WOLASTOQEY NATION IN NEW BRUNSWICK

Matawaskiye • Neqotkuk • Wotstak • Pilick • Sitansisk • Welamoktok

[SUBMITTED VIA EMAIL] *Ref: WNNB [021-20]*

March 26, 2020

Re: Comment on the Proposed West Flemish Pass Offshore Exploration Project (the "Project")

The Wolastoqey Nation in New Brunswick ("**WNNB**") represents the six Wolastoqey communities in New Brunswick (Madawaska Maliseet, Tobique, Kingsclear, Woodstock, St. Mary's and Oromocto First Nations). WNNB is not the rights holder, nor are we the body to which the Duty to Consult is owed. WNNB provides technical advice to Wolastoqey leadership and their respective Resource Development Consultation Coordinators ("**RDCCs**") on resource development matters that relate to our Wolastoqey constitutionally protected rights. WNNB also acts to protect and promote traditional lands, ceremony, cultural practices and language.

General Summary

The proposed Project is one of several that have recently been proposed in the area that are of a similar nature, both in scope, as well as temporal and spatial boundaries. Each of these most recently proposed projects all faced positive Environmental Assessment ("**EA**") determinations and are currently in some phase of the federal review process.

With several new exploration projects and with forecasts of doubling oil and gas production and 100 new exploration wells by 2030,[1] serious concerns surround compounding and cumulative effects for all environmental resources in offshore Newfoundland. While the first Regional Assessment ("**RA**") under CEAA 2012 is underway, and may address some of these concerns, we urge CEAA/IAAC to more fully review cumulative impacts. Projects and conditions may be similar, but each project is different, and each one carries the potential to cause distinctive adverse effects and would benefit from tailored mitigation

[1] https://www.releases.gov.nl.ca/releases/2018/exec/0219n01.aspx

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measures. Further, while proponents will continually downplay the significance of effects to the environment, even small residuals can accumulate and produce incremental, but damaging, cumulative impacts. This necessitates added conditions to explore the cumulative impacts specific to Green House Gases ("**GHGs**") and sustainability as well as the potential effects for both routine and unexpected impacts to fish and mammals, effects of avoidance during migration and feeding, as well as look at the statistics surrounding spills.

Comments in response to draft EIS Report

Impacts to Atlantic Salmon

WNNB focused its analysis on the impacts to Atlantic Salmon (OBoF & IBoF) as it is a resource that is currently on the verge of extinction within Wolastoqey territory and yet new sources of potential mortality are being proposed while access for food, social and ceremonial ("**FSC**") harvest has long been forgone. However, an ecosystem-based analysis within the proposed Project area is likely to provide the most comprehensive understanding of the potential impacts associated with this proposed Project to the ecosystem itself as well as to Atlantic Salmon.

Section 12.3.4.3 of the Environmental Impact Statement ("**EIS**") Report states: "Research vessel surveys have not identified salmon within the Project Area, therefore, the potential for occurrence within the Project Area is considered low. If Atlantic salmon were to occur within the Project Area, it is likely that they would be migrating through." The EIS Report also states that adult salmon hotspots include locations 480 km east of the Strait of Belle Isle and slightly east of the 200 m isobath (depth contour) along the eastern edge of the Grand Bank. These statements should be accompanied by a citation documenting where this information may be found or at the very least, a rationale for how this conclusion was reached. There was no mention of which research vessel surveys were considered, nor gear type, location, season, etc with the exception of the EIS summary document wherein Section 6.1.1 refers to research trawls and identifies the species which comprise 99.5% of trawl catches. However, this section t fails to provide information on the spatial and temporal extent of the trawls as well as any further information on the trawl (depth, mesh size, etc.) which would greatly influence the catchability of certain species such as salmon or eel.

The proponent acknowledges the importance of salmon to Indigenous groups in the Atlantic region, as well as the uncertainty associated with the known presence and activities of Atlantic Salmon in the

proposed Project areas. They point to the Environmental Studies Research Fund ("**ESRF**") as a potential avenue for addressing data gaps pertaining to Atlantic Salmon in the offshore in environment. While WNNB is disappointed with the rejection of our collaborative proposal to access the ESRF to address several of these existing data gaps, we look forward to seeing the results of these studies and remain open to opportunities and partnerships that enable us to conduct this important work. WNNB would like to emphasize that the results of these studies are only as impactful as the mechanisms developed to translate them (and others as part of the ESRF) into decision-making criteria for project approvals and project-specific mitigation and response measures. However, our anticipation of these results does not eclipse the fact that Atlantic Salmon may be at risk from these exploratory drilling operations, regardless of our knowledge on the magnitude of such risk. This necessitates the implementation of an interim strategy until we fully understand the gravity of routine drilling operations and incidental hydrocarbon release on Atlantic Salmon. Given existing evidence of salmon near the proposed Project area (albeit limited in breadth and scope), and the potential for feeding or overwintering, salmon-specific mitigation and monitoring measures must be developed even as more comprehensive research partnerships and programs are being solidified.

Section 12.6 of the EIS Report states that "[n]o follow-up and monitoring are proposed for routine Project activities." The Proponent continues by outlining the following reasons for disregarding routine Project activities within proposed follow-up and monitoring protocols: future ESRF research, standard mitigation measures already in place, ongoing Indigenous engagement, collaboration on an Indigenous Fisheries Communication Plan, as well as a high degree of confidence surrounding the lack of impacts. In contrast to their claims, Cordes et al. (2016)[2] states that routine activities during exploratory phases can have "detrimental environmental effects" and "impacts can result from indirect (sound and traffic) and direct physical (anchor chains, drill cuttings, and drilling fluids) disturbance". WNNB agrees with the authors' recommendations that the entire suite of potential impacts of routine operations must be considered and addressed when designing mitigation or monitoring plans. The Proponent highlights several mitigation measures that were developed in response to concerns expressed by Indigenous groups and communities on the loss of access to salmon (Section 4.2.1 – EIS summary). However, these proposed measures have

[2] Cordes, E.E., D.O.B. Jones, T.A. Schlacher, D.J. Amon, A.F. Bernardino, S. Brooke, R. Carney, D.M. DeLeo, K.M. Dunlop, E.G. Escobar-Briones, A.R. Gates, L. Génio, J. Gobin, L. Henry, S. Herrera, S. Hoyt, M. Joye, S. Kark, N.C. Mestre, A. Metaxas, S. Pfeifer, K. Sink, A.K. Sweetman and U. Witte. 2016. Environmental impacts of the deep-water oil and gas industry: A review to guide management strategies. Frontiers in Environmental Science, 4: 1-26.

all become the standard for exploration projects and do not represent an extra effort on behalf of the Proponent to accommodate the concerns of Indigenous peoples. In Section 12.3.4.5 of the EIS Report, emphasis is placed on the waste management measures on how they prevent impacts on migratory species and FSC/communal commercial fisheries. However, given the high degree of uncertainty pertaining to the movements and migration patterns of these species, the efficacy of such a mitigation strategy remains unknown.

Impacts to American eel

Further research also needs to be conducted on another species that may be present within the proposed Project area: the American eel. Given that this is a panmictic population, declines in abundance are felt across the entire range of the species and in turn across the range of eel fisheries. Eel represents another a crucial cultural resource and food source for the Wolastoqey. They are also subject of ongoing fisheries negotiations for the Wolastoqey, and given the strong consideration for conservation of this species in response to growing commercial interests, any increase in potential threats for this species should be accompanied by comprehensive studies on potential impacts to various life stages and/or a species-specific mitigation/monitoring strategy. Proposed mitigation measures in the EIS Report are inadequate to address questions surrounding impacts on this species as well. Literature should be cited on how the proposed mitigation measures will truly be effective for each species but most importantly those that are “At-Risk” and essential to First Nations existence and livelihood.

Duty to Consult and Accommodate

The proponent directly contradicts itself in the EIS Report where it initially states in Section 7.4 that “migratory species (including fish, birds and mammals) that move through the Flemish Pass may potentially be affected by Project activities and these species may be harvested by Indigenous groups in coastal areas through FSC fishing, commercial-communal fishing or through other harvesting activities.” However Section 13.3.1.3 maintains that: [i]t is unlikely that marine resources will be affected or disturbed in a manner that would result in effects on the overall availability or quality of a marine resource for commercial fishers or other ocean users.” We would request that the proponent clarify exactly how they reached the conclusion that Atlantic Salmon and other such “marine resources” will not be adversely impacted.

This statement on the nature of the impacts to marine resources used by Indigenous groups, should be accompanied by a citation documenting where this information may be found or at the very least, a rationale for how this conclusion was reached. Furthermore, what aspects of drilling operations were considered or omitted? WNNB acknowledges that much of this information remains to be fully investigated so as a result, any assertions made regarding the scope of potential impacts, should either be qualified as to the limited body of existing research on this topic or contingent on new evidence.

With regards to compensation, we want to explicitly state that no amount of compensation will adequately account for the loss of a population so vitally intertwined with Wolastoqey existence and culture. The proponent acknowledges the differences between commercial, communal commercial, and FSC based fisheries and the potential for varied impacts to each. While they agree to the CNLOPB Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity they also state that they would: "consider any damages to Indigenous fishing activity resulting from Chevron's proposed offshore activities on a case-by-case basis and in consultation with Indigenous groups." The proponent also states that they will: "continue to work with Indigenous fishers to minimize any potential impact on their ability to exercise their rights to fish." While this language offers some initial promise, it fails to elaborate on exactly how Chevron will work with Indigenous fishers, and specifically Wolastoqey fishers, in mitigating potential infringement of Aboriginal and Treaty rights. This statement also remains sufficiently vague surrounding a definition of "impacts" and whether this only includes a hydrocarbon release or if it also includes impacts from routine drilling operations. We still have very little indication of how these operations affect Atlantic Salmon and therefore this may indeed be more harmful than previously believed to the point of potentially higher rates of injury and/or mortality than a spill depending on the magnitude and timing.

For further context regarding compensation and how the Fishing Gear Damage or Loss Compensation Program proposed in the EIS Report falls short of addressing impacts to Aboriginal and Treaty rights, please refer to the document WNNB submitted for Husky Energy Exploration Project's Information Requirement 58-02 specific to compensation and the inadequacies within the current framework.

Woliwon / Wəliwən,

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MSES
Management and Solutions in Environmental Science

Technical Review of Chevron's EIS for the West Flemish Pass Exploration Drilling Project – Information Requests (IR)

Prepared for Wolastoqey Nation in New Brunswick

March 16, 2020

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ACRONYM LIST

km	kilometre
the Agency	Impact Assessment Agency of Canada
CEAA	*Canadian Environmental Assessment Act*
Chevron	Chevron Canada Limited
C-NLOPB	Canada-Newfoundland and Labrador Offshore Petroleum Board
COSEWIC	The Committee on the Status of Endangered Wildlife in Canada
DFO	Fisheries and Oceans Canada
EBSA	Ecologically and Biologically Significant Areas
EIS	Environmental Impact Statement
EL	Exploration Licence
IAA	Impact Assessment Agency of Canada
MSES	Management and Solutions in Environmental Science
NAFO	Northwest Atlantic Fisheries Organization
NL	Newfoundland and Labrador
the Project	West Flemish Pass Exploration Drilling Project
SEA	Strategic Environmental Assessment
THC	Total Hydrocarbons
WNNB	Wolastoqey Nation in New Brunswick

1.0 Introduction

The Wolastoqey Nation in New Brunswick (WNNB) have requested that Management and Solutions in Environmental Science (MSES) conduct a third-party review of Chevron Canada Limited's (Chevron) Environmental Impact Statement (EIS) for the West Flemish Pass Exploration Drilling Program (the Project) that was submitted to the Impact Assessment Agency of Canada (IAA, the Agency) in January 2020. In this technical review, MSES evaluated the EIS with the goal of assisting WNNB in understanding any gaps and deficiencies in the information provided by Chevron and to develop information requests and recommendations that would address those gaps and deficiencies.

1.1 Background on the Proposed Project

Chevron's exploration drilling program is proposed within its existing offshore exploration license (EL) 1138, in the Flemish Pass, approximately 375 kilometres (km) northeast of St. John's Newfoundland (NL) in the northwest Atlantic Ocean. Chevron submitted the EIS in January 2020 and in February 2020, the Agency invited public comments until March 18, 2020 on the potential environmental effects of the project and any proposed measures to prevent or mitigate these effects as described in the EIS. If approved, the Project would involve drilling up to eight exploration and delineation/ appraisal wells over the term of the EL (2016 to 2025) with an initial well proposed to be drilled in 2021, pending regulatory approval.

The Canadian Environmental Agency (now the IAA) issued the EIS guidelines in December 2018, under the *Canadian Environmental Assessment Act* (CEAA 2012). New federal environmental assessment legislation (Bill C-69) was approved in June 2019, however this will not apply to the project, which will continue under CEAA 2012.

1.2 Review Approach

The review focused on the following disciplines: fish and fish habitat, and fish health. Although no specific fish health section was included in the EIS, MSES expert, Dr. Sarah Alderman reviewed sections of the EIS related to the risk of Project accidental events and malfunctions and considered how the assessment of these impacts and proposed mitigations may affect fish health.

In this review, MSES experts reviewed the adequacy of information presented in the EIS in terms of the baseline data, mitigations and follow-up programs presented by Chevron, and the quality of the assessment of potential environmental impacts and/or risks associated with the proposed Project. A key objective of the MSES review process was to identify and highlight any information gaps in the EIS that may impede WNNB's understanding of the potential impacts resulting from the proposed Project.

1.3 Review Document Structure

This report is structured into Overarching Comments and Specific Information Requests for each discipline area. In the overarching comments, each expert provides a plain language summary of the overall findings of their review. The Specific Information Requests include the detailed technical analysis of the EIS and its supporting documents in terms of the potential direct, indirect and cumulative impacts of the proposed Project, with a consideration of WNNB's traditional use practices. Text containing comments, requests or questions directed to Chevron or regulators appears in **bold**. Throughout the whole

document, direct quotes from the EIS are in *italics* while quotes from other sources and literature remain in plain text.

2.0 Technical Review of Chevron's West Flemish Pass EIS

2.1 Fish and Fish Habitat

2.1.1 Overarching Comments

All recent offshore drilling EISs east of Newfoundland have relied heavily on the Eastern Newfoundland Strategic Environmental Assessment (SEA) prepared by AMEC Foster Wheeler in 2014 (e.g. the Central Ridge Exploration Drilling Program Abridged EIS by Equinor in 2020 and the Flemish Pass Exploratory Drilling Project EIS prepared by Nexen in 2018). As such, these assessments use the same arguments and reasoning to assess the potentially adverse effects from exploratory, off-shore drilling, which generally minimizes the risks to Fish and Fish Habitat by either downplaying the probability of catastrophic events (i.e. large oil spills), promising further studies or monitoring (i.e. Atlantic Salmon migratory routes, or pre-drilling sponge surveys), or citing the same or similar modelling studies to quantify impacts (e.g. JASCO sound propagation, AMEC or RPS/Mudmap drill cutting models). It is important to recognize that a streamlined approach has merits. For example, the literature and data review from the SEA provides a solid summary of insight available up to 2014, and certainly identifies the main sources of impact that require evaluation for subsequent EISs. However, it is therefore, important to clearly identify in each new EIS the SEA's limitations, and how a current effort is being expended to address these limitations. Fisheries and Oceans Canada (DFO) completed a detailed review of the draft SEA (DFO 2014), for which some of the recommendations were immediately addressed (e.g. including Northwest Atlantic Fisheries Organization (NAFO) data) and others were not, but presumably recognized for future work. In general, each new EIS within the region should aim to fill in these gaps. However, a glaring information gap presents itself in the review of Fish and Fish Habitat within the Chevron West Flemish Pass EIS because the SEA only presents baseline data for the southern half of the Project Area. Chevron does not recognize the importance of this data gap in any discussion point in the EIS. Furthermore, future baseline monitoring plans to presumably fill this gap prior to drilling are not substantively different than any of the aforementioned EISs, even though these former studies generally had better baseline data. There are also misleading statements in characterizing distributions of corals, sponges or sea-pens occurring in the southern half of the Project Area without the immediate caveat that the northern area was not surveyed. An incomplete baseline data set is an important factor to discuss in an EIS. More focus is required on this issue including more detail on pre-drilling assessments and the thresholds in benthos abundances that will lead to informing decisions regarding moving forward on the drilling or re-locating elsewhere. As well, more detailed discussion of Atlantic salmon migration routes is required, as this remains an unknown baseline factor for a culturally and commercially important species.

Aside from baseline data, the promise of the SEA's approach is not fulfilled in the cumulative effects assessment section of this EIS. The section does not seem to leverage a streamlined approach by presenting any quantifiable accumulation of potential effects (e.g. long distance noises from multiple drilling operations), and instead falls back on the standard approaches of describing in qualitative terms why impacts are too localized and in short duration to be of any influence on one another.

This review mainly focusses on one aspect of this EIS that could benefit from the presentation of more detail, which is the potential impacts on sponges and corals. These organisms provide a very important role in sea-bed ecosystem structure and function, and contribute to everything from the filtering of seawater to providing nursery habitat for commercially important species (e.g. redfish). More detail is required to ensure this vital organism is properly protected from drilling activities.

2.1.2 References

DFO. 2014. Science Review of the Eastern Newfoundland Strategic Environmental Assessment (SEA). DFO Can. Sci. Advis. Sec. Sci. Resp. 2014/035.

Equinor Canada Ltd. (2020) Central Ridge Exploration Drilling Program Abridged EIS. January 2020.

Nexen Energy ULC (2018) Flemish Pass Exploratory Drilling Project EIS (2018-2028). Prepared by Amec Foster Wheeler. St. John's, Canada, March 2018.

2.1.3 Specific Information Requests

1. Additional effort on estimating benthic community densities needed	
Reference:	West Flemish Pass Exploration Drilling Project, 6.1.6, pg. 6-14
Preamble:	Corals, sponges and sea-pens are an important component of the Project Area's benthos, and likely the most probable component of fish habitat that could experience residual impacts by this project (Smit et al. 2008, Ellis et al. 2012). Despite their importance, this EIS mainly reports existing DFO survey data and plans for an unspecified pre-drill survey to collect new baseline data. While it is understandable that the collection of baseline data requires considerable effort, it is difficult to conduct a rigorous impact assessment when the density of a valuable species is not understood. As such, a reasonable level of effort could involve the development by Chevron of some more advanced distribution and abundance modelling to properly characterize the benthic community in the area. While the EIS has presented some models (e.g. Knudby et al 2013) and even discussed the limitations of others (e.g. depth in Guijarro et al. 2016), a more formal comparison of models for the Project Area would be valuable. These models could mimic the manner in which sediment deposition models (i.e. Mudmap in Appendix C) is used.
Request:	**a) The baseline data for sponges, sea-pens and corals is insufficient to conduct a robust impact assessment because the northern half of the Project Area has not been surveyed. Provide a discussion as to how the lack of surveys in the northern half of the Project Area may affect the confidence in impact conclusions.** **b) Provide an updated distribution and density model (e.g. Guijarro et al. 2016) for the benthic community which would provide an intermediate baseline assessment to improve the proponents understanding of potential impacts on the benthic community.** **c) Please provide a plan to conduct spatial modelling of the Project Area's benthos by either developing a new model or presenting/contrasting the results of existing models.**
Literature Cited:	Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd.

	Ellis, J.I., G. Fraser, and J. Russell. 2012. Discharged drilling waste from oil and gas platforms and its effects on benthic communities. Marine Ecology Progress Series. Vol. 456: 285-302. Guijarro, J., L. Beazley, C. Lirette, E. Kenchington, V. Wareham, K. Gilkinson, M. Koen-Alonso and F.J. Murillo. 2016. Species distribution modelling of corals and sponges from research vessel survey data in the Newfoundland and Labrador region for use in the identification of significant benthic areas. Canadian Technical Report for Fisheries and Aquatic Sciences, 3171: vi + 126 pp. Knudby, A., E. Kenchington and F.J. Murillo. 2013. Modeling the distribution of Geodia sponges and sponge grounds in the Northwest Atlantic. PloS one, 8(12): e82306. Smit, M.G., K. I. Holthaus, H. C. Trannum, J. M. Neff, G. Kjeilen-Eilertsen, R. G. Jak, I. Singsaas, M. A. Huijbregts, A. J. Hendriks. 2008. Species sensitivity distributions for suspended clays, sediment burial, and grain size change in the marine environment. Environmental Toxicology and Chemistry. 27(4):1006-12.

2. Insufficient baseline data collection within the Project Area	
Reference:	West Flemish Pass Exploration Drilling Project, 6.0, Figure 6-5, pp. 6-22, 6-26
Preamble:	The reliance on the SEA 2014 report and on DFO survey vessel data for characterizing the baseline data for this EIS has a major flaw in that the Fish and Fish Habitat resources in the northern half of the Project Area are virtually unknown due to a lack of spatial coverage in survey effort. This is particularly important because there is some evidence that the northern area could hold valuable resources: - greatest density of fish is at the slopes of the Grand Banks (6.1.10, pg. 6-56) which is also the northern edge of the survey area - important redfish population densities (Figure 6.9, pg. 6-35) along the northern edge of the survey area, which could be related to the high densities of corals, sponges and sea-pens found along that same edge - Northeast Newfoundland Slope Closure overlaps with the northwestern edge (6.4.2.4, pg. 6-131) of the survey area and is designated as a marine refuge due to the presence of valuable benthic community resources. This results in two problems with the EIS: 1) loss of rigour in the ability to assess and monitor residual impacts, and; 2) misleading statements that suggest that valuable resources are only found in the southern half of the Project Area (e.g. "*Within the Project Area, large and small gorgonians, sponges and sea-pens are present in the southern half of EL 1138*." In Section 8.3.2.3.3 pg. 8-23)
Request:	**a) Provide and implement a plan to increase the understanding of Fish and Fish Habitat within the northern half of the Project Area apart from the pre-drilling surveys listed within the mitigation sections.** **b) Provide further detail on the pre-drilling survey.** **c) Provide a caveat that the northern section was not surveyed every time a statement describing the distribution of resources is made for further iterations of this report and future reports.**
Literature Cited:	Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd.

3. Omissions within literature review and bibliography	
Reference:	West Flemish Pass Exploration Drilling Project, 6.4.2.10, pg. 6-126
Preamble:	With the low baseline data resolution and the reliance of this EIS on literature reviews, it is surprising that there have been some omissions and mistakes in citing and referencing important documents. For example, Kenchington et al. 2018 is cited in the baseline work as an important paper for describing the state of resources (Significant Benthic Areas 6.4.2.10, pg. 6-137), yet it cannot be found within the reference section. Further, a Fisheries and Oceans Canada Science Advisory Report on Ecologically and Biologically Significant Areas (DFO 2016) is not cited within the sources of information in Table 6.18 (pg. 6-116). These types of omissions and bibliographical mistakes are common in large reports, yet they still need to be remedied. However, this reviewer noted that the Northeast Slope description (Section 6.4.2.1.9, pg. 6-126) was much shorter than they other area descriptions despite the fact that this area overlaps the Project Area. If these and other sources of literature were more rigorously included, the authors could be able to speak in more detail on this significant area.
Request:	**a) Please include Kenchington et al. 2018 within the reference section.** **b) Please review and include pertinent information from DFO 2016 for further iterations of this report and future reports.** **c) Please include additional details on the state of Fish and Fish Habitat within the Northeast Slope area for further iterations of this report and future reports.**
Literature Cited:	Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd. DFO. 2016. Refinement of Information Relating to Ecologically and Biologically Significant Areas (EBSAs) Identified in the Newfoundland and Labrador (NL) Bioregion. DFO Can. Sci. Advis. Sec. Sci. Resp. 2016/032.

4. Parameter justification needed for the Mudmap Drill Cuttings Model	
Reference:	West Flemish Pass Exploration Drilling Project, 8.3.1.3.3, pg. 8-15
Preamble:	The residual impact from exploratory drilling is a probable cause for loss of Fish and Fish Habitat (Ellis et al. 2012, Bell et al. 2015) and as such, the results from the Drill Cuttings modelling using Mudmap (Appendix C) are a particularly important component of the EIS. However, there is a need for some additional justification of the parameters chosen for the model, as well as, the language within the report in Appendix C to support the conclusion that residual impacts will be of a low magnitude.
Request:	**a) Why was the lower threshold of 1.5 millimetres (mm) of deposited particles not reported in the outputs of the Mudmap models when it is recognized within the EIS (pg. 8-17) and the model report (Appendix C, 2.5.1, pg. 17) that benthic communities could be sensitive to this level of deposition?** **b) What is meant by the statement on page 14 of Appendix C that the Mudmap model is "*conservative*"? Does this mean that the model under- or over- estimates the thickness and spatial extent of particle deposition?** **c) Why are only two seasons (spring and summer) modelled when Chevron states within the EIS that despite their preference for drilling within**

	those seasons, they recognize the potential in drilling year-round (11.1.4.2 Temporal Boundaries, pg. 11-7)? It is not that much harder to model these scenarios. Please provide the depositional estimates if a justification cannot be provided. **d) What is the background rate of particle deposition within the Project Area? This seems like an important rate to understand, considering that most impacts are judged relative to natural variation.**
Literature Cited:	Bell, J.J., McGrath, E., Biggerstaff, A., Bates, T., Bennett, H., Marlow, J. and M. Shaffer (2015). Sediment impacts on marine sponges. Marine Pollution Bulletin, 94(2015): 5-13. Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd. Ellis, J.I., G. Fraser, and J. Russell. 2012. Discharged drilling waste from oil and gas platforms and its effects on benthic communities. Marine Ecology Progress Series. Vol. 456: 285-302.

5. Drill Cuttings Model requires sensitivity analysis and regional comparisons	
Reference:	West Flemish Pass Exploration Drilling Project, 8.3.1.3.3, pg. 8-15
Preamble:	The discharge of drill cuttings on the sea floor is known to cause adverse effects on macrofauna (Ellis et al. 2012, Bell et al. 2015). The EIS has concluded that these effects will be low in magnitude based on the results of a Mudmap model presented in Appendix C, in which none of the scenarios modeled resulted in depositions greater than a 6.5 mm impact threshold. However, these results stand in stark contrast to other models within the region including one for Stat Oil (2017, Appendix G), and another for Nexen (2018, Appendix D) where each identified residual impact footprints of deposition greater than 6.5 mm. These examples are from another modelling platform (i.e. not Mudmap) for which there are likely nuances in the manner in which particles settle across the seafloor. However, Chevron's consultant states in Appendix C that the likely reason for low thicknesses is that the sediment is expected to be of a fine composition (Appendix C, Section 3.1.1, pg. 19), yet this parameter is identical across these models. Further, all these regional models use similar water velocities (Appendix C, Figure 1-3) and discharge values (Appendix C, Table 2-1 and Table 2-2, pg. 16). Therefore, it is important that Chevron justifies in greater detail why their model does not demonstrate an impact footprint while these other models do. It is also worth noting that residual impacts are expected in general for drill cuttings (Ellis et al. 2012), and so Chevron's findings are apparently extraordinary from a broader perspective. These unique results speak to an even broader need for all these regional drill cuttings models to undergo model validation/contrasts, and rigorous sensitivity analyses. As it is difficult to validate these models (Kampala et al. 2012), the scientific community has determined that contrasts among models (Niu and Drozdowski 2014) and sensitivity analyses (Nexen 2018) are required to be able to evaluate model predictions. Chevron has not provided these here, and their consultant's references for Mudmap's validation are not current, not accessible or not relevant (Burns et al. 1999, King and McAllister 1997, 1998, TetraTech 2002, all cited within the text of Appendix C).

Request:	**a) Please contrast and explain the different results from the Mudmap model for this EIS with the other drill cutting modelling results within the region including Nexen 2018 and Stat Oil 2017.** **b) Please include a proper sensitivity or elasticity analysis of the parameters within the Mudmap model that hold potentially necessary, yet unrealistic assumptions.**
Literature Cited:	Bell, J.J., McGrath, E., Biggerstaff, A., Bates, T., Bennett, H., Marlow, J. and M. Shaffer (2015). Sediment impacts on marine sponges. Marine Pollution Bulletin, 94(2015): 5-13. Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd. Ellis, J.I., G. Fraser, and J. Russell. 2012. Discharged drilling waste from oil and gas platforms and its effects on benthic communities. Marine Ecology Progress Series. Vol. 456: 285-302. Kampala, B., Guillou A., Marini, L., and Michel, C. (2012) A Review of the Evaluations of Six Offshore Numerical Models for E&P Discharges. International Conference on Health, Safety and Environment in Oil and Gas Exploration and Production, 11-13 September, Perth, Australia Nexen Energy ULC (2018) Flemish Pass Exploratory Drilling Project EIS (2018-2028). *Prepared by* Amec Foster Wheeler. St. John's, Canada, March 2018 Niu, H, and A. Drozdowski (2014) Modeling the transport of drilling muds: Comparison of bblt and ParTrack models. IEEE Conference Proceedings, OCEANS, St. Johns, Canada, Sept 14-19, 2014 Statoil Canada (2017) Flemish Pass Exploration Drilling Program EIS *Prepared by* Amec Foster Wheeler and Stantec Consulting. St. John's, Canada, November 2017

6. More justification needed on the weight given to a recent study on impacts to plankton	
Reference:	West Flemish Pass Exploration Drilling Project, 8.3.1.3.2, pg. 8-13
Preamble:	The EIS briefly mentions that one study, McCauley et al. 2017, has measured a 50% reduction in copepods and cladocerans out to a distance of 658 metres (m) from the sound source that mimics the seismic survey methodologies that would be used within the Project Area. Without context, this statistic is difficult to evaluate within the EIS. Further detail is needed because the health of lower trophic levels within important fish nurseries is of high concern for the ecosystem management of ocean fisheries.
Request:	**a) Please provide more detail on the McCauley et al. 2017 findings and some context into why these findings should not play a more prominent role in the risk assessment of residual impacts for this EIS?**
Literature Cited:	Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd. McCauley R. D., R. D. Day, K. M. Swadling, Q. P. Fitzgibbon, R. A. Watson. 2017. Widely used marine seismic survey air gun operations, negatively impact zooplankton. Nature Ecol. Evol., 1: 1-8.

7. Pre-drilling coral mapping survey is not described adequately	
Reference:	West Flemish Pass Exploration Drilling Project, 8.7, pg. 8-42
Preamble:	The mitigation that is proposed to reduce the adverse impact of drilling operations on the macrofauna on the sea floor is to conduct pre-drilling surveys to create a coral map at the proposed drill site. Unlike some other EISs in the region (e.g. Equinor 2020), the survey design will not be submitted to Fisheries and Oceans Canada prior to its implementation. Further, there is little detail given within the EIS on its methodology to allow for a proper evaluation of how effective pre-drilling surveys will be as a baseline monitoring tool. It would at least be helpful to understand what is considered a threshold for assigning significance to a coral or sponge aggregation which would warrant moving the drill location. Would one sponge be enough? Or following common conventions, would a certain density be required to move the well site?
Request:	**a) Please provide more detail on the decision points of how a wellsite will be relocated in the event that a coral or sponge is observed in the pre-drilling survey. Please include:** **i. The threshold of sponge or coral density that is considered significant.** **ii. The likely spatial resolution (i.e. how much area of the 500 m survey radius is observed) of the survey relative to the drill site.**
Literature Cited:	Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd. Equinor Canada Ltd. (2020) Central Ridge Exploration Drilling Program Abridged EIS. January 2020.

8. There is no fish habitat offsetting for smothered seabed	
Reference:	West Flemish Pass Exploration Drilling Project, 8.1.6, pg. 8-7
Preamble:	Under the *Fisheries Act*, the permanent loss or alteration of fish habitat following mitigation efforts requires that the proponent offset those losses through habitat compensation projects. This fact is recognized within the EIS in only one location (pg 8-7), yet never revisited. The drill cuttings will smother fish habitat on the seabed, and the over 30 wells from the six ELs will cumulatively cover a significant area. It is not known whether areas covered with drill cuttings ever recover, and there is indeed evidence that recovery can be slow or nonexistent (Smit et al. 2006). As these impacts are much greater than a bridge pile footing, for which the federal government often requires infrastructure developers to offset this area, there needs to be some explanation for why compensation for these losses to habitat are not considered.
Request:	**a) Please discuss why a fish habitat compensation project is not outlined in the EIS, or apparently required, for the loss of fish habitat on seabed from drilling activities.**
Literature Cited:	Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd. Smit, M.G.D., J.E. Tamis, R.G. Jak, C.C. Harman, C. Kjelilen, H. Trannum and J. Neff. 2006. Threshold levels and risk functions for non-toxic sediment stressor; burial, grain size

	changes and hypoxia. Summary, Environmental Risk Management System, Report 9, THO 2006-BH0046/A Open, 2006.

9. Cumulative effects section does not address warming ocean	
Reference:	West Flemish Pass Exploration Drilling Project, 14.0, pg. 14-1
Preamble:	The EIS mentions that the region will experience the top 1% in the warming rate of ocean waters globally (Section 6.1.2, pg. 6-3), but this fact is not included in the cumulative effects section. A discussion on how warmer waters will influence the impacts of the drilling programs (many of which have long operational timelines) is required. Questions pertaining to changes to the sensitivity of some of the valued components, changes in the migration and feeding areas for Atlantic Salmon, or whether physical attributes of the oceans could change (e.g. currents) is required.
Request:	**a) Please include the effects of the warming oceans as a cumulative effect that needs to be evaluated.**
Literature Cited:	Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd.

10. Cumulative Effects does not address the combined footprint of all regional wells	
Reference:	West Flemish Pass Exploration Drilling Project, 14.0, pg. 14-1
Preamble:	Pham and his co-authors recently published a paper in Scientific Reports that estimates the value of sponges and corals to the Flemish Cap area in terms of the rates of seawater they filter and carbon they assimilate (Pham et al. 2019). In this same article, they are able to estimate the cumulative effects of bottom trawling on these same corals and sponges in terms of loss of biomass, but also loss of ecosystem functioning. The drilling of wells smother fish habitat on the seabed for which the rates of recovery are uncertain (Smit et al. 2006). As mentioned in the EIS, many wells have been drilled in the Canada-NL Offshore Area since the SEA was written in 2014. As such, it should be possible, and also deeply insightful, for the cumulative footprint of all these wells to be estimated, and the cumulative loss in coral and sponge ecosystem function be described. This would contribute a much more robust form of cumulative effects assessment than the mostly qualitative arguments present throughout this section of the EIS.
Request:	**a) Please estimate the impact footprint, with error/uncertainty, of drilling operations in the Regional Study Area, on coral and sponge biomass following the approach of Pham et al. 2019.**
Literature Cited:	Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd. Pham, C.K., Murillo, F.J., Lirette, C. et al. (2019) Removal of deep-sea sponges by bottom trawling in the Flemish Cap area: conservation, ecology and economic assessment. Sci Rep 9, 15843 https://doi.org/10.1038/s41598-019-52250-1. Smit, M.G.D., J.E. Tamis, R.G. Jak, C.C. Harman, C. Kjelilen, H. Trannum and J. Neff. 2006. Threshold levels and risk functions for non-toxic sediment stressor; burial, grain size changes and hypoxia. Summary, Environmental Risk Management System, Report 9, THO 2006-BH0046/A Open, 2006.

2.2 Oil Spill Impacts to Fish Health

2.2.1 Overarching Comments

The EIS considered plausible spill scenarios at two locations within the Project Area. For each location, the spill scenario was described as an unmitigated blow-out, meaning an uncontrolled release of oil from the well head located on the ocean floor, for short (approximately one month) and long (approximately four months) durations, without intervention (e.g. physical recovery, surface burning, physical or chemical dispersion). The model employed existing historical data on water and weather conditions in the Project Area to predict the environmental fate of released oil, and ran 171 iterations of simulated spills for each scenario to come to a plausible worst-case scenario impact. While modeling unmitigated spills offers a worst-case scenario for surface oiling and shoreline stranding by maximizing the volume of oil under consideration, this approach does not account for the potential increased impact to fish and other aquatic organisms imposed by dispersant application. Dispersion decreases droplet size, increases submerged oil, and increases dissolved contaminants in affected areas. The dissolved contaminants are a major factor in the adverse effects to fish and other aquatic biota. The proponent notes in several places throughout the EIS that physical and/or chemical dispersion would be a likely component of the spill response; therefore, this would alter model predictions with respect to dissolved hydrocarbons. The conclusion that there would be little to no adverse effects to fish and fish habitat are, therefore, premature.

A major gap in this report is consideration of the potential impacts to Atlantic salmon in the unlikely event of a spill. The proponent notes that DFO surveys failed to identify Atlantic salmon in the Project Area, yet the migration routes and feeding grounds (to the extent that these are known) are within the bounds of the impact zone of the modelled spills. There is very little known about the impacts of crude oil exposure on Atlantic salmon, particularly with respect to sublethal effects on the cardiorespiratory, osmoregulatory, or nervous system. Impairments to these physiological systems could have adverse effects on critical life history events such as migration, smoltification, and homing.

2.2.2 Specific Information Requests

11. Oil spills are not unmitigated events	
Reference:	West Flemish Pass Exploration Drilling Project, 15.0 and Appendix F
Preamble:	The assessment specifies that the oils spill scenarios "*were modelled as completely unmitigated, implying that no response efforts were undertaken during the modelled time period.*" (Appendix F, pg. 1). This is a conservative approach that permits the proponent to track the fate of a maximal volume of released oil, which is a good approach for predicting the potential maximum extent and impact of surface oil and shoreline oiling. However, as noted elsewhere in Appendix F (e.g. pg. 121 and 125), unmitigated release is an unlikely scenario "*because various emergency response tactics would typically be employed immediately in the event of a spill.*" Certain response measures, such as mechanical recovery and *in situ* burning, would reduce the total volume of spilled oil and provide a less conservative estimate of impacts. However, other mitigation measures, specifically application of chemical surfactants or physical dispersion would greatly enhance subsurface oil content (e.g. droplets, mousse), and by extension dissolution rates and dissolved hydrocarbon concentrations (NASEM 2019).

Request:	**a) Please provide the rationale for excluding standard spill response measures in the modeled analysis, specifically with respect to use of dispersion.** **b) Please provide information and credible references on the expected change in dissolved hydrocarbon concentrations if dispersion is carried out as a response measure in the four spill scenarios.** **c) We recommend that the proponent consider standard spill response procedures when determining the fate of released oil in the subsurface environment, and with respect to potential impacts on aquatic organisms.**
Literature Cited:	Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd. National Academies of Sciences, Engineering, and Medicine. 2019. The Use of Dispersants in Marine Oil Spill Response. Washington, DC: The National Academies Press. https://doi.org/10.17226/25161.

12. Resolution of oiled shorelines	
Reference:	West Flemish Pass Exploration Drilling Project, 15.0, Figure 15-26
Preamble:	Several fates of released oil were tracked in the spill scenarios, including total hydrocarbons (THC) stranded on shorelines and in sediments. In some cases, a relatively high concentration of THC are fated to end up along the eastern shorelines of islands in Newfoundland. For example, Figure 15-26 (pg. 15-52) indicates extensive shoreline oiling at >500 grams per metre cubed (g/m^3). This shoreline includes access points to critical habitat for Atlantic salmon transitioning between freshwater and seawater life stages, including discrete populations listed as threatened by Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (e.g. South Newfoundland Population DU4; DFO).
Request:	**a) Please explain what spill response tactics are typical/appropriate for this environment and Project. If multiple response tactics could be employed, please specify what factors contribute to the decision to use a particular mitigation measure.** **b) Please provide the rationale for excluding standard spill response measures in the modeled analysis, specifically with respect to use of chemical dispersants.** **c) Please provide information and credible references on the expected change in dissolved hydrocarbon concentrations if chemical dispersants are applied in the four spill scenarios.** **d) We recommend that the proponent consider standard spill response procedures when determining the fate of released oil in the subsurface environment, and with respect to potential impacts on aquatic organisms.**
Literature Cited:	Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd.

13. Monitoring impacts to fish populations	
Reference:	West Flemish Pass Exploration Drilling Project, 15.4, Contingency Planning and Spill Responses
Preamble:	The spill response detailed in this section outlines the general policies and procedures for responding to a spill. This includes oils spill response resources designated to wildlife monitoring and handling (pg. 15-74). It is not clear how and if these resources will be used to track impacts on marine fish.
Request:	**a) A list of response resources is given in Chapter 15 (pg. 15-74) that includes physical dispersion, and strategy guidelines for a tactical spill response are offered on page 15-76 and in Table 15.33. Please specify what factors contribute to the decision to use dispersion, and how this decision affects wildlife monitoring efforts (especially fish).** **b) Wildlife monitoring includes interventions and monitoring only for seabirds. Please explain specific strategies to minimize exposure and to monitor impacts to marine fish, including documenting species-specific mortalities.**
Literature Cited:	Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd.

14. Migratory fish not considered	
Reference:	West Flemish Pass Exploration Drilling Project, 15.5.1, Marine Fish and Fish Habitat
Preamble:	The proponent states that at least 65 fish species are known to use habitat in the Project Area and lists several examples, including some of conservation concern (pg. 15-79). The species survey was sourced from data collected from DFO fish surveys in the Project Area over several years. The proponent notes that Atlantic salmon were not identified in these fish surveys, and therefore are unlikely to be "*in the immediate Project Area at any given time*" (Chapter 6, pg. 6-53). As a result, potential impacts to Atlantic salmon were not considered in the EIS. This conclusion does not adequately take into consideration the complex life history of Atlantic salmon, or the uncertainties surrounding the movements of Atlantic salmon populations during oceanic life stages. For example, significant shoreline oiling could increase dissolved hydrocarbon concentrations in near-shore habitats where smolts congregate during seawater transition. While this is outside the Project Area, it falls within the potential impact zone of worst-case scenario spills. Ocean migration routes and feeding grounds for Atlantic salmon are only loosely defined, indicating the significant gap in our understanding of this life stage of these fish. The Project Area is within plausible migration routes and feeding grounds for Atlantic salmon, as is the extent of dissolved hydrocarbon spread in the spill models.
Request:	**a) Please acknowledge in the EIS that there is not enough information known on the movement patterns of Atlantic salmon in and around the Project Area to conclude that this species would not experience impacts from the project and/or spill.** **b) Please acknowledge in the EIS that shoreline oiling in the unlikely event of a spill could impact certain Atlantic salmon designation units at specific life stages.**

Literature Cited:	Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd.

15. Assumptions on fish recruitment	
Reference:	West Flemish Pass Exploration Drilling Project, 15.5.1.3.1, Subsea Blowout, pg. 15-87
Preamble:	The proponent notes that fish eggs, larvae, and juveniles could experience lethal and sublethal effects from a spill, while adult fish would most likely avoid the spill zone. The argument then follows that changes in population recruitment would be minimal (i) because the spill zone would not occupy the full habitat of a given species, or (ii) because a species' spawning window would not be completely affected by a spill.
Request:	**a) Please provide credible references that natural recruitment is re-established after a subsea blowout "*to their original level within one generation*".** **b) Please provide examples of fish species relevant to the Project Area, including those of conservation concern, that spawn in large areas and/or over long timescales.**
Literature Cited:	Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd.

16. Information error	
Reference:	West Flemish Pass Exploration Drilling Project, Table 2.10, pg. 2-29
Preamble:	Table 2.10 Proposed Drilling Program for West Flemish 2 (500 m) contains identical information to Table 2.9, with the exception that the Intermediate drilling component is broken in to 2 subcategories. The total values are not all correct.
Request:	**a) Please confirm that identical cuttings discharges are expected for each drilling component, irrespective of the depth of the drilling program.** **b) Please ensure total values are correctly reported.**
Literature Cited:	Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd.

17. Missing information	
Reference:	West Flemish Pass Exploration Drilling Project, Appendix F
Preamble:	There are several instances of missing references in the text, which appear as "(Error! Reference source not found.)" Examples include Report Section 1.1 and Report Section 1.4.
Request:	**a) Please provide credible literature references.**
Literature Cited:	Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd.

18. Conditions for feasibility of avoiding sensitive areas not provided	
Reference:	West Flemish Pass Exploration Drilling Project, Table 2.23 pg. 2-53
Preamble:	Prior to drilling, the proponent will conduct area surveys at proposed well sites to "*confirm the absence of sensitive environmental features*." If the survey identifies environmental or anthropogenic sensitivities, the proponent will either move the wellsite or consult with the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB). This

	description is vague and open to interpretations that may be ultimately steered by financial motives of the proponent.
Request:	**a) Please explain what factors are used to determine the feasibility of moving the wellsite, and who is responsible for making this decision.** **b) Please clarify the expected outcome of consulting with the C-NLOPB if it is not feasible to move the well site.** **c) Please identify how and where the baseline data for coral and sensitive benthic habitat will be made available.**
Literature Cited:	Chevron Canada Limited. 2020. West Flemish Pass Exploration Drilling Project. Prepared by Stantec Consulting Ltd.