 14, No. 3. 1-9.

[57] Barlow, J. and Gisiner, R. 2006. Mitigating, monitoring and assessing the effects of anthropogenic sound on beaked whales. *Journal of Cetacean Research and Management*, *7*(3), pp.239-249.

[58] Weilgart, 2018.

[59] Gill, J.A. et al. 2001. Why behavioural responses may not reflect the population consequences of human disturbance. *Biological Conservation* 97 (2001) 265-268. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.546.453&rep=rep1&type=pdf

[60] Stillman, R.A. & Goss-Custard, J.D. 2002. Seasonal changes in the response of Oystercatchers Haematopus ostralegus to human disturbance. *J. Avian Biol*. 33: 358–365.
http://obpa-nc.org/DOI-AdminRecord/0064594-0064602.pdf

[61] Bejder, L. et al. 2006. Decline in relative abundance of bottlenose dolphins exposed to long-term disturbance. Conservation Biology. 20(6). 1791-98.

There are known, safer alternatives to seismic testing such as Vibroseis (MV), which the IAAC should be encouraging or requiring whenever possible.[62] Penetration into the seafloor is largely a function of sound frequency, and MV can produce the same well-penetrating, low frequencies as airguns and send sound waves just as deeply into the seafloor as airguns.[63] Moreover, MV is a controlled source and as such, the source characteristics (frequency, duration, type of sound) can be altered in real-time, to optimize the output for each environment and situation. This technology is less environmentally impactful, as the unnecessary high frequencies that airguns emit (up to 100,000 Hz), are not used by MV. Frequencies over about 150 Hz are not recorded or used by the oil and gas industry. Thus, a great deal of energy is emitted by airguns that is wasted. The high frequencies that airguns emit can unnecessarily disturb species such as narwhals, belugas, northern bottlenose whales, and harbour porpoises. MV is much quieter, both near the source and at distance.[64] Researchers have estimated that a MV survey would expose only about 1-20% of whales and dolphins to high noise levels when compared to those exposed to an airgun survey, based on their models.[65] MV is roughly one-thousand times quieter than traditional seismic air guns and does not have a "shot-like" quality, something that is particularly injurious to living tissues.

The most effective mitigation measure for seismic air guns is simply to prohibit their use, particularly when safer alternatives such as MV are known to exist. At a bare minimum, the IAAC should require mitigation measures, such as ramp-ups, soft starts, marine observers, and safety zones; air gun surveys must be prohibited in areas rich in marine life and sensitive species; and the source level should be lowered (i.e. quiet the noise).

Even with mitigation measures in place, it is important to note that the mitigation options that do currently exist (none of which are being proposed in the EIS in any case) are largely unproven in their effectiveness. For instance, ramp-ups or soft starts, where the number of air guns firing are gradually and audibly increased, do not appear to be consistently and reliably effective in causing humpback whales to move away from the source vessel.[66] There is large variation in whale behavior, with some groups swimming away from the sound source whereas others approached even relatively loud noise levels, possibly viewing them as a challenge that needed to be confronted. Whales that did avoid the (source) vessel emitting air gun noise may have avoided the vessel itself, not the noise.[67] Although the sound source was different (naval sonar vs. seismic air guns), and the ramp-up procedures are different, gradually increasing the sonar source intensity has been found not to be an effective method to reduce the risk of physiological effects for humpback whales overall, mainly because most whales did not exhibit very strong avoidance responses to the sonar signals.[68] Animals that had not been exposed to sonar recently, were not feeding, or were with a small calf were more responsive. This again illustrates how difficult it is to

[62] Weilgart, L. 2016. Alternative Quieting Technology to Seismic Airguns for Oil and Gas Exploration and Geophysical Research. Brief for GSDR – 2016 Update.
[63] Ibid.
[64] Duncan, A.J., Weilgart, L.S., Leaper, R., Jasny, M. and Livermore, S., 2017. A modelling comparison between received sound levels produced by a marine Vibroseis array and those from an airgun array for some typical seismic survey scenarios. *Marine Pollution Bulletin*, *119*(1), pp.277-288.
[65] LGL & MAI. 2011. Environmental Assessment of Marine Vibroseis. LGL Rep. TA4604-1; JIP contract 22 07-12. Rep. from LGL Ltd., environ. res. assoc., King City, Ont., Canada, and Marine Acoustics Inc., Arlington, VA, U.S.A., for Joint Industry Programme, E&P Sound and Marine Life, Intern. Assoc. of Oil & Gas Producers, London, U.K. 207 p.
[66] Dunlop, R.A. et al. 2017. Response of humpback whales to ramp-up of a small experimental airgun array. *Marine Pollution Bulletin*. 103: 1-2.
[67] Ibid.
[68] Wensveen et al. 2017. Lack of behavioural responses of humpback whales indicate limited effectiveness of sonar mitigation. Journal of Experimental Biology. 220(22): 4150-4161.

form conclusions about innocuous noise impacts since whales, but also fish, show great variation in their behavior in the wild. Moreover, when animals have a strong motivation not to move away from their current location, ramp-ups are unlikely to be effective.

Rules and mitigation measures for seismic air gun surveys must be substantially strengthened and based on the best available science. The most effective mitigation for seismic air gun surveys are:

- **remove the surveys from areas/seasons rich in marine life and sensitive species**
- **lower the source level (quiet the noise)**
- **require the use of air gun alternatives such as Marine Vibroseis, which can drastically cut noise levels and limit the frequencies (pitches) of noise output.**

Significant gaps in knowledge exist regarding the effects of seismic air gun noise on marine mammals,[69] and we do not yet have sufficient information on the abundance and distribution of some north Atlantic marine wildlife.[70] Baseline studies of biological abundance and distribution should occur at least a year, preferably two, in advance of any seismic surveys, as we have a legitimate reason to expect negative impacts severe enough to impact the health, welfare, and sustainability of at least some animal populations, from plankton through fish to whales.

The long-term impacts of seismic testing, together with threats such as climate change and ocean acidification, on the ecosystem and population biology of the BdN region should be thoroughly researched. Such studies are challenging to carry out, but the burden of proof (to show no harm) should be on the project proponent who wishes to alter the environment, rather than those wishing to preserve it.

The EIS notes that Equinor Canada maintains a strong commitment to safe, secure and sustainable operations. WWF-Canada urges Equinor Canada to live up to these values and properly consider the potential seismic, climate, oil spill and other operational impacts and risks of the BdN project, as well as impacts on the conservation of biodiversity as a whole in the region. We thank you again for the opportunity to provide comments on this important impact assessment process.

Sincerely,

Sigrid Kuehnemund
Vice President, Wildlife and Industry
WWF-Canada

[69] Gordon et al. 2003.
[70] Weilgart, 2019.