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November 8, 2019

Your file *Votre référence*
17-6461-1300

Our file *Notre référence*
19-HMAR-00032

Attn:
Nova Scotia Environment
Environmental Assessment Branch
Barrington Place
1903 Barrington Street, Suite 2085
Halifax, Nova Scotia B3J 2P8

Dear :

Subject: Notice of NPNS Focus Report and request for feedback

The Fish and Fish Habitat Protection Program (FFHPP) of Fisheries and Oceans Canada (DFO) received the request for feedback on the Northern Pulp Nova Scotia Focus Report on October 3, 2019. At this time, the Program would like to offer general comments on the document for the Minister's consideration.

Please note that the timeline was considered inadequate for a substantive review by DFO. As such, it is important to note that the comments represent a non-exhaustive review of the report and appendices in relation to DFO's mandate. There is an expectation that additional comments could be provided with an opportunity for a more detailed and thorough review.

DFO also provided information on areas such as oceanographic modelling, sediment transport and specific fish and fish habitat data to Environment and Climate Change Canada and Health Canada in order to support their comments to be provided in relation to their respective mandates.

The review and following general comments focused on the physical impacts to fish and fish habitat under the *Fisheries Act* (FA), specifically Section 34 (Death of Fish) and Section 35 (Harmful Alteration, Disruption or Destruction (HADD) of Fish Habitat). DFO's review also considered potential impacts to aquatic species at risk, as defined in subsection 2(1) of the *Species at Risk Act* (SARA). This review did not extend beyond potential changes in fish productivity as a result of the physical works; therefore, conclusions presented by DFO should not be applied directly to potential socio-economic impacts including impacts to resource use by Indigenous people.

DFO offers the following general comments on the NPNS Focus Report:

There are still locations in the document that refers to DFO as responsible for regulating effluent under the FA. The Pollution Prevention Provisions of the FA are intended to control the deposition of deleterious substances affecting fish, fish habitat or the use of fish, and are therefore of interest to DFO, Environment and Climate Change Canada (ECCC) and Health Canada (HC) in fulfilling their respective mandates. The administration and enforcement of Subsections 36(3) to 36(6) of the FA is led by ECCC, with support, cooperation, and communication with DFO and HC, as appropriate.

The description of the Project and technical details and mitigations presented in the focus report are not sufficient in completely characterizing the project effects related to DFO's mandate. There are information gaps related to the disposal at sea location (which may result in impacts to fish and fish habitat), final pipeline construction methodology and mitigation to avoid or minimize potential HADD, Death of Fish, including marine mammals and sea turtles. The proponent would be required to address these issues as part of a DFO regulatory review process, should it proceed to this stage.

The preliminary review identified a number of gaps in the information presented. For example, information on marine species in particular is lacking and, at times, factually inaccurate. Moreover, the oceanographic modelling was considered inadequate. Given that many of the impact assessments require a robust appreciation of the species present in the environment, it would be important to ensure accuracy on these elements.

Specific comments:

- The review of literature describing the aquatic community in this area is deficient: a substantial number of reports and publications are available that provide more contemporary information on aquatic communities. The report largely relies on a desktop review of sparsely published and in some cases outdated materials or incorrectly uses fisheries information as a proxy for species distribution.
- The limited spatial and temporal marine habitat assessment and baseline distribution of many of the marine fish species presented are inaccurate. The list of marine species used to describe the marine environment component should be extended to better reflect the aquatic species expected to be found and how they use the habitat in the vicinity of the project. The report also incorrectly indicates that some species utilize the area for only migration (e.g., Atlantic herring, American eel, striped bass).
- There is an absence of information on marine mammals, leatherback sea turtles, and sharks.

- DFO notes that there are a number of Indigenous Food, Social and Ceremonial (FSC) fisheries, as well as commercial and recreational fisheries and related species that occur within the local area that were not identified in the report, including important bivalve, tuna, and rock crab habitats and fisheries.
- The proponent identified a “Communication and Compensation Plan for Commercial Fisheries and Aquaculture, in coordination with NSE, DFO, and potentially impacted stakeholders,” as a key mitigation measure in the Environmental Assessment Registration Document and Focus Report. However, DFO has not been engaged by NPNS in developing, approving or reviewing this mitigation measure and it is uncertain to what extent it can be relied upon to reduce potential impacts to the socio economic environment.
- There are species in the local area that have a stock status in the critical (e.g., mackerel) or cautious zone (e.g., herring) as outlined in DFO’s fishery decision-making framework incorporating the precautionary approach (<https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/precaution-eng.htm>). Therefore, any component of the project that has the potential to interact with these species should be carefully considered.
- Herring harvest areas directly overlap the pipeline in outer Caribou Harbour and Northumberland Strait as stated but more importantly the project area includes herring spawning and larval distribution.
- The time provided did not allow DFO to review the sections on ice to confirm their accuracy.
- Sections of the report use risk based management language in some of the assumptions, but they do not indicate the manner in which risk categories are applied with criteria.

Scallop Buffer Area-Marine Refuge:

- The project is within the marine refuge (Scallop Buffer Zone 24), which is a fisheries closure that counts towards DFO’s National Marine Conservation Targets. This important area is closed to scallop dragging to protect juvenile lobster, scallop, flounder and their habitat. It is not clear that the Scallop Buffer Area-Marine Refuge has been adequately considered in the environmental management and planning sections of the document.
- The document also incorrectly notes that the Scallop Buffer Zone-Marine Refuge was established as a fishery closure in 2014 when it was actually established in 1996. This area was then identified as a Marine Refuge in June 2017 and considered an Other Effective Area Based Conservation Measure counting towards Canada’s Marine Conservation Targets of protecting 10 % of Canada’s coast and oceans by 2020.

Editorial comments:

- Some common species names are incorrect (American plaice and not Atlantic plaice);
- The COSEWIC assessed status of Striped Bass for the southern Gulf of St. Lawrence DU is special concern, not threatened as indicated.
- The DFO Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky 1998) was not developed for use in the marine environment and, therefore, cannot be cited as a mitigation measure. Blasting, if required for construction, would need further review and evaluation by DFO-FFHPP.

DFO looks forward to continued involvement in the review of the project. If you have any questions concerning the above, please contact me at 902-402-5851 or Michael.wambolt@dfo-mpo.gc.ca

Yours sincerely,



Mike Wambolt
Section Head-Marine Developments
Ecosystem Management-Regulatory Reviews

cc: _____, Pictou Landing First Nation
Environment and Climate Change Canada
Transport Canada
Health Canada
Public Services and Procurement Canada
Crown-Indigenous Relations and Northern Affairs Canada



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16th Floor Queen Square
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November 8, 2019

Nova Scotia Environment
1902 Barrington Street, Suite 2085
Halifax, NS B3J 2P8

Dear _____ :

Re: Northern Pulp Effluent Treatment Facility Replacement Project – Focus Report

In response to your October 3, 2019 request, Environment and Climate Change Canada (ECCC) has reviewed the Focus Report submitted by Northern Pulp Nova Scotia for its proposed Effluent Treatment Facility Replacement Project. The attached comments are offered for your consideration in reaching a decision on the adequacy of the document:

The department's review focused on issues within our mandate and available expertise involving marine water quality (end of pipe discharge criteria, receiving environment); the potential impacts of effluent discharge (on water frequented by fish and on fish and fish habitat); and, potential impacts to migratory birds. The comments on fish and fish habitat have been prepared in collaboration with Fisheries and Oceans Canada in relation to our respective responsibilities under the *Fisheries Act*.

If you have any questions or concerns, please feel free to contact me or Stephen Zwicker, lead EA coordinator for this project.

Yours truly,

Michael Hingston
Head, Environmental Assessment
Environmental Protection Operations Directorate, Atlantic

cc: J. Corkum
M. Dober
MT Grant
H. Dupuis
S. Zwicker

Northern Pulp Replacement Effluent Treatment Facility Project Focus Report – Environment and Climate Change Comments, November 8, 2019

Clarification on Regulatory Requirements and Standards

Table 2.4-2 Calculated Regulatory Limits in Canadian Jurisdictions vs. Veolia Expected Performance

ECCC Comments:

Intensity factors for the calculation of allowable daily discharges for BOD and TSS are rounded-up from what is identified in ECCC's May 2019 Detailed Proposal for the Modernization of the *Pulp and Paper Effluent Regulations*. While the limits discussed in the proposed Modernization document are not yet part of any regulations, they should still be referenced accurately. Rounding-up the intensity factors represents an increase in allowable discharges.

2.5 Provide any proposed changes to the pipeline construction methodology and other associated pipeline construction work, related to the potential changes to the marine portion of the pipeline route (e.g., infilling, trenching, temporary access roads, excavation, blasting, disposal at sea, and others where applicable).

ECCC Comments:

Disposal at Sea (DaS) activities include the loading, transport and disposal of material and these activities are regulated under Part 7, Division 3 of the *Canadian Environmental Protection Act 1999* (CEPA). Any proposed in-water work at any project phase that involves the movement of material (e.g. sediment) in the marine environment could constitute DaS and may be prohibited unless authorized under a permit.

ECCC recognizes that more detailed design work is still underway for this proposed project. It is worth noting however, that one important requirement of the DAS regulatory process is the need to characterize sediment to be dredged and disposed (or re-used) in accordance with ECCC standards. Based on the sediment sampling results submitted to date, it is likely that further sampling will be required along certain portions of the proposed pipeline route and the proponent is encouraged to contact ECCC directly to discuss this requirement.

4. Marine Water and Marine Sediment

4.1 Conduct baseline studies for the marine environment (such as marine water quality and marine sediment) in the vicinity of proposed marine outfall location.

ECCC Comments:

Section 4.1 of the Focus Report (page 69) states that six water samples were collected on May 24 and 25 2019. According to Table 4.1-1 (page 70) – which appears to be incorrectly titled

“Sediment Sample Locations and Description” – two samples were collected in “Caribou Harbour” and four at the “Outfall”. Page 70 states that “detailed results are provided in Stantec’s report, appended in Appendix 4.1 of this report” however in that 471 page appendix we could only find results related to sediment and soil. Section 7.3 (Impact Assessment for Marine Fish) states that *“water quality was examined within the LAA over two seasons (October 2018 and May/June 2019) and at varying depths and tide cycles. In total, 22 samples were collected, eight from Caribou Harbour along the proposed pipeline route and 14 within the effluent mixing zone”* (page 125). Appendix 4.2 Updated Receiving Water Study (page 3.3) also states that water quality data were collected in May and June 2019.

It is unclear how many marine water quality samples were in fact collected or how the laboratory results were used to calculate the Background Water Quality (e.g. in Table 4.1-2: Background Water Quality at Caribou Harbour used in RWS, page 71). In addition, no justification for the number of samples or sampling locations was provided. ECCC is not in a position to assess whether the marine water quality samples are representative of background water quality.

4.2 Update the receiving water study to model for all potential contaminants of concern in the receiving environment (based on the result of the effluent characterization and/ or other relevant studies such as Human Health Risk Assessment). Baseline water quality data for Caribou Harbour must be applied to this study.

ECCC Comments:

Following from our observations on 4.1 above, it is not clear how the background water quality samples were used to calculate the input into the model for the updated receiving water study.

The receiving water study modelled an arbitrary concentration of whole effluent, which was then used to identify dilution factors, assuming a linear rate of degradation of all parameters. It needs to be confirmed whether this is a standard approach as various components of the effluent may in fact be degraded, stratify or move differently than others, and there was no analysis specific to the fate of these individual components.

Section 3.1.1 (page 3.1) of the Marine Environment Impact Assessment (Appendix 7.3) suggests that “additional sampling, consistent with the scope of these sampling efforts is planned and data corresponding to these events will be made available as it is completed.” It is not clear how much more additional data is being considered, the anticipated timelines for receipt of that information (before or after EA decision), and what the purpose of this additional data may be (e.g. would it be expected to change the input parameters for the model?).

A more precise description of the water sampling locations than “Caribou” and “diffuser area” is expected. Showing the water sampling locations identified on a map is preferable.

4.3 Provide results of sediment transport modelling work to understand the impact of potential accumulation of sediment within near field and far field model areas. This should

include chemical and physical characterization of the solids proposed to be discharged by NPNS as well as a discussion of how these solids will interact with the marine sediments and what the potential impact will be on the marine environment as a result.

ECCC Comments:

The conclusions reached in the Focus Report are largely dependent on estimates of dilution of the effluent based on a 2D oceanographic model. The choice of a 2D approach is not appropriate for far-field modelling in the Northumberland Strait. Of further consequence, there are number of underlying deficiencies in the assumptions used in the models and the fundamental baseline information. ECCC's review of the information in consultation with DFO scientists determined there remains a high level of uncertainty regarding the fate of effluent particles and their potential impacts on the receiving environment.

Among the shortcomings in relying on a 2D model are the following:

- 2D suppresses the ability to account for bottom boundary layer dynamics (lower speed near bottom), 3D circulation patterns resulting from wind forcing and/or tide/topography interactions, and local buoyancy effects of freshwater release at the bottom.
- A 2D model could be appropriate if conditions are well-mixed, but this is not the case for the Northumberland Strait which is stratified for some parts of the year, and for which the surface conditions (current, temperatures) can differ substantially from bottom conditions.
- Unrealistic effluent mixing results come from the 2D approach (e.g. the concentration at the surface will be higher than expected because of the buoyancy of the freshwater effluent) which could have important implications for the ultimate fate of the effluent.

The review of the modelling results revealed several other gaps and deficiencies including:

- The 2D model was run for two 30-day periods (February conditions, July conditions). However, there is significant variability both seasonally and inter-annually, meaning the periods simulated may not be representative of conditions throughout the year.
- Given the two finite 30-day time periods for model runs, it is not clear from the documentation if there is expected to be any cumulative effects (e.g. increasing concentrations/ambient temperature) resulting from a continuous discharge.
- Dynamics of the model effluent are not clear and information is missing on how particles are used to represent an effluent concentration. Notably, there is a lack of detail on the model mesh resolution, particularly in the outfall area. This is an important consideration as in a 2D approach, the initial dilution will depend on the volume of the model mesh cell(s) that receive the effluent and that will greatly influence the distance at which a given dilution threshold is met.
- It is noted that a 3D model was used for the near-field analysis, but the input conditions are taken from the 2D model. This is not considered adequate to support conclusions on the accumulation of effluent particles in the near-field.

Similarly, ECCC, with input from DFO, has identified several deficiencies with the sediment transport modelling leaving a high degree of uncertainty with the conclusions and the potential for ongoing impacts of nutrient loading. Shortcomings in the methodology that have been noted include:

- The assumptions of unidirectional flow only considering horizontal currents seems overly simplistic and inaccurate. Unidirectional transport cannot be expected over several hours (minimal suspension time is 3.3 hours) in a tidal regime
- Using a settling velocity in the far-field effluent modelling approach would be a first step towards more realistic assessment of the fate of effluent particulates
- The premise that any build-up of particulates would be prevented by the organic, and hence biodegradable, nature of these products is not supported by the data or information presented. In fact, it is likely this organic matter in the effluent that was refractory to the secondary waste treatment is not highly degradable.
- There are questions related to the physico-chemical behaviour of the particulates and effluent as a whole. Flocculation/aggregation of particulates from a freshwater effluent released in seawater would be relevant for the overall dynamics of the effluent transport

The proponent used the particulate characteristics of effluents from two other Canadian mills, also using Activated Sludge Treatment, as the input parameters for the exercise. The effluents from both mills contain suspended solids that are mostly fines. The exercise calculated the expected suspension times and transport distances for these particles for each effluent. The results for the finer particles traveling at 1 m above the sea floor yield suspension times of a few days and “transport distances” of 22-148 km, depending on whether the current speed is set to slack-tide or average values. Particles suspended 5 m above bottom might be carried for over two weeks and more than 700 km. These calculations do not adequately account for some possible scenarios as they do not incorporate the cyclic variations in current speeds, bidirectional tidal currents or the possibility of flocculation, such that the numbers provided may not be meaningful.

The currents in some areas, (e.g. along quiet shorelines or coves), can be expected to be sufficiently weak to provide the opportunity for these particles to eventually settle out. The Focus Report and Appendix 4.3 do not consider this possibility. The proponent instead predicts (without any supporting references or evidence) that the particles, being largely organic, will be consumed by marine organisms and will not settle anywhere.

The document does not provide sufficient evidence to demonstrate how a deleterious substance such as effluent suspended solids – up to 4,080 kg of suspended solids a day, the value used in the Receiving Water Study – will be completely removed from the plume. Follow-up monitoring should not be seen as acceptable mitigation or remediation.

7.0 Fish and Fish Habitat

7.3 Conduct additional impact assessment of treated effluent on representative key marine fish species important for commercial, recreation and Aboriginal fisheries. This must be based upon updated information, additional studies and/ or an understanding of expected movement of contaminants. Assessment methodology must first be agreed upon by NSE in consultation with relevant federal departments.

ECCC Comments:

Overall, ECCC, based on information from DFO has determined the level of detail is insufficient to assess if the conclusions on potential effects to marine life or the validity of proposed mitigation,

are supported by the data presented or any literature cited. Based on input from DFO, ECCC noted the following:

- The review of literature describing the aquatic community in this area is deficient. A substantial number of reports and publications are available that provide more contemporary information on the aquatic communities
- The report largely relies on a desktop review of sparse published materials (some outdated) or uses fisheries information as a proxy for species distribution. The two are not equivalent and in some cases the fisheries information is erroneous.
- A baseline video survey conducted in May 2019 is inadequate to describe the marine aquatic community in that area; these types of studies are insufficient given the movements of organisms (e.g. seasonal movements), the annual cycling of the Northumberland Strait and the proposal to discharge effluent on a continuous basis, year-round.
- The list of marine species used to describe the marine environment component should be extended to better reflect what is expected to be found in the vicinity of the diffusers.
- Some common species names are incorrect (American plaice and not Atlantic plaice); the COSEWIC assessed status of striped bass for the southern Gulf of St. Lawrence DU is special concern not threatened as indicated; and, a number of species utilize this area for more than migration (Atlantic Herring, American Eel, Striped Bass). In particular, the area of the proposed effluent discharge is directly on herring spawning grounds.
- There is a total absence of information on marine mammals, leatherback sea turtles, and sharks.

The analysis of the potential impacts of the effluent is highly dependent on an ocean circulation model for which a number of concerns have been identified in the previous section. Following from that and these fundamental deficiencies in the collection and presentation of baseline data, ECCC, in consultation with DFO, has determined it is not able to fully assess the analyses in the Report that lead to the conclusions of “no residual significant impact” from the project. Among the concerns:

- Little consideration is given in the report to the effects of effluents (temperature, salinity, chemical composition, nutrients, particulates) discharged on different life stages of aquatic organisms (e.g. eggs and larvae of herring, sea scallop, phytoplankton, zooplankton, shellfish and crustaceans). As a result, the potential implications may be understated in the Report. For example, the temperature and freshwater discharge can be lethal to sensitive marine species (e.g. sea scallops, herring eggs and larvae) some of which, like shellfish, have limited to no mobility.
- An assumption is presented in the Report that the aquatic community is expected to consume/degrade the approximately 4 tonnes of organic materials discharged daily. The basis for this assumption is not well described or supported from a short-term or continuous long-term discharge scenario and raises several other questions including:
 - What aquatic species are expected to consume this material?
 - Could this alter the current species composition in the area of the deposition?
 - What is the nature and composition of the deposit in terms of nutrition for those species?

- Complying with applicable regulatory requirements for effluent discharge quality does not in itself mean there is no potential for significant residual effects. For example, the level of nutrients discharged into the marine ecosystem is not negligible and will most likely influence the food chain (e.g. plankton, filter feeders) with uncertainties in terms of ecological consequences. The report is inconsistent about how these nutrients will be incorporated into the marine ecosystem (i.e. inert versus bioavailable).
- The criteria to assess the significance of residual effects (Table 4.5, Marine Environment Impact Assessment (Appendix 7.3) includes elements for duration, frequency and reversibility. It may not be appropriate to indicate that a duration which persists for the life of the project would be considered “medium term” if the anticipated life of the project is in decades.

In addition, based on input from DFO, ECCC noted the following:

- The potential effects on water quality associated with the ongoing discharge of the effluent (Table 4.6 Marine Environment Impact Assessment (Appendix 7.3) indicates that for several species (winter flounder, American (not Atlantic) plaice, white hake), a Level III effect is identified (effluents expected to occur continuously through the life of the Mill). However, for all other species and with the frequency the same, the effect is identified as Level II.
- The Report states that toxicity testing of treated effluent and estimation of sub-lethal effects will be measured in situ as part of the post-construction monitoring program. Due to the overlap between the effluent discharge site and the herring spawning grounds and scallop beds, such tests should be done before the project goes forward. This should form part of a series of controlled laboratory experiments. As the future effluent is obviously not available, consideration should be given to using either the plant’s current effluent or another acceptable and representative substitute.
- In terms of the reversibility of the effects associated with changes in water quality, Table 4.6 indicates for all species that “effects are reversible following cessation of effluent discharge”. However, there is no supporting information to suggest how long it will take before any impacts to fish/fish habitat will be reversed.
- In Table 4.6, in the column titled “Overall Significance” the terms “generally minor” and “generally reversible” are used. These terms are subjective and there is no supporting information to quantify what they are intended to define.
- There is insufficient consideration of the potential effects of the project on the overall marine food web in the region (e.g. species interactions). These include potential impacts on predator-prey relationships and the risk of bio-accumulation of contaminants in benthic-sessile species, longer-lived species and in species that feed at higher trophic levels.

7.4 Submit an updated Environmental Effects Monitoring (EEM) program based on the results of various relevant baseline studies and an updated receiving water study.

ECCC comments:

Section 7.4 of the Focus Report incorporates the results of the updated Receiving Water Study and asserts that neither fish-population nor benthic-community studies will be required as the modeled plume is rapidly diluted within 20 m. However, the summer and winter scenarios modeled in that study indicated that effluent concentrations can be expected at times to exceed 1% in isolated pockets beyond 250 m. To be clear, the requirements of the EEM program for Northern Pulp will be based on regulatory requirements and sound scientific practices and design, and will be determined once the modeled plume has been empirically validated.

Section 5.2 of the Marine Environment Impact Assessment (Appendix 7.3) states that a number of assessments, including: phytoplankton community assessment; a zooplankton assessment; and, a benthic invertebrate community assessment, will be conducted as part of an EA Follow-up Performance Monitoring Program. Similar assessments should form part of the receiving water study/marine impact assessment, so that there would be baseline information on which to quantify assumptions made in the report (e.g. consumption of the suspended solids) and to validate the results of any follow-up monitoring.

The information provided in the report is inadequate as a descriptor of baseline conditions which would be used for the Environmental Effects Monitoring that would follow. For example:

- Specific to American lobster and rock crab, the chemical analysis of muscle tissue and hepatopancreas tissue from 5 or less individuals, of unknown size and sex, is insufficient to capture the potential variability in chemical loading of individual male and female lobsters and rock crab across size classes.
- Insufficient baseline studies will render it impossible to assess any changes in chemical loading of American lobster and rock crab resulting from the effluent treatment facility.
- Going forward, environmental monitoring plan effectiveness would require a statistically robust sampling regime that accounts for seasonal variability. The Report does not articulate such a plan.

8.0 Flora and Fauna

8.2 Complete a migratory bird survey along the proposed re-aligned effluent pipeline route.

ECCC Comments:

Migratory bird surveys detected Kildeer that was most likely breeding in the project area. The proponent will need to monitor and develop mitigation plans for Kildeer when working in vicinity of the wharf, as like most shorebirds, Kildeer will likely nest in the same location year after year. It should also be noted that Kildeer may start nesting as early as April.

Transect bird surveys should be conducted along the proposed linear footprint of the project in advance of any work.

The total wetland area should be reported, not just the area where it is bisected by the pipeline (p.7).

Similarly, wetland function was only assessed at areas intersecting the pipe, rather than an assessment of the entire wetland area that may be impacted. This could be important for wetlands that are bisected by the pipeline such as WL-13

Environmental Health Program (EHP) Atlantic Region
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November 8, 2019

Environmental Assessment Branch
Nova Scotia Environment
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PO Box 442
Halifax, Nova Scotia, B3J 2P8

Subject: Health Canada's Response to the Focus Report for the Replacement Effluent Treatment Facility Project for Environmental Assessment.

Dear :

Thank-you for your e-mail dated October 3rd, 2019, requesting Health Canada's review of the Focus Report for the "Replacement Effluent Treatment Facility Project for Environmental Assessment Document" for issues with respect to human health.

Due to the length of the Focus Report and the short review period, Health Canada was unable to review all aspects of the Report. Health Canada has reviewed the documentation with particular emphasis on the Focus Report, the Human Health Risk Assessment Problem Formulation Report, Expanded Air Dispersion Modelling Study and other documents as they pertain to potential impacts on human health.

Health Canada is not evaluating the merits of the aforementioned project in comparison to the existing Boat Harbour Effluent Treatment Facility. Although the proponent makes relative risk comparisons between both, Health Canada's evaluation for the purposes of this review is based on the project specific information contained in the Registration Documents and Focus Report for the Replacement Effluent Treatment Facility Project.

Health Canada is providing the following comments for your consideration:

#1 Document Reference – Terms of Reference

Section 9.2 - Commence a Human Health Risk Assessment (HHRA) to assess potential project-related impacts on human health. The risk assessment must consider human consumption of fish and other seafood, consumption of potentially contaminated drinking water, exposure to recreational water and sediment, outdoor air inhalation, and any other potential exposure pathways. The analysis must inform the identification of contaminants of concern and updating of the receiving water study.

Health Canada Comments:

- a. The commencement of an HHRA does not adequately assess the risk to human health from which mitigation measures can be identified that may reduce the risk to human health or identify risk management approaches to reduce any unacceptable risks. Health Canada is unable to assess whether the project as outlined in the Registration Submission and Focus Report may pose

unacceptable or un-mitigatable risks/adverse effects to human health as adequate information (i.e. a completed and well documented HHRA and supporting documentation) has not been provided at this time. A completed HHRA is required in order for Health Canada to assess whether the project poses acceptable or unacceptable risks to human health and whether mitigation measures are available to mitigate identified risks to acceptable levels.

An HHRA can be used to provide a quantitative estimate of the likelihood of potential risks in an exposed population, to highlight the need for mitigation measures where there may be elevated exposures, and to guide the development of follow-up monitoring plans, remediation, and/or risk management approaches to reduce any unacceptable risks. Where a proposed project may result in effects to multiple environmental media (e.g., air, soil, water, food) and there are multiple exposure pathways, an HHRA that evaluates all potential exposure pathways together (i.e., multi-media) is a useful tool for estimating potential risks to human health as a result of the project. – Health Canada, 2019

b. Additional information is needed to meet the requirement of Section 9.2 of the Terms of Reference for the Focus Report:

I. All potential exposure pathways have not been considered or assessed. See #10, #12, #13.

#2 Document Reference -HHRA

Figure 1.2: Approximate Commercial Fishing Locations in the Vicinity of the of the Proposed Diffuser

Health Canada Comments:

After consultation with the Department of Fisheries and Oceans (DFO) it was determined that the fishery information in the Focus Report is very limited in scope and does not represent the full scale of fisheries that occur around the marine components of the project, including Food, Social and Ceremonial fisheries. Species which were not captured in the report but occur around the marine component of the project include but are not limited to herring roe, quahogs, soft shell clams, bar clams and marine mammals.

Additional information is required in the HHRA to represent all marine species which are harvested and consumed in the area around the marine component of the project and in all types of fisheries-commercial, food, social and ceremonial. These species represent part of an exposure pathway in which humans may be exposed to contaminants of potential concern and should be evaluated. In addition, information for these species should be included in the baseline studies for COPCs in marine organism tissues where possible. Marine species will contain varying level of baseline contaminants, will bioaccumulate COPCs differently and may contribute to biomagnification in the food chain, i.e. sedentary organisms that feed on marine sediments may contain higher levels of COPCs, marine mammals due to their higher trophic level position may have higher levels of COPC due to biomagnification, etc.

The additional information detailed above is needed for exposure and toxicity assessment and risk characterization in an HHRA.

#3 Document Reference - HHRA

Section 2.1 Objective and Scope of Risk Assessment - “This HHRA will follow a standard risk assessment approach as defined in the Detailed Quantitative Risk Assessment guidance from Health Canada (HC, 2010a).”

Health Canada Comments:

- a. Health Canada has published several technical guidance documents related to HHRA at contaminated sites, and much of this guidance is also applicable to HHRA's completed as part of the assessment process; however, the main difference between assessments of contaminated sites and future projects is that there is a lack of measured data regarding concentrations of chemicals that may become elevated in the environment as a result of a proposed project. As such, there is a greater reliance on predictive modelling (and the inherent uncertainties associated with modelled numbers) in HHRA's conducted for Environmental Assessments. In addition, the DQRA guidance is intended specifically for the assessment of sites that are to remain the property of a federal agency and are within its care and control; therefore it is not the appropriate guidance document or methodology for the purposes of assessing the potential risk from this project.

All Environmental Assessment HHRA's, including the submission for this project should be conducted using Health Canada's *Guidance For Evaluating Human Health Impacts In Environmental Assessments: Human Health Risk Assessment* and other “Guidance for Evaluating Human Health Impacts in Environmental Assessment” documents for noise, air quality, drinking and recreational water, etc. as applicable. Federal Contaminated Sites guidance documents such as the DQRA can be used to supplement the EA Guidance documents were appropriate.

- b. DQRA guidance on HHRA's as referenced by the consultant was not followed in the preparation of this problem formulation. See also #7, #8.

#4 Document Reference -HHRA

Section 2.2 Study Area- Marine Study Area Although the mixing zone, within which effluent is distinguishable from background, is estimated to be approximately a 20 m radius around the diffuser, the HHRA will consider a Marine Study Area of a 5 km radius around the future diffuser (Figure 2.2). This Marine Study Area is conservative because the potential exposure to effluent parameters above background is likely only within 2% of this area. The water depth is approximately 20 m at the diffuser and it is not anticipated that the effluent will come into contact with sediment within the mixing zone (Stantec, 2018).

Health Canada Comments:

After consultation with the Department of Fisheries and Oceans (DFO) it was determined that the choice of a 2D oceanographic model is not appropriate for far-field modelling in Northumberland Strait due to its inability to account for layer dynamics, 3D circulation patterns resulting from wind

forcing and/or tide/topography interactions, local buoyancy effect of freshwater, etc., which together introduce significant uncertainty on the overall conclusions of the model. The marine study area determination for the HHRA was determined using the modelling report conclusions, which estimates the dilution of the effluent and its geographical impact; therefore errors in modelling may impact the potential risk/adverse effect of the project to human health and the risk calculations of the HHRA. The potential risk may be impacted by increased contaminant concentrations in the study area that may impact the food chain, the geographical extent to which the COPCs in the effluent travels including seaweed harvest areas which would cause a risk of deposition and adsorption of contaminants, recreational water users exposure to COPCs, etc. Appropriate modelling as verified by DFO/oceanographic modelling experts should be utilized and the HHRA updated to reflect the change in study area, contaminant dilutions, etc. as to accurately assess the potential risk to human health.

#5 Document Reference - Air Dispersion Modelling & HHRA

Monitoring and mitigation measures for elevated COPCs in air emissions not addressed in the HHRA problem formulation report.

Health Canada Comments:

Without the completion of the HHRA, Health Canada is unable to determine the adequacy and duration of monitoring and/or follow-up programs, risk mitigation strategies, and risk management approaches. Therefore, Health Canada is unable to comment on whether the risk associated with the COPCs identified in the air dispersion modelling is able to be mitigated.

#6 Document Reference

Section 2.3.1 Contaminants of Potential Concern in Project Air Emissions- The estimated maximum emission concentrations during the operation of the Project were below their respective Nova Scotia Reg. 150/2017 limits. For PM2.5 and PM10, the estimated maximum emission concentrations were above their respective National Ambient Air Quality Objectives Reference Level (CCME, 1999). For the contaminants compared to Ontario Ambient Air Quality Criteria (MECP, 2019), ammonia, calcium oxide, hexavalent chromium, manganese, chloroform, benzo(a)pyrene, and total reduced sulphide were found to be above applicable limits at discrete receptors infrequently.

Health Canada Comments:

- a. Discrepancies exist between the COPCs identified in the HHRA Problem Formulation report, Stantec's Draft Expanded Air Dispersion Modelling Study (August 27, 2019) and Stantec's Final Expanded Air Dispersion Modelling Study (September 27, 2019). It is unclear which COPCs are being considered in the final HHRA document due to these discrepancies.
- b. It is not evident as to why these discrepancies exist as examination of Table 4.1 in both the draft and final Air Dispersion Modelling studies appear to report the same emission rates for the identified contaminants. Hydrogen sulphide for both the 24-hour and 1-hour differ between the draft and final report- with the draft report showing exceedances of health based criteria and the

final showing none. In Table B1 Emission Rates- The emission rates for Hydrogen Sulphide have been changed from the draft report to the final report with lower emission rates being reported for the primary clarifier and higher rates being reported in the secondary clarifier in the Final report. As hydrogen sulphide is screened as a COPC based on health criteria and changes to reporting have removed it as a COPC, the proponent should show justification and scientific support for these modifications in reporting from draft to final.

- c. The study does not consistently use the Upper Risk Threshold (URT) criteria in the Ontario Reg. 419/05- selected contaminants have had the URT applied while others have not with out justification in the report for these discrepancies.
- d. For contaminants for which the URT has been exceeded, mitigation measures have not been provided. While URTs are above the air quality standard, the allowances for exceedance in the Ontario Regulations has defined timelines and corresponding actions aimed at reducing emissions to less than the URT. The air dispersion modelling study is reporting predicted a URT exceedance for Benzo(a)pyrene (24-hour) at predicted concentrations for operations, while the URTs are in place to allow for short exceedances while corrective action is applied. This issue was not addressed in the Stantec report and as health is the screening criteria for the contaminant it should be addressed.
- e. In the final version of the air modelling report, Health based criteria (not including URT- see d above) was exceeded for the predicted concentrations for hexavalent chromium (annual), ammonia (24-hour), chloroform(24-hour), Total Reduced Sulphur (24-hour) however mitigation measures to address these health based exceedances was not provided. Without completion of the HHRA and risk management strategies and approaches identified it is not possible to determine whether these exposures can be mitigated to acceptable risks.
- f. Air dispersion modelling was completed at the facility's average production output of 280,000 to 300,000 air dried metric tonnes (ADMT), however the facility has an industrial approval to operate to 330,000 ADMT. Therefore modelling was not done at maximum capacity and if completed at this capacity it is reasonable to assume the exceedances of health based criteria for the above identified would increase and other COPCs such as but not limited to PM 2.5 (24 hour) (which is just under the air quality criteria) would exceed. As the facility is entitled to operate at this rate according to its industrial approval, it may choose to do so in the future which could result in exceedances of COPCs which may pose a risk to human health. The air dispersion modelling should be should be completed at maximum operational output to provide worst case scenario for the project as well as the provided current production rate.
- g. Further to comment #6g, the increased output would increase the quantity of biosludge used in the boiler, which could also contribute to higher concentrations of COPCs.
- h. Mapped location of discrete receptors was not provided for Table 6.2 Maximum Predicted GLCs at Discrete Receptors. It is not possible to determine whether the location of these receptors represent the maximum point of impingement for the COPCs and the suitability of the location of these receptors without this information.

#7 Document Reference - HHRA

Sections 2.3.2 Contaminants of Potential Concern in Project Effluent Discharge- A screening

process was carried out to identify COPCs in the future treated effluent. The approach is depicted in Figure 2.4 and described in detail in Appendix A. Parameters analyzed in current effluent samples collected from the current compliance point of the ETF, Point C, in Boat Harbour, were used as the initial list of candidate parameters for the identification of the future effluent COPCs.

The initial parameter list included over 300 parameters measured by NPNS. Parameters that were represented by others or are not of human toxicological concern were removed.

Health Canada Comments:

- a. COPCs were not screened based on guidance from Health Canada. The approach depicted in Figure 2.4 screens out COPCs if the maximum predicted effluent concentration is greater than the median background contaminant concentration. The median background was taken from proposed diffuser location, which is in the same receiving water body as the Boat Harbour Effluent Treatment Site and would have COPCs attributed to anthropogenic sources. For the comparison of COPC concentrations, background must be from natural sources only. According to Health Canada guidance:

“3.4.2.3 Comparing chemical concentrations with background concentrations- The control or reference site must be carefully chosen because the chemicals of interest must be attributable solely to natural (i.e. non-anthropogenic) sources. The reference site must be shown to be free of any possible anthropogenic point source influence with regard to the chemicals of interest.” - Health Canada 2010a

Due to the screening methodology used by the consultant, COPCs in effluent may have been inappropriately screened out and comparison to an appropriate control or reference site should be used for screening. If the proposed diffuser location is to be continued to be used as the reference site then justification and scientific support should be provided by the proponent to support that the COPCs found at the reference site are not due to anthropogenic sources and are naturally occurring. Screening COPCs based on a reference site with anthropogenic impacts may inappropriately screen out contaminants which may pose a risk to human health/cause adverse effect and may underestimate the risk associated with the project.

- b. See comment #4 for modelling uncertainty and impacts on COPC screening
- c. The HHRA did not state whether the potential for interactive effects for similarly acting chemicals has been considered in the problem formulation. Clarification on the statement “Parameters that were represented by others or are not of human toxicological concern were removed.” is required.

It is essential that the interactive effects of similarly acting chemicals be considered, or the whole group could be inappropriately excluded on the basis of data on individual chemicals. Currently, this concern applies to carcinogenic PAHs, polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDDs/PCDFs), and dioxin-like polychlorinated biphenyls (PCBs).- Health Canada 2010a

As PAHs, PCDDs, PCDFs, and biphenyls have been identified in the emissions and/or effluent for this project the COPC screening should account for similarly acting chemicals and provide rationale for screening in the written HHRA/HHRA Problem Formulation with evidence

supporting this rationale.

- d. The report did not address the risk associated with exposure to chemical mixtures which could underestimate the risk to human health associated with the project. The calculation of Hazard Quotients (HQ) and Incremental Lifetime Cancer Risk (ILCR) which account for additivity is needed for Health Canada to assess the risk associated with exposures to these mixture.

Section 7.4.3 Chemical Mixtures- Unless there is compelling science of other factors for additivity, for simultaneous exposure to multiple COPCs, non-cancer HQs should be assumed to be additive and summed for those chemicals which have similar target organs/effects/mechanisms of action. Where the estimated total HQ is less than or equal to 1.0, these risks will be deemed negligible. Risk estimates for chemicals with unique target organs/effects/mechanisms of action should be shown individually (Health Canada 2010a).

For carcinogens with the same target organ and form of cancer, the risks should be assumed to be additive and summed. The total cancer risk in such cases will be deemed to be “essentially negligible” where the estimated total ILCR is less than or equal to 1×10^{-5} (Health Canada 2010a).

An additive effect occurs when the combined effect of several chemicals is equal to the sum of the effects of each individual chemical (i.e., where more than one COPC is expected to impact the same target organ via the same mechanism of action). -Health Canada 2019.

#8 Document Reference - HHRA

Appendix A- Selection of Contaminants of Potential Concern

A) Seafood Ingestion- For the seafood ingestion pathway, the maximum effluent concentration was compared to the United States Environmental Protection Agency (US EPA) National Recommended Water Quality Criteria for human health based on consumption of aquatic organisms only (US EPA, 2019a; Table A.6a). This water quality guideline is protective of human seafood consumption. Where a US EPA (2019a) guideline for the consumption of organisms was not available, the US EPA (2019a) criterion for human health based on the consumption of water and organisms was selected. This guideline is also protective of the seafood ingestion pathway.

Health Canada Comments:

The description of the methodology for assessing the seafood ingestion pathway did not provide sufficient information for Health Canada to determine definitively whether appropriate guidance was utilized.

Where the criteria adopted for screening purposes are obtained from sources other than CCME or Health Canada, they should be adjusted as necessary to be consistent with the health protection endpoints prescribed by Health Canada and CCME. For example, if the health-based guidelines for carcinogens (non-threshold substances) are derived based on a target incremental cancer risk of 1×10^{-6} (1 in 1 million), the criteria can be adjusted to a target incremental risk of 1×10^{-5} in accordance with Health Canada’s essentially negligible risk level. For non-carcinogens (threshold substances), guidelines from other jurisdictions, such as the U.S. EPA, are commonly based on 100% of the tolerable daily

intake (TDI) or reference dose (RfD). These guidelines should be divided by 5 to make them approximately equivalent to CCME guidelines that are based on only 20% of the TDI or RfD. - Health Canada 2010a

The EPA Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000) Technical Support Document Volume 2: Development of National Bioaccumulation Factors demonstrates the methodology used to calculate the Water Quality Criteria. The formula for non-cancer effects utilizes RfD in the equation; therefore the screening values from the EPA should be adjusted as directed by the above guidance from Health Canada to be consistent with the health protection endpoints prescribed by Health Canada and CCME. Use of the screening criteria without sufficient adjustment may not be sufficiently protective of health and may not adequately reflect the risk associated with the project.

#9 Document Reference - HHRA

Appendix A- Selection of Contaminants of Potential Concern: Seafood Ingestion - Parameters were considered bioaccumulative based on the same criteria defined in Section 4 of the Persistence and Bioaccumulative Regulations under the Canadian Environmental Protection Act (CEPA): A substance is bioaccumulative a) when its bioaccumulation factor is equal to or greater than 5,000; b) if its bioaccumulation factor cannot be determined in accordance with a method referred to in Section 5, when its bioconcentration factor is equal to or greater than 5,000; and c) if neither its bioaccumulation factor nor its bioconcentration factor can be determined in accordance with a method referred to in section 5, when the logarithm of its octanol-water partition coefficient is equal to or greater than 5. The US EPA (2016) framework for selecting methods for deriving national bioaccumulation factors (BAF) factors was used to assess if a parameter was considered to be bioaccumulative based on CEPA's definition.

Health Canada Comments:

The Persistence and Bioaccumulation Regulations made under the Canadian Environmental Protection Act references the use of both Bioaccumulation factor and Bioconcentration factors. According to the EPA's Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000) Technical Support Document Volume 2- Development of National Bioaccumulation Factors:

Previously, EPA primarily used bioconcentration factors (BCFs) to estimate chemical accumulation of waterborne chemicals by aquatic organisms. The BCF reflects contaminant exposure and accumulation by fish and shellfish only through the water column. Over the past two decades, however, science has shown that all the routes (e.g., food, sediment, and water) by which fish and shellfish are exposed to highly bioaccumulative chemicals may be important in determining the chemical accumulation in the organism's body, and that these chemicals can be transferred to humans when they consume contaminated fish and shellfish. The EPA's approach to estimating uptake into fish and shellfish now emphasizes the use of a bioaccumulation factors (BAFs), which account for chemical accumulation from all potential exposure routes.

The methodology employed in the HHRA is not clear; the HHRA Problem Formulation Report

states the “US EPA (2016) Framework for selecting methods for deriving national bioaccumulation factors (BAF) factors was used to assess if a parameter was considered to be bioaccumulative based on CEPA’s definition.”, however Table A6b utilizes a BCF to screen out cadmium as a COPC. However, the methodology in the EPA Framework utilizes BAF. As BCFs and BAFs are determined using different exposure routes, they cannot be used interchangeably (unless explicitly stated by the EPA). The use of a BCF in a framework which utilizes BAFs may inappropriately screen out COPCs and therefore may not be sufficiently protective of human health and may underestimate the risk associated with the project.

#10 Document Reference -HHRA

Table A.6b: Assessment for Potential Bioaccumulation for Parameters

Cadmium: “COPC for Seafood Ingestion Pathway?” “No. Although there is evidence for food chain bioaccumulation of cadmium by animals (ATSDR, 2012), the BCF for cadmium is less than 5,000.”

Health Canada Comments:

The proponent screened out cadmium as a COPC for the reason that the bioconcentration factor (BCF) they referenced was less than 5000 (as it is the criteria established by the Persistence and Bioaccumulation Regulations made under the Canadian Environmental Protection Act). According to the ATSDR Toxicological Profile for Cadmium:

Aquatic and terrestrial organisms bioaccumulate cadmium (Handy 1992a, 1992b; Kuroshima 1992; Naqvi and Howell 1993; Roseman et al. 1994; Suresh et al. 1993). Cadmium concentrates in freshwater and marine animals to concentrations hundreds to thousands of times higher than in the water (EPA 1979). Reported bioconcentration factors (BCFs) range from >200 to 18,000 for invertebrates (van Hattum et al. 1989), from 3 to 4,190 for fresh water aquatic organisms (ASTER 1995), and from 5 to 3,160 for saltwater aquatic organisms (ASTER 1994). Bioconcentration in fish depends on the pH and the humus content of the water (John et al. 1987). Because of their high ability to accumulate metals, some aquatic plants have been suggested for use in pollution control. - ATSDR Toxicological Profile for Cadmium

As the screening criteria for COPCs in the HHRA Problem Formulation Report is for all seafood species, trophic level specific and/or site specific BCF/BAF values for the screening of the COPCs should be utilized. BAF/BCFs may be organism, trophic level or site specific; as lobster, rock crab, quahogs, clams and other invertebrates are caught in the area surrounding the marine portion of the project and may have a bioconcentration factor as high as 18,000 there may be the potential for cadmium to bioaccumulate in these organisms. Many of these organisms are harvested in Aboriginal food, social, ceremonial and commercial fisheries and represent an exposure pathway. The HHRA Problem Formulation should provide scientific justification and rationale in the selection of bioaccumulation/bioconcentration factors used for screening criteria in the assessment of all COPCs. The use of incorrect screening criteria may not be sufficiently protective of human health and may underestimate the risk associated with the project.

In addition, there are seaweed harvest licences issued for the area surrounding the marine portion of

the project (verified by DFO) and therefore this risk associated with this exposure route should be assessed whether the food survey identifies seafood consumers or not, as the presence of the licence allows for the harvesting of seaweed. As plants have a high ability to bioaccumulate metals such as cadmium, lead, etc., marine plants that are harvested for human consumption should be evaluated as an exposure pathway for the HHRA. Omission of this exposure pathway may underestimate the risk associated with the project.

#11 Document Reference -HHRA

Monitoring and mitigation measures for elevated COPCs in seafood not addressed in the HHRA problem formulation report.

Health Canada Comments:

As COPCs have the potential to bioaccumulate in organisms and biomagnify in the food chain, monitoring of contamination levels in seafood and mitigation measures including but not limited to should be addressed in the Report. For example the EPA has developed consumption advisories for seafood- "*EPA Polychlorinated Dibenzo-p-dioxins and Related Compounds Update: Impact on Fish Advisories*", which includes "Monthly Fish Consumption Limits for Dioxins/Furans" which identifies consumption advisories for dioxin and furan levels in fish tissue (wet tissue weight) for concentrations greater than 0.5ppt (parts per trillion) in fish. As Treated Effluent Concentrations (Point C) identify dioxin and furan concentrations between <2 to 28.9 pg/L (1 pg/L =1ppt) there is the potential for fish tissue concentrations to bioaccumulate to levels which could be considered as a potential risk to human health as per the EPA guidance.

All relevant seafood consumption advisories for the COPCs should be identified and adjusted to meet Canadian standards where applicable. The risk of bioaccumulation should be quantified in a finalized HHRA as food, social, ceremonial and commercial fisheries exist within the marine area of the project. A well-developed, comprehensive HHRA will also help determine appropriate monitoring and mitigation measures (where applicable) to address the potential risk to human health.

#12 Document Reference -HHRA

Section 2.1 2 Objective and Scope of Risk Assessment – "...For the future effluent discharge exposure pathway, a multi-media approach will be taken to consider exposure from all relevant environment components such as water, sediment, and sea foods"

And

Section 2.3.2 Contaminants of Potential Concern in Project Effluent Discharge -For the recreational use of water pathways, a guideline for incidental water intake while swimming was considered to be protective. This guideline, where applicable, was derived from drinking water guidelines as described in Appendix A. This guideline was also considered to be protective of the surface water dermal contact exposure pathway, and the incidental ingestion of sediment and dermal contact with sediment exposure pathways, because these pathways are considered to be negligible when compared to the incidental ingestion of surface water exposure pathway.

And

Section 2.5 Receptor Exposure Pathways: 2.5.2 Marine Water- “The complete exposure pathways for COPCs in the effluent include: Incidental ingestion of and dermal contact with surface water by First Nation Members, Residents, Commercial Fishers, and Recreational Users; Incidental ingestion of and dermal contact with beach sediment through the partitioning of effluent COPCs in surface water to sediment by First Nation Members, Residents, and Recreational Users...”

Health Canada Comments:

- a. The methodology used in the HHRA Problem Formulation report for recreational water intake does not follow Health Canada guidance. The HHRA Problem Formulation Report excluded “the incidental ingestion of sediment and dermal contact with sediment exposure pathways, because these pathways are considered to be negligible when compared to the incidental ingestion of surface water exposure pathway” however, in Section 2.5: Receptor Exposure Pathways they were included in “the complete exposure pathway for COPOs in the effluent” and “These exposure pathways will be quantitatively assessed for the HHRA”. This discrepancy in the report should be corrected as they cannot be quantitatively assessed if they were eliminated.
- b. Calculation of the HQ or Incremental Lifetime Cancer Risk (ILCR) associated with a chemical/chemical mixture requires determination of the Dose (Total Exposure Dose (non-threshold) or (ILifetime Average Daily Dose (threshold)) at which receptors are exposed/likely to be exposed. The Dose calculation must represent all exposure pathways where applicable, which may include inhalation of air, water ingestion, incidental soil ingestion, dermal contact with soil/sediment, inhalation of fugitive dust, groundwater ingestion and country food ingestion. For the recreational water exposure pathway all relevant exposure routes would need to be assessed to determine the Dose i.e. the ingestion of water, dermal contact with soil/sediment, incidental soil ingestion and inhalation of air (if applicable). The elimination of the surface water dermal contact exposure pathway, the incidental ingestion of sediment and dermal contact with sediment exposure pathways from the dose calculation may underestimate the dose and thus the risk associated with the COPC for the receptor. See Health Canada’s *Guidance For Evaluating Human Health Impacts In Environmental Assessments: Human Health Risk Assessment* should be followed.
- c. As a result of the elimination of the exposure pathways as stated above, COPCs for recreational exposure pathways screening was not based on all exposure pathways. For example dioxins and furan were not retained as a COPC for the recreational use of water, however the incidental ingestion of sediment and dermal contact with sediment contaminated with dioxins and furans would be considered exposure pathways and therefore should be evaluated in the calculation of the total exposure dose. COPCs for recreational water exposure should be screened based on all relevant exposure pathways, not just incidental water ingestion.

See pages 51-53 of Health Canada’s *Guidance For Evaluating Human Health Impacts In Environmental Assessments: Human Health Risk Assessment* for a worked example for calculating Total Exposure Dose.

#13 Document Reference -HHRA

Section 2.5 Receptor Exposure Pathways: 2.5.2 Marine Water- “Receptor exposure locations will include: Beach areas along the shoreline of the Marine Study Area for the recreational exposure pathway assessment (i.e., incidental ingestion of and dermal contact with surface water and sediment)...”

Health Canada Comments:

- a. See Comment #4
- b. In further consultation with DFO regarding modeling, issues concerning the sediment transport model were raised including physio-chemical reactions of the effluent, potential flocculation, dispersion, accumulation and potential nutrient loading. DFO could also not substantiate the claim that any build-up would not occur as it was not supported by data or information presented in the report. Sediment in which COPCS are absorbed or adsorbed may pose a risk to recreational water receptors as contaminated sediment may deposit along beaches and shorelines thus creating exposure pathways.
- c. The proposed study area should be expanded to encompass any shoreline area which may have sediment deposition as a result of the project. As 2,265 Kg** of TSS is released daily with the effluent, the risk for deposition in areas which may create an exposure pathway should be also be identified.
- d. In addition, the elevated temperature of the effluent and the potential for nutrient loading may pose bacteriological risks to bathers. The two provincial parks in the near vicinity of the marine portion of the project have beaches and a beach is located in Pictou Landing First Nation which is utilized by the people of that community. Bacteriological risks associated with the effluent for recreational water users was not evaluated in the HHRA problem formulation report or the Focus Study. Evaluation of this risk should be completed and monitoring and mitigation measures should be identified as applicable.
(*From the Focus Report: $TSS = 29 \text{ mg/L} = 0.000029 \text{ kg/L}$, $85,000 \text{ m}^3 \text{ effluent/day} = 85,000,000 \text{ L effluent/day}$. $0.000029 \text{ kg/L TSS} \times 85,000,000 \text{ L effluent/day} = 2,265 \text{ kg of TSS/Day}$).

#14 Document Reference -HHRA

Section 2.5 Receptor Exposure Pathways: 2.5.3 Drinking Groundwater- There are a number of residential wells near the pipeline route. There is the possibility of a leak leading to treated pulp mill effluent infiltrating into groundwater that is used as drinking water. Although there will be spill contingency plans in place to stop and clean up any spill caused by ruptured pipelines or leaks along the pipeline corridor, the possibility of exposure was assessed.

And

Appendix C Effluent to Groundwater used as Drinking Water Pathway- If none of these agencies had a guideline available and the parameter was detected, the parameters was considered a COPC. Parameters that did not have guidelines and were not detected in effluent were not considered COPCs.

Health Canada Comments:

COPCs were not screened based on guidance from Health Canada. Though the HHRA Problem Formulation Reports states that “ If none of these agencies had a guideline available and the parameter was detected, the parameters was considered a COPC”, Table C.1: : Comparison of Maximum Effluent Concentrations to Drinking Water Guidelines for a Spill Scenario of Drinking Groundwater Exposure Pathway eliminates dioxins and furans as a “COPC for Drinking Water in Spill Scenario” despite that it is present in the effluent, although no guidelines were identified for it. All COPC for Drinking Water in Spill Scenario screening should be re-evaluated to follow Health Canada guidance:

In cases where there are no guidelines/standards/criteria available for screening an environmental medium (e.g., country foods), the COPCs will be carried forward into a quantitative risk assessment to determine whether there may be health risks associated with the predicted concentrations.- Health Canada 2019

Additionally, screening criteria may exist from other jurisdictions that may be applicable. For example the US EPA has established acute and chronic exposure guidance for 2,3,7,8-Tetrachlorodibenzo-p-Dioxin in drinking water in the Toxicological Profile for Chlorinated Dibenzo-p-Dioxins.

#15 Document Reference -HHRA

2.4 Identification of Potential Human Receptors- Considering that a range of potential receptors could frequent the Study Areas, or consume seafood harvested from the Marine Study Area, a conservative approach has been taken in the selection of receptors to ensure that the “critical” receptors, which are assumed to have the highest frequency and duration of exposure, will be captured in the HHRA. These receptors include First Nations Communities, Residents, Commercial Fisheries Workers, and Recreational Users.

Health Canada Comments:

Sensitive receptors should be included in the identification of receptor groups

When identifying potential receptors, consideration should be given to potentially sensitive receptors and vulnerable populations that may be exposed to increased levels of risk due to physiology, health status, behaviour, and/or lifestyle. Examples include seniors, pregnant or nursing mothers, infants (particularly where COPCs are known to biomagnify or exhibit potential neurotoxic or fetotoxic effects), and consumers of higher quantities of local country foods that may receive greater exposure to COPCs.- Health Canada 2019.

If you have any questions, please contact the undersigned at your convenience.

Sincerely,



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November 8, 2019

Environmental Administrator
Environmental Assessment Branch
Nova Scotia Environment
P.O. Box 442
Halifax, NS, B3J 2P8

Dear

Regarding: Public Services and Procurement Canada: Comments- Northern Pulp Nova Scotia Focus Report

Public Services and Procurement Canada (PSPC) has conducted a preliminary scientific and technical based gap analysis of the Northern Pulp Nova Scotia (NPNS) Focus Report (Report) released for public comment by the Nova Scotia Department of the Environment on October 3rd, 2019. In doing so, PSPC has collaborated with other federal departments with a view to identifying respective areas of mandated interest and authorities, informing scientific and technical considerations and avoiding related duplication of effort.

General Comments:

The Report was, overall, found to be cumbersome to navigate and incomplete in certain areas. Additionally, several review participants noted that the volume of information was such that a 30 day review period was insufficient to complete an in-depth review of related material.

Specific Comments:

Section 1.2

Table 1.2-2 Engagement Plan after the focus report fails to address Federal regulators and expert departments.

Section 2.2/ Appendix 2.2- Marine Geotechnical Survey: Ice Scour

The Report summarizes the results of the CSR Geosurveys Limited (CSR) geotechnical survey, including investigative and analytical results pertaining to ice scour. CSR indicates that dredging constraints may present themselves in certain areas along the Caribou pipeline route component due to sub-bottom geographical features (i.e. bedrock). CSR has also indicated that some uncertainty exists with regard to bedrock depth owing to the coarse nature of glacial till (sequence 4) in three areas intermittently situated from CKP 0.725 to CKP 2.214 (see Figure 5.5.2-Appendix 2.2 for sampling station locations). Figure 5.5.2 of the CSR report also shows that the most frequent incidence of ice scouring for the Caribou pipeline route section overlaps a good portion of these areas. CSR has also indicated that a 70x100 meter patch in the near shore area west of Munroes Island shows sea bottom disturbances likely due to "ice grounding".

While the CSR report indicates that underlying bedrock in these areas may be suitably weathered so as to be "rippable", this suggests that it may also not be. Should the latter be the case, it is assumed that the bedrock would either have to be blasted to create the 3m by 14 m trench profile currently targeted by NPNS, or, the pipeline would need to be laid on the surface and protected in some fashion. CSR has stated that "the ice



scour depth parameter is perhaps the most important measurement in estimating the minimum trenching depths required for a pipeline installation". In this regard, PSPC is of the opinion that confirmatory bedrock analysis should be undertaken in the identified areas. It seems reasonable to assume that surface placement of the pipe in the area of greatest ice scour would not be advisable in terms of ensuring pipeline protection from the environment. It is also worth pointing out that blasting- should it be required- would require regulatory permission, subject to additional environmental approvals and conditions.

Section 3.5.1-Effluent Pipeline Leak Detection

This section describes leak detection for the overland portion of the effluent pipe. No mention is made of leak detection for the underwater buried portions of the pipe. Independent of effluent impacts associated with effluent discharged from the end of pipe in deeper waters, what would the potential impacts on water quality and biota be resulting from undetected leaks, particularly in shallower near shore areas? There appears to be an underlying assumption that leaks in the buried marine portions of the pipeline are not an issue. If this is accurate, NPNS would need to expand on the rationale used to support this. NPNS has also not provided any detailed mention of response protocols to leaks detected in the marine portions of the pipeline, which speaks directly to mitigation of associated potential environmental impacts.

Appendix 0 (section 0.2.2.9) – Wildlife, Priority Species and Migratory Birds

There is a lack of detail presented on how impacts to the Double-Crested Cormorant colony located along the east side of Highway 106 causeway will be mitigated during installation of the pipeline across Pictou Harbour. Section 0.2.2.11 discusses mitigation measures which include excluding project activities within 300m of active bird colonies as well as avoiding blasting and other intrusive construction activities related to the Pictou Harbour Causeway crossing during the nesting season. Clarification on "other intrusive construction activities" is required to better understand the effectiveness of these mitigation measures in this sensitive area as the Cormorant colony is located inside 300m of the proposed pipeline location in Pictou Harbour.

PSPC will defer to Environment and Climate Change Canada (ECCC) for further address as deemed appropriate.

Species at Risk

An Atlantic Canada Conservation Data Centre (ACCDC) search was carried on behalf of NPNS in November 2018. An independent Species at Risk Act evaluation was commissioned by PSPC for information verification purposes in October 2019 as part of this review exercise and no conflicting information materialized. That said, federal and provincial listings in this regard are updated regularly owing to the ongoing collection of data on the part of ACCDC and others. Because of this, additional listed species within the study area and its buffer may be identified over time. Periodic searches for listed species at risk and incorporation of new information from ACCDC as it becomes available will need to be incorporated in the Wildlife Management Plan should project implementation occur. Due to the duration of the proposed project, the Wildlife Management Plan would need to be a living document and updated regularly during any construction period. If new species at risk are identified within the project area as a result, project/ species interactions would need to be assessed, mitigation measures developed and the appropriate regulator contacted.



Terrestrial Wildlife/Priority Species

Three species of listed bats were identified during the ACCDC search. Mitigation measures will need to be employed to ensure protection.

Section 10.1: Marine Archaeological Resource Impact Assessment

Two sidescan sonar targets have been identified as potential caribou hunting structures in close proximity to the diffuser. This section indicates the complete marine ARIA is provided in Appendix 10.1. Appendix 10.1 includes a 1-page letter report, this is not an acceptable ARIA.

Section 10.2: Land Based Archaeological Investigation

This section states that based on shovel testing and review of historic aerial photos the project footprint exhibits a low potential for encountering cultural resources. However at the end of the section it states due to the fact that cultural resources were found in the archaeological survey it was suggested the detailed survey results not be provided. It is not clear where the resource(s) was found or the type of resource(s). Some level of detail on the type of resource(s) and general location should be provided, otherwise the recommendations made and potential mitigations cannot be reasonable assessed.

Section/ Appendix 11.1- Mi'kmaq Ecological Knowledge Study (MEKS)

The information provided is limited and provides no detail. The MEKS does identify some activities which take place in the project and study location but does not identify duration, seasonality, purpose or level of activity. A general statement was provided regarding harvesting of plants by the Indigenous community however it does not provide the list of plants that are harvested, their purpose/use, etc. The MEKS as presented in the focus report does not provide enough information or detail to reasonably portray the current and historic use of the area by the Mi'kmaq. The MEKS is considered to be inadequate to support an assessment of Project impacts on Indigenous communities. There should also be concurrence by the Pictou Landing First Nation that the information contained within the report is accurate. Membertou Geomatics Solutions has also not received feedback on the review by the Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO).

Appendix 5.1 – Wetland Baseline Survey:

Eelgrass (*Zostera marina*) beds are considered to be a type of wetland under the current definition provided in the *Federal Policy on Wetland Conservation* (administered by ECCC). According to Appendix 7.2 (Fish Habitat Baseline Survey), eelgrass was noted to be present within Caribou Harbour. The proponent does not discuss how potential project impacts to these eelgrass beds will be mitigated within the context of adhering to the goals of the *Federal Policy on Wetland Conservation* of no net loss of wetland functions on all federal lands and waters.

PSPC will defer to ECCC for further address as deemed appropriate.

Appendix 7.2 - Fish Habitat Baseline Survey:

The criteria for selecting a subset of video transects to bring forward for the detailed video transects (i.e. best video quality) introduced a level of bias which could have been avoided if a more random selection process was used (assuming that the videos of poorer quality could still be interpreted to provide an adequate level of information). The method chosen resulted in a lack of detailed habitat information in large sections of the proposed pipeline route as well as the entire diffuser footprint. The detailed habitat description for the diffuser location was based on a single transect conducted 150m to the northeast and may not accurately represent the benthic habitat within the diffuser footprint.

Marine Sample VC-50C-1 collected in Pictou Harbour had a Total PAH of 8.53 mg/kg. As this value exceeds the CEPA Disposal at Sea Criteria, will toxicity testing be carried out? How will this hotspot be delineated? What mitigation measures will be put in place to protect fish and fish habitat from causeway construction and removal, dredging and disposal activities in this area?

PSPC will defer to the Department of Fisheries and Oceans and ECCC for further address as deemed appropriate.

Appendix 7.3 - Impact Assessment Marine:

Is the establishment of in-water staging areas necessary or could these be established on land to avoid potential impacts to the marine environment?

As part of the proposed EEM, benthic invertebrate sampling will be conducted to assess recolonization of species within the pipeline corridor and discharge location. No project specific baseline data, however, is presented to use to determine the potential project effects on the pre-construction community. This survey was scheduled for fall 2019 and as such is not available for the current review.

This report makes reference to a number of data sets that are currently being completed or planned to be addressed in the fall of 2019 (i.e. Traditional Knowledge Study, benthic invertebrate study, additional baseline water sampling program, First Nation resource use survey). This information will be required in order to make any ultimate determination concerning the potential environmental impacts and related significance moving forward.

Appendix 7.4 - Environmental Effects Monitoring Program(EEM):

This Appendix consists of an excerpt from the Pulp and Paper Effluent Regulations and does not provide project specific details. PSPC cannot comment on the effectiveness of the EEM as project specific details are not provided.

PSPC appreciates the opportunity to provide input on the Focus Report.

John Appleby
Regional Operations Manager
Environmental Services
Public Services and Procurement Canada
Nova Scotia
John.appleby@pwgsc.gc.ca



From: Flanagan, Jason <jason.flanagan@tc.gc.ca>
Sent: November 8, 2019 4:33 PM
To:
Subject: TC response: Notice of NPNS Focus Report and request for feedback
Attachments: image001.png

**** EXTERNAL EMAIL / COURRIEL EXTERNE ****

Exercice caution when opening attachments or clicking on links / Faites preuve de prudence si vous ouvrez une pièce jointe ou cliquez sur un lien

Thank you for the chance to review the Focus Report submitted by Northern Pulp Nova Scotia Corporation (NPNS) for the Replacement Effluent Treatment Facility Project as part of the Provincial environmental assessment process. Transport Canada has reviewed the report, focusing on the proposed pipeline route and the areas related to its mandate; i.e. the Canadian Navigable Waters Act (CNWA) and the requirement for a possible Lease or License to cross lands under the custodianship of Transport Canada at the Caribou Ferry Terminal. While there are some further details included in the Focus Report regarding the location of the pipeline, Transport Canada has yet to receive more specific details that are required in the form of an application for approval under the CNWA and for a Lease or License to access Transport Canada lands at the Caribou Ferry Terminal.

It is important to note that there is a potential for direct impacts to navigation and any measures necessary to mitigate those direct effects will be included as terms and conditions associated with any works that may be approved or permitted pursuant to the Canadian Navigable Waters Act.

If you have any questions, please do not hesitate to contact me.

Regards,

J. Jason Flanagan, M.Sc.

Senior Environmental Assessment Officer

Environmental Affairs and Aboriginal Consultation Unit Transport Canada, Atlantic Region

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Agent principal d'évaluation de l'environnement Affaires environnementales et Service de consultation auprès des Autochtones Transports Canada, Région de l'Atlantique jason.flanagan@tc.gc.ca<mailto:jason.flanagan@tc.gc.ca> | Tél. : 506.227.8257 | ATS: 1.888.675.6863

Date: November 8, 2019.

To: , Nova Scotia Environment

From: Nova Scotia Office of Aboriginal Affairs

Subject: **Replacement Effluent Treatment Facility Project**

The Nova Scotia Office of Aboriginal Affairs (OAA) has reviewed the Focus Report for the proposed Replacement Effluent Treatment Facility by Northern Pulp Nova Scotia, dated October 2019. The following review considers whether the information provided will assist the Province in assessing the potential of the proposed project to adversely impact established and/or asserted Mi'kmaq Aboriginal and Treaty rights.

Section 1.0 Public, Mi'kmaq, and Government Engagement

The Focus Report ToR requires two components related to public engagement:

- a concordance table that outlines the comments received from public, Mi'kmaq, and government stakeholders and how NPNS has or will address those comments/issues and;
- A plan that outlines how future information and studies will be shared with stakeholders.

Both components were included in the Focus Report as appendices. The Focus Report provides a summary of comments/questions by topic for public and government commenters but does not do so for Mi'kmaq commenters. There is no rationale provided for this.

Section 1.1 Concordance Table

The concordance table outlines the concerns raised by PLFN in the review of the original EARD. PLFN presented 84 comments on the original EARD. The table responds to some comments directly in the table while for others, it directs to the relevant section of the Focus Report that relates to the comment. This was frequently the case for the comments from PLFN. This made it difficult to determine if and/or how comments/concerns/issues were addressed.

Section 1.2 Engagement Plan and Appendix 1.2 Engagement Plan Engagement Specific to Pictou Landing First Nation

Section 1.2 has an error in that it indicates that formal consultation began with PLFN in April of 2017, however, crown consultation was initiated on January 9, 2017.

Section 1.2 provides an overview of engagement activities with PLFN to-date regarding the planning and design of the ETF and also outlines planned engagement activities with PLFN, should the Focus Report be approved. The summary of activities to-date provides an adequate overview of various ways PLFN was engaged by NPNS throughout the EA process. The SEP in Appendix 1.2 appropriately outlines how PLFN will continue to be

engaged by NPNS should the Focus Report be approved.

Section 11.1 Mi'kmaq Ecological Knowledge Study (MEKS)

The MEKS was not included in the original EARD. The Focus Report Terms of Reference requested it, but the MEKS is not included as part of the Focus Report. While the main Focus Report contains a short summary of the MEKS findings that provides a good overview, not having the complete report is a shortcoming as regulators are unable to review the information directly. Please see a related comment below regarding Section 7.3 Impacts Assessment for Marine Fish. OAA is aware that the draft MEKS was shared with PLFN by NPNS.

Section 10.0 Archaeology

The Focus Report indicates that NPNS conducted archaeological investigation under two permits issued by the Department of Communities, Culture and Heritage (CCH). One permit focused on the marine portion of the project and the other permit focused on the revised outfall route. The Focus Report provides two approval letters issued by CCH accepting the recommendations in the Heritage Research Permit Preliminary reports submitted by the consulting archaeologist retained by the Proponent. While no new archaeological resources were identified through the archaeological investigation under both permits, the final Archaeological Impact Assessment reports are not included in the Focus Report. Having access to the information contained in these final reports, particularly items related to Indigenous land use and known archaeological sites of interest to the Mi'kmaq, would assist in better understanding the project and its potential impacts.

Section 5.0 Freshwater Resources

The completed wetland baseline survey along the proposed re-aligned effluent pipeline route indicates that a total of 19 wetlands were documented and that wetland compensation will be required for the proposed wetland alterations. The Proponent should consider engaging with the Mi'kmaq of Nova Scotia when developing and implementing required Wetland Habitat Compensation Plans for the project.

Section 5.2 Monitoring Methodologies

The terms of reference for the Focus Report indicates that the proponent must provide monitoring methodologies for areas with significant risk of pipeline leaks or spills. However, in Section 5.2 Monitoring Methodologies, monitoring methodologies for areas with significant risk of pipeline leaks or spills, including two areas where the pipeline crosses the Source Water Protection Delineated Boundary for the Town of Pictou wellfields, below the water table, and important wetlands and watercourse crossings was not provided. This section notes that there is connectivity between the majority of wetlands and surface water features within and adjacent to the project footprint area. Section 11.0 Indigenous People's Use of Land and Resources notes that primary uses within the project site identified by interviewees include fishing, hunting, gathering food and culturally significant plants, and use of culturally significant and recreation areas. Pipeline leaks or spills into wetlands and watercourses therefore has the potential to affect and/or impact traditional and current land and resource use by the Mi'kmaq of Nova Scotia. However, given the lack of a surface water monitoring program, it remains unknown whether monitoring controls are sufficient to monitor these potential adverse impacts to freshwater resources and subsequently impacts to traditional and current

resource and land use by the Mi'kmaq of Nova Scotia. Any subsequent Industrial Approvals and/or Watercourse Crossing Alteration Approvals should ensure that surface water monitoring requirements are sufficient to monitor potential adverse impacts to freshwater resources.

Section 7.3 Impact Assessment for Marine Fish

Section 7.3 Impact Assessment for Marine Fish notes that potential impacts to important fisheries of commercial, recreation, and Aboriginal value within the project area were evaluated and that no significant residual effects were identified. However, Appendix 7.3, Section 3.6.3 Indigenous Fisheries indicates that information on Indigenous Fisheries will be provided following the completion and reporting of a First Nation resource use survey. Section 11.0 Indigenous People's Use of Land and Resources notes that a Mi'kmaq Ecological Knowledge Study (MEKS) was completed between May and July 2019 and complements the previous study completed in July 2018 by Membertou Geomatics Solutions on behalf of the proponent. However, the MEKS is not included in the Focus Report submission. Given that the MEKS is not provided as part of the Focus Report submission, there is insufficient information to review to determine whether the proposed project will potentially have adverse impacts on Mi'kmaq fisheries.

Date: November 8, 2019

To: , Nova Scotia Environment

From: Coordinator Special Places, Culture and Heritage Development

Subject: Northern Pulp Effluent Treatment Facility Focus Report

Staff of the Department of Communities, Culture and Heritage has reviewed the Northern Pulp Effluent Treatment Facility Focus Report and have provided the following comments:

Archaeology

Staff reviewed the Focus Report and have no archaeological concerns. The findings and recommendations from the archaeology investigations and reports have been included in the Focus Report.

Botany

Staff reviewed the Focus Report and provided the following comments:

Among the priority species detected in the 2019 floristic surveys are 3 priority lichens, 2 priority mosses, and a lichen and a moss that are so uncommon that they have not yet been ranked in Nova Scotia. Only the two *Leptogium* species are currently held in a Nova Scotian herbarium (specifically the NSM and Acadia University), but collections have been made of the others, so no additional collecting should be required at this time. While the species are not protected by legislation, efforts should be made to avoid destroying them, where possible, due to their apparent rarity.

Palaeontology

Staff have reviewed the Focus Report, there was no additional information that result in any changes of the previous assessment of low risk for encountering palaeontological resources.

Zoology

No CCH staff were currently available to review the sections relating to zoology.

Date: November 7, 2019
To: Nova Scotia Environment
From: Department of Business

**Northern Pulp – EA Focus Report for the Replacement
Effluent Treatment Facility Project**

The mandate of the Department of Business (DOB) is to lead and align provincial government efforts behind a common agenda for inclusive economic growth. This mandate focuses on strategic priorities and opportunities that encourage Nova Scotia's innovation, competitiveness, entrepreneurship, and export orientation.

Fulfilling this mandate involves working collaboratively with our Crown corporations (Develop Nova Scotia, Halifax Convention Centre Corporation (Events East Group), Innovacorp, Invest Nova Scotia, Nova Scotia Business Inc. and Tourism Nova Scotia), key partners in other levels of government, entrepreneurs, large businesses, post-secondary institutions, venture capital investors and Nova Scotians.

In March 2019, DOB provided comments on the Environmental Assessment (EA) Registration Document submitted by Northern Pulp Nova Scotia Corporation for the replacement of their effluent treatment facility.

The March 2019 decision by the Minister of Environment on the proposed Effluent Treatment Plan replacement, required Northern Pulp Nova Scotia Corporation to complete an EA Focus Report to better understand the potential for adverse effects or significant environmental effects.

DOB feels the EA Focus Report required by the Minister of Environment responded to the concerns raised by DOB during the review of the EA Registration Document.

DOB has reviewed the EA Focus Report submitted by Northern Pulp Nova Scotia Corporation on October 2, 2019 and have no further comments.



Lands and Forestry

MEMORANDUM

TO: NS Department of Environment

FROM: Department of Lands and Forestry

DATE: November 8, 2019

RE: Focus Report Northern Pulp

The Department of Lands and Forestry provides the following comments on the Northern Pulp Focus Report:

Crown Lands:

The proponent will require permissions from Land Administration (permit/easement/lease) for any pipelines, outfalls/intakes and other associated infrastructure beneath the Ordinary High-Water mark of both the large crossing at the junction of the three rivers before federal Pictou Harbour and in the Northumberland Strait.

The project description notes portions of the pipeline will be constructed within the limits of the public highway, should this design change, there are Crown lands that abut that public highway, and would require permissions from Land Administration (easement).

Parks/Coast Line Area:

The Department's mandate includes operating provincial parks in the immediate coastline area of the outfall. The Department requests that it be provided the results from the Human Health Risk Assessment (HHRA) to better understand potential project related impacts on potential human health as a result of visitors recreating at the provincial parks. The results of the HHRA will also help us better understand potential impacts to recreation activities, specifically swimming and beach use, as part of the socioeconomic impacts in the outfall area. Provincial park coastline areas of interest include: Caribou-Munroes Islands, Waterside Beach, MacKenzie Beach and Melmerby Beach.

Wildlife, Wildlife Habitat and Surveys:

The Department of Lands and Forestry's comments below are in reference to Nova Scotia Environment's Focus Report Terms of Reference requirements:

FLORA AND FAUNA TERMS OF REFERENCE:

Terms of Reference Requirement: 8.1 Complete a plant baseline survey along the proposed re-aligned effluent pipeline route.

Department of Lands and Forestry's Comments:

The applicant completed baseline surveys.

Terms of Reference Requirement: 8.2 Complete a migratory bird survey along the re-aligned pipeline route.

Department of Lands and Forestry's Comments:

- *Section 8.2 Migratory Bird Survey,*
Information provided here is inaccurate as it does not reflect data provided in the Appendix. Eastern Wood-Pewee (*Contopus virens*, SARA Special Concern, NSESA Vulnerable) was found during the course of field surveys. **A mitigation and monitoring plan will need to be developed for this species in consultation with both Environment and Climate Change Canada and the Department of Lands and Forestry** (see comments on page 4 under Section 0.1.10 Migratory Birds and Priority Bird Species/Habitats)
- *Appendix 8.2 Migratory Bird Survey.*
 - Section 8.2.2 indicates that peak fall migration occurs “late August and lasts until early October.” However, **no fall survey was conducted** (the Department of Lands and Forestry recognizes that it was not possible to complete the fall survey given the Focus Report submission timeline).
 - The difference between breeding bird point count and migratory bird surveys is unclear. It cannot be determined if both were conducted on the same survey point at the same time. Details on methodology and data submission is lacking. Habitat selection methodology may have resulted in species being missed as coverage of survey points was not uniformly distributed along the re-alignment. **More survey points should be added along the pipeline re-alignment and more surveys completed to provide a complete view of bird species distribution and habitat use along the pipeline re-alignment. Fall migratory bird surveys are recommended. This information must be used to inform mitigation plans.**

Term of Reference Requirement: 8.3 Complete a bird baseline survey for common nighthawk (*Chordeiles minor*), double crested cormorants (*Phalacrocorax auratus*), owls, and raptors and raptor nests, for the entire project area which includes the re-

aligned pipeline route.

Department of Lands and Forestry's Comments:

- *Appendix 8.3 Bird Baseline Survey.*
 - *8.3.1. Select Species – Bird Survey Methodology.* Nests of bird species are protected under the *Wildlife Act*, regardless of whether they are active or not. This distinction needs to be made as it will need to be included in the development of mitigation or monitoring plans with respect to project construction and maintenance.
 - *Common Nighthawk Survey.* Survey point site selection reasoning was not provided. It was also not addressed why survey points #5 and #6 were in such close proximity to each other in comparison to distribution of survey points across the length of the re-alignment. **Data has not been presented in sufficient detail to adequately conclude whether the survey was properly conducted. No mitigation measures under *Appendix 0 Impacts and Mitigation* were proposed with respect to the protection of the species or its habitat pursuant to this proposed project. Mitigation measures need to be identified and approved by Lands and Forestry prior to any work commencing.**
 - *Raptor Nest Survey.* **No raptor nest survey appears to have been completed for the pipeline re-alignment, as requested under the ToR.** The Department and Lands and Forestry recommends that the proponent complete a raptor nest survey to identify nest locations and provide the Department with a mitigation plan to avoid these locations.

Term of Reference Requirement: 8.4 Complete a herptile survey for the Project area which includes the re-aligned pipeline route.

Department of Lands and Forestry's Comments:

- *Appendix 8.4 Herptile Survey.*
 - The Department of Lands and Forestry recommended that the herptile surveys be conducted during the spring and fall activity period. **Data provided indicates that no surveys for herptile species occurred in the fall months** (the Department of Lands and Forestry recognizes that it was not possible to complete the fall survey given the Focus Report submission timeline). The Department has two concerns additional regarding the surveys that were completed:
 1. herptile surveys were conducted as “incidental” observations during the course of other field programs and were not dedicated stand-alone programs. Timing of these programs may not have been sufficient for herptile surveys given that a number of the wetlands/watercourses identified along the pipeline re-alignment

were considered “moderate” potential for foraging or overwintering habitat, or both. Methodology did not provide adequate detail on timing duration of survey, weather conditions, or temperature, which, for example, can influence movement, and hence, sightability of turtle species. It is not possible to properly assess the results of the survey at this time.

2. the report incorrectly identifies figure 8.3-1 as a summary of the types of herptiles and habitat that were identified along the proposed realigned route. **This figure actually shows Nighthawk, Owl, Double-crested Cormorant and Raptor Survey Locations.**

The Department of Lands and Forestry recommends that the proponent provide the Department with a revised survey methodology to address these concerns before conducting new herptile surveys. Fall herptile surveys are recommended.

FOCUS REPORT- ADDITIONAL COMMENTS:

The Focus Report provided additional information on a number of areas. The Department has the following concerns:

Appendix 0 Impacts and Mitigation.

- **Section 0.1.72 Wetlands.** Information on control of spread of invasive species is not sufficiently detailed. **For example, cleaning of vehicles should not just occur when moving equipment between wetlands but should also occur away from any waterbody to prevent the potential introduction or spread of invasive species.**
- **Section 0.1.9 Terrestrial/Wildlife Species.** The proponent indicates that “...mitigation and residual effects identified in Section 8.9 of the EARD remain valid.” This is incorrect, as both the location of the pipeline (within a treed section of the highway right of way vs. road shoulder) and method for placing the pipeline through wetlands has changed. These factors will likely change the mitigation measures that were identified within the original EARD as it pertains to both wildlife and wildlife habitat. **Additional mitigation measures will need to be developed to address the loss of wetland function resulting from trenching activities during construction.**
- **Section 0.1.9 Terrestrial/Wildlife Species.** Potential foraging and overwintering habitat for turtles was identified during the course of survey work. Depending on species, turtles are protected under the Nova Scotia *Endangered Species Act*, the *Wildlife Act*, or both. **Mitigations will need to be developed with respect to, for example, preventing the creation of artificial nesting habitat in construction/laydown areas and exclusion measures near wetland habitats,**

among others.

- **Section 0.1.10 Migratory Birds and Priority Bird Species/Habitats.** Two species at risk were found during the course of the 2019 field season: Eastern Wood-Pewee (*Contopus virens*, SARA Special Concern, NSESA Vulnerable) and Common Nighthawk (*Chordeiles minor*, SARA Threatened, NSESA Threatened). There is also a colony of Double-crested Cormorants nesting near the causeway. **The development of suitable and appropriate mitigation measures to prevent disturbance to the Double-crested Cormorant colony and protect the Common Nighthawk and Eastern Wood-Pewee must be approved by Lands and Forestry, as these species fall under provincial jurisdiction.**

- **Section 0.2.2.9 Wildlife, Priority Species, and Migratory Birds.** There is insufficient detail at this time to assess the validity of certain mitigation measures (for example, wall height and steepness to prevent wildlife access to the Effluent Treatment Facility). **The Department of Lands and Forestry recommends that the proponent seek the advice of the Department on its mitigation plan and provide the Department with an updated plan**

- **Section 8.0 Flora and Fauna, and A) Impacts and Mitigation** Non-migratory bird species, that are protected under the *Wildlife Act*, and the *Endangered Species Act*, require the development of mitigation and contingency plans, to be approved by Lands and Forestry. **The Department recommends that the proponent provide the Department with mitigation and contingency plans for non-migratory bird species protected under the *Wildlife Act* and *Endangered Species Act* and develop a training program for field staff to enable them to recognize the potential for species occurrences and procedures to follow.**

- **Section 5.1, Appendix 5 – Wetland Baseline Study:** A total of 19 wetlands were documented within the realigned pipeline route. The preferred technology for wetland crossings has been identified in the report as trenching. The report acknowledges that this activity may increase the risks to wetlands including release of hazardous materials, sediment deposition, nutrient loading, soil compaction, changes in hydrology and wetland function. **The Department of Lands and Forestry recommends that wetland field delineation be done to enable proper determination of values and function; and mitigations be put in place to reduce the risks.**
 - a) The realignment has shifted the route to the eastern side of highway 106, within the NSTIR ROW in a treed area instead of the routinely mowed and maintained road shoulder. For many of the wetlands within the proposed re-aligned pipeline route, only a small fraction were assessed on the ground. The wetlands outside of the NSTIR ROW were examined from satellite imagery and mapping. **In order to properly assess the wetlands, ground delineation surveys are required. Wetlands that overlap or are within proximity that may be impacted by the project, are to be field**

delineated prior to the commencement of construction activities.

- b) The Department recommends that flora and fauna surveys be completed to compliment the field delineation surveys. This will enable a full evaluation of the wetlands. It is also recommended that follow-up evaluation and monitoring be conducted as necessary.**
- c) The Department of Lands and Forestry's mapping of wetlands indicates that there is potential for wetlands of special significance, as defined by Nova Scotia Environment, within proximity of the proposed re-aligned treated effluent pipeline route (based on extrapolations made by the Department of Lands Forestry using the maps provided by the applicant in the Focus Report, where spatial files were not provided). **As stated above, the Department of Lands and Forestry recommends that wetland field delineation be done to enable proper determination of values and function.****
- d) Department of Lands and Forestry recommends the development of a maintenance plan for the land portion of the proposed re-aligned pipeline route, that details any plans for vegetation control (i.e., herbicide plan) be completed prior to beginning of construction.**

- The Department has the following general recommendations regarding the planning and implementation of this project:

- Avoid creating temporary, artificial habitat that may encourage or attract wildlife for nesting purposes. Artificial nesting sites can constitute 'ecological traps' conducive to nest predators and human disturbance. **Avoid locating sandpits or gravel piles in areas that may encourage turtle nesting, or conditions that may be appealing to bank swallows.****
- Standard procedures and measures be established to prevent entrapment of wildlife as a result of work activities (i.e. trenching).**
- The proponent provide the design for watercourse and wetland crossings along the land-based portion of the proposed re-aligned treated effluent pipeline route for approval prior to the commencement of any construction related activities.**

Comments Respecting the Original Registration Document:

The Focus Report does not fully address the Department of Lands and Forestry's comments on the original Environmental Assessment (EA). The Department has the following concerns:

- Mitigation plan to protect wildlife and wildlife habitat, including birds, mammals, reptiles, raptors, and species and risk is not well detailed. **The Department of****

Lands and Forestry recommends that the proponent seek the advice of the Department on its mitigation plan and provide the Department with an updated plan.

- Options for discouraging wildlife from using or accessing spill basins and clarifiers has not been sufficiently explained in detail (see Appendix 1.1 Concordance Table). **The Department of Lands and Forestry recommends that specific measures be developed to discourage waterfowl from accessing the spill basin, if/when it is active, and these be provided to the Department.**
- Explanation of discrepancies in original bird survey results provided within the EA was not provided; **The Department recommends that the proponent explain discrepancies in the original bird survey results.**
- Information provided for Double-crested Cormorant nesting colonies in the vicinity of the project footprint do not address impacts and appropriate protection and mitigation measures in the event of a pipeline rupture; **The Department recommends that appropriate mitigation measures be created to protect Double-crested Cormorant nests in the event of a pipeline rupture**
- Mitigation measures were not updated to reflect the results of new information resulting from 2019 field surveys. For example, species of conservation concern, including species at risk listed under the SARA and the NSESA, were identified during field programs; however mitigation measures specific to these species were not provided. **The Department of Lands and Forestry recommends that additional mitigation measures be created to address new information in 2019 surveys.**
- Barn Swallow (*Hirundo rustica*, SARA Threatened, NSESA Endangered) was discovered during field programs for the original EA submission. **A dedicated mitigation/monitoring plan will need to be developed for this species.**



Department of Municipal Affairs and Housing

Maritime Centre, Floor 14 North
1505 Barrington Street
PO Box 216
Halifax, NS B3J 2M4

Date: November 8, 2019
To: Department of Environment
From: Department of Municipal Affairs & Housing
Subject: Northern Pulp Environmental Assessment Focus Report

As requested, the Department of Municipal Affairs and Housing has reviewed the Environmental Assessment Registration Documents for the proposed Northern Pulp Replacement Effluent Treatment Facility Project.

Although we have found nothing of concern respecting the Department's areas of mandate, we would like to remind the proponent to ensure that they have undertaken adequate consultation with the Municipality in order to confirm conditions for compliance with municipal planning policies and by-law provisions.

The Engagement Plan in the Focus Report shows that local municipalities will receive the same level of engagement as the provincial government; however, it is unclear in the Report as to the difference between engagement and communication, as the words are used interchangeably. It would be helpful if the proponent were clear in the project phases as to when engagement meant that comments from relevant stakeholders, such as the affected municipalities, would be accepted.

Thank you for the opportunity to review the Registration Documents for the above-noted project.

Agriculture

Date: 2019-11-07

To: , Environmental Assessment Officer

From: Executive Director, Policy and Corporate Services
Nova Scotia Department of Agriculture

Subject: Northern Pulp Replacement Effluent Treatment Facility Project Focus Report

Thank you for the opportunity to review the Northern Pulp Nova Scotia Focus Report for the Replacement Effluent Treatment Facility Project.

The Nova Scotia Department of Agriculture has the following comments:

No update is necessary for the agricultural land review based on the focus report.

There are agricultural lands within 1 km of the proposed pipeline, however, the proposed pipeline route may not impact agricultural land bordering Highway 106 directly.

Nova Scotia Department of Fisheries and Aquaculture

Date: November 7, 2019

To: , Nova Scotia Environment

From: Executive Director, Policy and Corporate Services, Nova Scotia Department of Agriculture, Fisheries and Aquaculture

Subject: Northern Pulp Nova Scotia Focus Report EA comments

Thank you for the opportunity to comment on Northern Pulp Nova Scotia Focus Report (Focus Report) for the Replacement Effluent Treatment Facility Project. The Nova Scotia Department of Fisheries and Aquaculture (NSDFA) recognizes the marine environment identified in the methodology of the project proponent falls under federal jurisdiction, however NSDFA has the following comments for consideration:

- Additional video information on depth and current in diffuser area would be helpful to understand what species occupy this area.
- The Focus Report provides a more detailed and accurate representation of the freshwater habitat along the pipeline corridor where it would cross or run adjacent to stream, marsh or wetland habitat.
- The focus report could have been broadened to include stakeholders such as local sports fisher people and river associations.
- NSDFA suggests the focus report to address whether there are contingencies in place to mitigate potential large and rapid fluctuations in water temperature at the diffuser location during low production or maintenance shut down periods would be helpful.
- The adjacent oyster farms should also be mentioned in the focus report in addition to the wild harvest context.
- NSDFA suggests the focus report to reference aquaculture leases in the area of the effluent outflow pipe. There are 25 licensed aquaculture lease/licenses within 25 kilometers of the proposed project, with the potential for increased investment in the industry and the addition of more aquaculture leases.
- NSDFA suggests that a separate heading titled "Aquaculture Industry" be included in the list of outstanding information for fisheries species.

Date: November 8, 2019

To: Nova Scotia Environment

From: Peter Hackett, Chief Engineer

Subject: Northern Pulp Nova Scotia Corporation (NPNS) Focus Report for
environmental assessment for the Replacement Effluent Treatment Facility
Project

Dear ,

TIR staff have reviewed the Focus Report for environmental assessment for the Replacement Effluent Treatment Facility Project of Northern Pulp Nova Scotia Corporation (NPNS) and prepared the following comments:

Previous comments provided by TIR to Northern Pulp in correspondence dated September 20, 2019 and March 1, 2019 should be reviewed as several items still need to be addressed. Some of the comments below are similar to comments previously provided by TIR.

Appendix 2.1 On-Land Pipeline Info (Preliminary Drawings by Wood Rev. B dated 2019-09-25; 10 sheets)

1. General - Drawings are preliminary and lack detail making it difficult for TIR to fully assess impacts of the proposal on highway infrastructure at this stage. Further reviews as design progresses will be required before any approvals can be granted.
2. General – A legend is required. Cross-sections are required at regular intervals and key locations showing location/dimensions of pipe relative to other highway features and ROW/property boundaries. Additional details around structures are required e.g. underground foundation limits in plan/profile/cross-section. Plan drawings should be at an appropriate (larger) scale and show all relevant details e.g. edge of pavement, edge of shoulder, top/bottom of highway slopes, intersecting roads/intersections, excavation limits, contour labels, etc. Some of this information appears to be shown but is incomplete and not properly labelled and the plan scale does not facilitate a thorough review.
3. General - There are no carrier (sleeved) pipes shown in plan or profile drawings where crossing highway or structure locations and the length of some of these crossings appear to exceed 30 meters which the design report suggests to be the upper practical length for pipe jacking methods while horizontal drilling methods are not feasible/anticipated in this project. This was previously discussed as a TIR requirement to facilitate installation as well as potential future maintenance/replacement as open trenching methods will not be permitted by TIR in these areas.
4. General – Locations of the alignment along Highway 106 where transfer of property to Northern Pulp is being contemplated across existing accesses to private property. In the event property is transferred to Northern Pulp in these areas, easement arrangements in favour of the adjacent

property owners may be required to maintain their highway access rights. All road and driveway crossing locations should be identified on profile as well as plan drawings.

5. General – Locations of underground infrastructure (as well as above ground infrastructure including highway signs) should be shown in the design drawings e.g. fibreoptic, natural gas, electrical highway lighting, municipal sewer/water, storm sewer infrastructure or culverts, etc.
6. Sheet 2 – Plan view being split across two separate lines with no match line indicated is confusing.
7. Sheet 2 – Not clear why shaded (apparent paved surface) does not start until chainage 2+650.
8. Sheet 2 – The pipe alignment appears to cut through the causeway rock fill embankment slope at a slight angle. Feasibility of excavating and replacing the large rock fill along this alignment and potential impacts on stability of the causeway embankment need to be fully considered. An alignment angle more perpendicular to the embankment, e.g. across PID 00889162 (owned by TIR) may provide a more appropriate transition into the submarine portion of the alignment with less impact to the causeway embankment.
9. Sheet 3 – Plan drawing appears to show proposed property parcel(s) along a former alignment that has since been changed with the alignment now proposed to go through the rotary. This should be removed/adjusted on the plan.
10. Sheet 4 – Refer to Comment #2 above, it is particularly important to see these details between 4+400 and 5+100 where the pipe is proposed to be placed between two nearby parallel roadways.
11. Sheet 4 – Alignment of pipe in plan drawing appears to fall outside of proposed property boundaries; some adjustment to the delineation of property parcels may be required in this area.
12. Sheet 9 – Air release valve location/limits needs to be shown on plan drawing and there should be reference to a detail. Access provisions for this infrastructure should also be shown on design plans.
13. Sheet 9 – Shaded gray area appears to show Hwy 106 pavement limits, not clear why this stops at 10+300.
14. Sheet 9/10 –Three Brooks Road structure appears to be shown outside of highway right-of-way limits. This should be reviewed for accuracy.
15. Sheet 10 – Review and approval by property owner e.g. Government of Canada (PIDs 65049850 & 65166746) in vicinity of ferry terminal will be required where the proposed alignment involves property not owned by TIR.

Appendix 2.1 On-Land Pipeline Info (Wood Design Report)

16. Justification for why a corridor width of 10 m is required should be provided as per previous TIR comments. Minimal corridor width is desired by TIR.
17. Anticipated locations and excavation limits of thrust/reception pits should be shown on design drawings. Section 3.4.1 suggests the area required is approximately 6 m x 50 m on either side of highway crossings – is there adequate space at all crossing locations?
18. Proponent will be required to coordinate, arrange, and provide all wetland compensation and watercourse alteration permits required for any portion of the work that falls on TIR property.

19. Section 3.4.2 Traffic Control - as previously communicated, lane closures or stoppage or traffic on Highway 106 for any significant amount of time will not be permitted by TIR and work should be planned accordingly.

Focus Report Main Document Project Description Section 2.1 On-Land Pipeline Info (pp13-18)

20. Pg 13 & 16 "*Approximately 1.5 km will be a marine installation adjacent to the Pictou Causeway (to be designed by Makai Ocean Engineering)*" – It would be prudent for TIR to review details of this portion of the design, to ensure the underwater work near the base of the causeway rock embankment does not impact its stability. The preliminary report by Makai Ocean Engineering in Appendix 2.5 "Changes to Pipeline" did not appear to get into this level of detail but did provide general figures suggesting dredged trench dimensions in the order of 3.4 m deep and 13.9 m wide.
21. Pg 13 – There appears there is an error in referring to Appendix 3.5 where the Wood design report for the on-land realignment route is found (should be Appendix 2.1).
22. Pg 14 "*On-land pipeline will be installed below ground with a nominal depth of cover of 1.6 m*" – this statement appears several times however the depth of bury appears to be less than this in some locations based on profile drawings. Minimum depth of cover under TIR policy is 1.2 meters and the design would need to ensure buoyancy, resistance to weight of highway maintenance equipment e.g. excavators, and frost protection are adequate in these locations. Details must be provided where nominal cover is less than 1.6m.
23. Pg 14 "*...specific details of the location will be determined in agreement with NSTIR*" – refer to Comment #1 above.
24. Pg 14 "*...with the possibility of using trenchless construction methods at road and utility crossings*" – refer to Comment #3 above.

General comments

25. Any work within the Highway Right of Way will require a Work Within Highway Right of way Permit, available from the Area Manager.
26. Any work zones that are created on provincially owned roads in any case would need to comply with the appropriate section of the Nova Scotia Temporary Workplace Traffic Control Manual. Any traffic control issues such as speed reductions, signage, lane and road closures will have to be detailed out and approved by the local traffic authority.
27. Dangerous Goods Transportation as referenced in Section 3.6 of the Focus Report will need to be compliant with any relevant Acts and Regulations for any transportation on provincially owned roads.

Thank you for the opportunity to review and comment this document.

Sincerely,



Peter Hackett
Chief Engineer

Date: November 15th, 2019
To: Environmental Assessment Branch
From: Air Quality Unit
Subject: Northern Pulp Replacement Effluent Treatment Facility

Introduction

Further to your request, the Air Quality Unit provides the following comments with respect to the Air Quality sections of the Focus Report, dated October 2019 as part of the Class I Environmental Assessment Registration Document (EARD), dated January 31st, 2019, for the above-mentioned project:

Comments

Planning/Design Issues

- The Expanded Air Dispersion Modelling Study, submitted in Appendix 6.2 of the Focus Report has predicted exceedences of 4 contaminants: ammonia, chloroform, total reduced Sulphur (TRS) and hexavalent chromium. The proponent has assumed that the exceedences are overpredictions of the model and has proposed no mitigative options to reduce the ground level predictions. The modelling report indicates that emission rates would be verified/refined through source testing and ambient air monitoring following construction of the effluent treatment facility. The updated emission rates would then be used to update the air dispersion modelling to determine whether predicted exceedences are likely to occur. If ground level predictions still exceed criteria, an air emission reduction plan would then be developed, which is a reactionary approach. Allowing the project to proceed when predictive air dispersion modelling indicates air pollutant standards could be exceeded in populated areas, increases the risk that the project could impact public health and the environment.
- The Focus Report indicated that the expanded list of air contaminants was compared to Ontario Regulation 419/05 as none of the contaminants have permissible ground level concentration limits under the Nova Scotia Air Quality Regulations. The report indicates that the Ontario criteria are used for information purposes but have no force of law in Nova Scotia. Given the predicted concentrations, ground level criteria limits for the air contaminants of concern should be adopted and included in any

Environmental Assessment Approval and subsequent Division V Approval under the Activities Designation Regulations, granted for this project.

- Table 4.1 of Appendix 6.2 identifies the emission rates used for individual emission sources. The Table should identify whether the emission rate used was measured or based on emission factors. The reference for individual emission rates and factors should be identified.
- Table 0.1.1-2 of Appendix 0 indicates that the estimated emission rates for hydrogen sulphide from the proposed effluent treatment plant have been reduced from those submitted in Section 8.1.3.3 of the EARD. There is no rationale or explanation provided for the reduction in emission rates used in the air dispersion modelling.
- With meteorological anomalies removed, the report indicated that the health-based Ontario criteria (ammonia, chloroform, hexavalent chromium and 24 hour TRS) were exceeded less than 0.5 % of the time at discrete receptors. The Focus Report suggests that this level of frequency of exceedences was low and below “significance criteria”. The report does not reference the source of significance criteria used to make this determination.
- With meteorological anomalies removed, odour based criteria (10-minute TRS) were exceeded up to 19.24% of the time at discrete receptors. It should be noted that Ontario allows 10-minute average standards to have modelled exceedences at human receptors up to 0.5% of the time, annually.
- The Human Health Risk Assessment (HHRA) is incomplete. Results of a complete HHRA would assist in the review of the significance of the predicted exceedences of the ambient air criteria in the air dispersion modelling.
- The updated ambient air monitoring plan provided in Appendix 6.3 is incomplete and does not fulfil the requirements of the terms of reference for the Focus Report. The terms of reference of the Focus Report (6.3) required the submission of an updated ambient air monitoring plan based on the results of the air dispersion modelling. The terms of reference also required a plan to include air contaminants to be monitored and proposed monitoring locations. Appendix 6.3 identifies parameters to be monitored, but the plan does not identify the specific volatile organic compounds (VOCs), metals or polycyclic aromatic hydrocarbons (PAHs) proposed for monitoring. In addition, the Focus Report (pages 113-114) does not include any PAH monitoring which conflicts with Appendix 6.3. As a result, the proposed parameters are either not specified, conflicting or unclear when comparing the language between Appendix 6.3 and the Focus Report. The location and number of proposed monitoring sites and duration of sampling was not provided. Text is missing from Section 2.1 of Appendix 6.3. Section 3.2 of the Appendix 6.3 provides a list of nearby sensitive receptors but does not indicate how they will be used to inform the ambient air monitoring program.
- Section 3.1 of Appendix 6.2 indicated that the upper risk thresholds (URTs) of Ontario Reg 419/05 Schedule 6 were included in the assessment for the respective contaminants. However, Tables 3.2 and 6.1 did not include all the URTs from Schedule 6 for the respective contaminants. The URTs for n-butanol, ethyl benzene, xylenes and dioxins and furans were not included or assessed.
- Although predicted ground level concentrations of benzo(a)pyrene complied with the annual criteria, the predicted ground level concentration ($0.07 \mu\text{g}/\text{m}^3$) exceeded the upper risk threshold for the 24 hour averaging period ($0.005 \mu\text{g}/\text{m}^3$). The

contaminant is listed for consideration in the human health risk assessment but the exceedance is not addressed in the modelling report.

- Ground level concentrations of TRS were predicted at 92% of the upper risk threshold for the 24 hour averaging period. The contaminant is listed for consideration as a contaminant of potential concern in the human health risk assessment.

Operational Issues/Other Permitting Processes

- Technical details associated with the method of sludge dewatering and proposed operational or physical modifications to the power boiler to manage sludge, should be provided with the Application for Approval under Division V of the Activities Designation Regulations.
- The Environmental Assessment indicates that the mill will conduct a pilot study on the co-combustion of hog fuel and wastewater sludge in the power boiler. Details of the proposed pilot study should be included as part of the Division V Application for Approval. The study plan should include, but not be limited to:
 - Proposed volume of fuels to be burned, fuel mixtures, fuel feed rates;
 - Proposed fuel feed method;
 - Analytical characterization of the wastewater sludge to identify the contaminants of concern;
 - Comparison of the wastewater sludge with existing fuel characterization;
 - Proposed contaminants of concern for testing;
 - Proposed test methodologies;
 - Identification of air quality standards proposed for comparison during testing;
 - Proposed operating conditions of the power boiler during testing; and
 - Proposed testing scenarios to demonstrate that testing will be conducted for the cases when the highest concentration of air contaminants would occur.

Depending on the results of the study, further modeling and testing may be required.

- The Division V Application for Approval should include an alternate method for sludge disposal in case the pilot study for co-combustion proves unsuccessful.
- The Division V Application for Approval should include an environmental response plan to address any malfunctions or upset conditions at the power boiler resulting from the co-combustion of wastewater sludge with primary fuels.
- The Division V Application should include odour mitigation strategies for operations as a result of the proposed activity.

Other Observations

- The mill is authorized to operate at an annual production rate of 330,000 air dried metric tonnes/year. The air dispersion modeling study indicates that the mill currently produces between 280,000 to 300,000 air dried metric tonnes (ADMT) per year which was the basis for the modelling. The air dispersion modelling should represent results for the mill under its authorized production rate. The air dispersion modelling report indicates that the mill has no current plans to increase production. The production rate of any Environmental Assessment Approval granted for this project should be limited

to the modelling assumptions presented (280,000-300,000 (ADMT per year)). In addition, the Approval to Operate should also be reduced until the Approval Holder can demonstrate that the facility is capable of operating at 330,000 ADMT per year while complying with acceptable ambient air standards.

- Isopleth mapping was provided for the contaminants with predicted exceedences, with exception of the 10-minute average TRS. The isopleth mapping should be completed for the 10-minute average TRS to identify the extent of predicted exceedences.
- The HHRA identified contaminants of potential concern for consideration in the assessment of the air emissions. The HHRA screened out contaminants based on the output of the air dispersion modelling. However, the modelling output used to develop the list of contaminants of potential concern in Table A.3 of the HHRA, is not the same as the modelling output submitted in Appendix 6.2.

Date: October 21, 2019

To: Environmental Assessment Branch

Cc:

From: Climate Change Unit

Subject: NPNS Effluent Treatment Facility Focus Report

Comments

Planning/Design Issues

Climate Change Adaptation

The Focus Report did not require the proponent to specifically address the impacts of climate change on the operational phase of the project however is recommended that the proponent consider the combined effects of warmer temperatures as a result of climate change and project activities on water quality of Northumberland Strait and Caribou Harbour. A plan for adapting to changing environmental conditions, particularly climate change, should be included in the follow-up and monitoring program.

Greenhouse Gas Emissions

The proponent maintains that air emissions including greenhouse gas emissions during the construction from fossil fuel combustion in heavy construction equipment, trucks and other mobile equipment will be short term, localized, transient and immaterial. It is in the proponent's interest to estimate fuel consumption in construction equipment and ascertain an estimate of the greenhouse gas emission based on published emission factors. Based on the expectation that these emissions will not be significant the proponent has committed to appropriate mitigative measures where required.

Operational Issues/Other Permitting Processes

Greenhouse Gas Emissions

Regarding the operation phase of the Effluent Treatment Facility, the proponent also maintains that the removal of sludge from the rotary press to be co-combusted with hog fuel in the mill's existing power boiler could have a mitigative impact on greenhouse gas emissions from the facility. This assumption is fair.

Date: November 5, 2019
To: Environmental Assessment Branch
Cc:
From: Environmental Health
Subject: Final Comments NPNS Focus Report

Comments

Planning/Design Issues

- Section 2.4 of the Focus Report entitled, “Treated Effluent Characterization”, p. 34 , highlights the significance of chemical oxygen demand as a key indicator of ETF efficacy and its effects on the receiving environment.

The authors point out that Total COD (tCOD) is the typical industry measure used in Canada, however, for the lab trial described, soluble COD (sCOD) was chosen as the measured indicator. The authors state that,

“The soluble sCOD is a more representative way to assess the effect of effluent on a receiving environment. This filtered, or soluble, sCOD has been found to be a better representation of the actual biochemical oxygen demand of the wastewater than the unfiltered or total test result. sCOD is a more accurate representation of the expected or actual performance of a biological wastewater treatment system.”

Supporting evidence is deemed necessary to demonstrate that the use of sCOD rather than tCOD as the key measure will not result in an underestimation of effluent COD entering the receiving environment.

- Section 3.1, p.45 of the Focus Report discusses treatment performance and settling times for primarily and secondary clarifiers, and enumerates “typical design settling times”. Supporting evidence should be provided to support reported typical design settling times.

- Section 3.5 entitled Effluent Pipe Leak Detection p.62 describes the leak detection systems to be incorporated into the pipeline. The report describes an automated leak detection system planned for the portion of the pipeline that spans overland from Pictou to Caribou. It is not clear in the report why this section of pipeline was specifically chosen for automated leak detection technology, and/or why other section were deemed to not require automated leak detection systems. Rationale for the decision made to incorporated different leak detection systems throughout various portions of the pipeline is absent from this report.
- The Expanded Air Dispersion Modelling study predicts that maximum GLCs for ammonia, chloroform, hexavalent chromium will exceed applicable air quality criteria less than 1% of the time, and that TRS is predicted to exceed the odour based 10 minute limit more frequently. Given the existence of an exceedance it would be deemed appropriate to report the frequency of TRS exceedances.
- Table 6.1 of the Expanded Air Dispersion Modelling Study provides a comparison of the maximum predicted GLC levels of dioxins and furans against the adopted air quality criteria. It appears the predicted concentration of 0.013ug/L exceeds the applicable air quality criteria of 0.1pgTEQ/m³, however, dioxins and furans were not deemed to exceed applicable criteria. Please confirm.
- Page A.5 of the HHRA states,

For the recreational exposure pathway, there are Canadian recreational water quality guidelines (HC, 2012). However, there are no Canadian recreational guidelines available for our parameters of interest (Table A.5). As such, Canadian drinking water guidelines protective of potable water were considered to be protective of recreational users that may incidentally ingest water while engaging in recreational activities such as swimming. The drinking water guideline was also considered to be protective of the surface water dermal contact exposure pathway, and the incidental ingestion of sediment and dermal contact with sediment exposure pathways, because these pathways are considered to be negligible when compared to the incidental ingestion of surface water exposure pathway.

As drinking water guidelines were used to derive recreational water quality guideline the level of protection offered by the recreational water guideline is substantially less than the protection offered by a drinking water guideline. Statements claiming that certain exposure pathways pose a negligible risk should be supported by evidence. Excluding exposure pathways from the HHRA can have the effect of underestimating human exposure to contaminants and risk to public health.

- Table A.7 of the HHRA states that o-Cresol was not detected in any samples. However, information provided in the table suggests that 2 samples were analyzed for 0-Cresol, and that only one sample was deemed to be below the RDL, suggesting that one sample did produce a result. This appears to pose a contradiction that can impact whether or not o-Cresol is deemed a COPC.

- The HHRA has been formulated and scoped, however, insufficient data is available to present results or make conclusions respecting human health risk related to the proposed undertaking. In essence, human health risks remain unknown from this study.

Date: October 22, 2019
To: Environmental Assessment Branch
Cc:
From: ICE Division
Subject: NPNS Comment on Focus Report Submission

Introduction

A preliminary review of the materials submitted in response to the submission of a Focus Report in support of the EARD for the NPNS Replacement Effluent Treatment System to service the Pulp Mill located at Abercrombie Point, Pictou County, NS .

Comments

Planning/Design Issues

Water/Wastewater

- The Focus Report references average flows and concentrations rather than daily maximums. Design of an ETF must be based on daily maximums. Effluent flows are based on flows at Point C not Point A.
- Based on water use data, the facility has the potential to experience wastewater flows in excess of 85,000 m³/d. The facility must be designed for peak flows not average flows. NPNS has proposed installation in-mill cooling towers which would equalize water and therefore wastewater volumes between winter and summer volumes. Installation of the in-mill cooling towers as part of this project is key to ensuring design flows are not exceeded.
- NPNS did not respond to previous comments regarding the impact of colour (TCU) laden wastewaters being discharged into the Northumberland Strait on the marine sediments.
- NPNS should address how homogeneous plume buoyancy throughout the water column has the potential to cause the colour to rise to surface sooner than expected.

- NPNS has not addressed the previous comments in response to the EARD regarding the breakdown of the COD and treatment efficiency. The Focus Report speaks mainly about soluble COD. COD fractionization should be provided and treatment efficiency with respect to total COD should be provided.
- The predicted effluent quality results were compared to the proposed PPER monthly limits. These results should also be compared to the proposed PPER daily limits.
- The Focus Report states that portions of the proposed ETF can treat effluent flow of 90,000 m³/d without compromising organic removal efficiency, however how long those portions of the proposed ETF could sustain these flows was not provided. Information should also be provided on how the entire proposed ETF will perform when subjected to 90,000 m³/d.
- The Focus Report states “the most common practice in the Canadian pulp and paper industry is to mix waste biosludge with wood waste (hog fuel) and generate steam and energy from combustion in power boilers”. References were not provided for this statement. Additionally, rationale was not provided to support why this option is better than alternative uses.
- A limited data set was provided to support the basis for design (for example, only 2 samples were collected to characterize the effluent) and no rationale was provided to indicate why this is appropriate or representative.
- Additional parameters considered to potentially cause adverse effects as identified in the KSH report 11-1112-D Rev. 5 should be scrutinized further in EEM and HHRA as suggested in the report.
- Laboratory trials were performed on a limited number of parameters. There is no data to confirm the concentrations of many parameters of concern after treatment.
- Maximum concentrations of the proposed ETF are compared to the average concentrations measured at the BHETF. Maximums should be compared to maximums and averages should be compared to averages to avoid confusion and eliminate the potential for errors in interpretation of the information presented.

Air Quality

- NPNS has not provided a sludge management plan. This should include details regarding dewatering, sludge bulking as well as a secondary disposal option for the sludges should use in the biomass boiler prove to not be a viable option.

Spill Basin/Dangerous Goods

- The sizing of the spill basin is actually smaller than comparable chemical mills for sizing. As the spill basin is proposed to be used for secondary containment for dangerous goods spills, NPNS are required under the Dangerous Goods Management Regulations to design a spill basin to contain 110% of the largest storage tank (including in-mill process tanks). Information has not been provided to demonstrate the current submission meets the requirements of the Regulations.

- Based on the description provided, the spill basin also appears to be proposed for use as an equalization basin for the reintroduction of excess/ off-spec effluent which will be bled into the system. As well, the spill basin will not be maintained completely empty. This would mean the spill basin would not be available for spills of dangerous goods as indicated in the report.
- NPNS has not indicated how they will deal with reactive materials. The information provided in the Focus Report is based on small leaks or spills of compatible Dangerous Goods, not the worst case scenario. Reactive material spills should be separated to ensure the requirements of the Dangerous Goods Management Regulations are being met.
- Based on the description of how the spill basin will be operated as provided in the Focus Report, it does not appear to be feasible that Dangerous Goods spills can be recovered and pumped back into the process.
- It is unclear if Dangerous Goods will be removed from the spill basin for treatment/ disposal at an Approved facility or are strictly proposed for neutralized and/or diluted and fed into the new ETF. There is no discussion regarding the treatment systems capability to treat waste dangerous goods and no modelling to show the impact of waste dangerous goods on the final effluent quality should a spill occur.

Pipeline Routing

- The marine portion of the pipeline route is proposed to go through a critical herring habitat in the Northumberland Strait. The excavation for the installation of the pipeline will alter this habitat. There is no discussion regarding the extent of impact on the fishery.
- A limited number of marine species samples were collected- PAHs and phenols were not analyzed. The precise location of the samples collected was not provided therefore it is unclear if the current BHETF has influenced the samples collected.
- Although it was indicated the wetland alteration area for the project will be approximately 2 ha, the total project cumulative impact, directly and indirectly at ETF location and pipeline location, appears to be more than 2ha. Greater detail regarding the delineation and functionality of the wetlands proposed to be impacted should be provided.
- All wetland alterations will require water approvals, separate from any Industrial Approval(s), as such, detailed compensation plans must be provided with those applications.
- The Focus Report did not provide information on seasonal surveys which could result in not identifying species at risk which may reside seasonally within the wetlands in question or reside outside the limited survey area.

- Limited data has been provided on marine species. Additional monitoring should be conducted on American lobster, rock crab, Atlantic herring and should include fish community studies and benthic invertebrate community studies.
- Ice Scour should be monitored in the areas of greatest concern. Mitigative measures should be pre-determined in the event that increased frequency and/or depth of scour is observed.

Pipeline Construction

- . NPNS did not identify a standard industry practice for HDPE pipe travelling across/through well fields. Monitoring programs should be established based on industry standards.
- NPNS should provide more detailed information regarding how the diffuser will be monitored for damage or disrepair during the winter months.
- NPNS has not provided pipeline inspection frequencies or methodologies.
- NPNS did not provide a basis for the “detection of leaks as small as 60L” information.
- For the receiving water study (RWS), background water quality data is only from May and June 2019. Additional data would be helpful to determine if there are seasonal or other changes to be considered.
- The marine pipeline is proposed to be buried up 3 m deep with up to 2 m of soil cover to provide protection. How will the 2 m of soil cover be maintained? Will this affect fish habitat? How?

Operational Issues/ Other Permitting Processes

- A more specific timeline (e.g., prior to commissioning of the ETF) should be required to ensure the in-mill cooling towers are part of the replacement ETF project.
- Scenario B in the Receiving Water Study indicates colour does not reach ambient conditions until <200 m from the diffuser. NPNS indicates they will install O₂ delignification in the future but does not commit to a definitive timeline. O₂ delignification will help reduce colour in the treated effluent.
- A timeline for the installation of O₂ delignification should be provided.
- The Focus Report also indicates COD may increase following installation of the in-mill cooling towers. Information should be provided to indicate how NPNS plans to maintain compliance with COD limits in the current IA given the proposed ETF project may impact COD concentrations.
- The Focus Report states “the CCME MAL guideline (<1° differential) is met within 2

m of the outfall” and “the zone within which temperature could have an impact on fish is extremely small” but it doesn’t state what the impact within the 2 m could be. NPNS should provide additional information regarding how fish are anticipated to interact with the 2 m zone and what the potential impact may be.

-

Air Quality

- Ground level concentrations(GLC) should be measured to evaluate the predicted exceedances against actual performance, the number of locations should be selected on a risk/social basis to provide data to demonstrate the actual GLCs.

Dangerous Goods Management

- Secondary containment for dangerous goods and waste dangerous goods must be separate from an equalization basin.
- KSH recommendations for dangerous goods management must be implemented however they will not be sufficient for the new ETF.
- The description of maintenance practices for the spill basin presented in the Focus Report raises concerns for the integrity of the liner. Maintenance practices should be clearly defined and also be acceptable to the Department.

Pipeline Routing

- NPNS do not confirm if they received approval from TIR for the pipeline placement in the ROW; Table 2.1-1 of the Focus Report identifies some parcels as owner is undetermined/no owner identified. Ownership of these parcels and proof of authority to undertake the designated activity on any parcels not owned by NPNS will have to be provided as part of an application for Industrial or Watercourse Alteration Approval.
- A domestic well survey along the pipeline route would be beneficial as a means of collecting baseline data from nearby private water supply wells. Typical domestic well surveys include wells within a 500 m radius of the proposed activity and involve both water quality sampling and water level measurements. It is important to verify the number and location of nearby water supply wells in the field rather than relying on NSE’s Well Logs Database or other online resources. The Domestic Well Survey would need to be completed prior to installation of the pipeline.
- The need for groundwater monitoring along the pipeline route should be further evaluated, including both pre- and post-construction monitoring. This is particularly important in sensitive areas, such as the Town’s Source Water Protection Area, areas in proximity to private water supply wells, and locations where the proposed pipeline location is below the water table. .
- Location(s) where the proposed pipeline depth is below the seasonal high water table were not identified.

- Potential changes in groundwater flow regimes due to the installation of the pipeline and any secondary containment were not evaluated.
- Landowners of unidentified parcel owners must be established prior to application for Industrial Approval.
- A surface water monitoring program for the pipeline route should be included in the NPNS Environmental Protection Plan.
- Background marine sediment quality issues were identified. Disposal or reuse may be restricted as a result. Disposal of dredge spoils on land will require an Approval from NSE.
- NPNS proposes to install the pipeline with a nominal depth of cover of 1.6 m. NPNS should confirm this is possible along the entire on-land portion. If it is not, mitigation measures should be developed and proposed.

Pipeline Construction and Design

- Options for leak detection technologies were presented in the Focus Report, however, the preferred option(s) were not confirmed. A robust, accurate, sensitive, and reliable pipeline monitoring and leak detection system is necessary for the protection of the environment and local water supplies along the pipeline route. The pipeline monitoring and leak detection system should be appropriate for the operating conditions, automated, continuous, and equipped with alarms. A regular maintenance plan for the pipeline monitoring and leak detection system is also important, along with adequate staff training to ensure the system is operational and effective.
- The following three options were considered as enhanced pipeline protection: 1. clay lined trenches, 2. double-walled pipeline, and 3. improved engineering design. Improved engineering design, specifically an increase in pipe wall thickness, was selected by the Proponent as the preferred option for enhanced pipeline protection. The Focus Report did not include sufficient information to demonstrate the selected option and final pipeline design will provide adequate protection of local groundwater resources in the event of a pipeline leak. Secondary containment was not adequately evaluated as an additional groundwater protection measure for the land-based portion of the pipeline
- The potential impact to groundwater supplies associated with the operation of the pipeline, including the risk to water supplies in the event of a pipeline leak, were not properly evaluated. The Focus Report did not consider, for example, the time of travel between the proposed pipeline location and water supply wells and potential contaminants of concern.
- A plan should be developed to outline actions that will be taken in the event of a pipeline leak to manage, control and remediate any release to the environment.

- Consideration should be given to enhanced monitoring for the water-based portions of the pipeline.
- The Report indicated the construction and installation of the pipeline will be closely monitored and the pipeline will be tested prior to being buried. A detailed plan for monitoring and testing the pipeline during the construction phase was not provided.
- The Focus Report states the replacement ETF will be controlled by “well-trained operators” but doesn’t specify a training standard. Minimum training standards should be required.
- Standard Operating Procedures (SOPs) for a wide variety of operating scenarios including production variability, loss of electrical power, and annual maintenance outages and resumption of mill production should be required.
- A preventative maintenance plan should be developed.
- Specific pipeline monitoring technologies proposed for construction should be provided.

Other Observations

- Figure 3.5-1 appears to be missing.
- Armour stone in areas of potential ice scour should be considered over and above the 2m pipe trench.
- Given the location of the proposed project on an existing industrial site and within the highway right of way, there would be potential for contamination to be encountered during construction. A plan should be developed for managing any contamination that is encountered during construction.
- Any groundwater that is encountered during construction should be tested and released appropriately. A plan should be developed, which outlines steps that will be taken in the event groundwater is encountered.

Groundwater and Surface Water Monitoring (Mill Site)

- There is an existing groundwater and surface water monitoring program at the mill site, which would have to be modified to accommodate the proposed project. Changes to the current monitoring locations, parameters, and frequency would be based on the proposed new infrastructure, such as the spill basin, clarifiers, and chemical storage, as well as effluent quality. Additional baseline data would also have to be collected.
- Every effort should be made to protect the existing monitoring well network during construction activities. Any monitoring well that is damaged during construction should be properly decommissioned and replaced or repaired, as appropriate. The

Department should be notified of any changes to the existing monitoring well network.

- The alteration of any watercourse(s) on the mill site may lead to reconfiguration of the existing surface water monitoring network. The Department should be notified of any changes to the existing surface water monitoring stations.

Environment

Date: 6 November 2019

To: Environmental Assessment

From: P.Eng., Senior Engineering Specialist, Industrial Management

Subject: Comments on Environmental Assessment Focus Report for Northern Pulp Nova Scotia Corporation ("Northern Pulp" or "NPNS") Replacement Effluent Treatment Facility ("ETF")

I have reviewed portions of the focus report submitted for environmental assessment for the proposed replacement effluent treatment facility for Northern Pulp. My comments relate to areas of the report, specifically s.3.6 "Dangerous Goods" and, where related, to s.3.4 "Spill Basin". This also included related Appendices 3.6 "Dangerous Goods" and 3.4 "Spill Basin".

For s. 3.6, the proponent was asked "Clarify where the potential releases of waste dangerous goods at the project site will be directed for treatment and/or disposal. It is important to note that the new treatment facility is not proposed to treat waste dangerous goods based on the information provided in the environmental assessment registration document ("EARD") and requirements of NSE." In the Focus Report, the proponent confirms that "the new replacement ETF is not proposed to treat waste dangerous goods on-site". The Focus Report then goes on to detail how, if there was a spill or release of dangerous goods or waste dangerous goods that left the immediate area of storage of these materials, the release would be directed to the spill basin. The contents of the spill basin would then be tested to see if they were compatible with the ETF and, if deemed so, would be added to the ETF. If not compatible, the basin contents would be moved via tanker trucks to an approved disposal facility.

One of the issues with the proponent's response is that these released dangerous goods or waste dangerous goods are still being considered for disposal through the new ETF, despite their stated intention not to do so. Many of these materials, especially in their concentrated forms from onsite storage or piping systems, are fundamentally incompatible with a biological treatment system and, in some cases, with each other. Releases into a common spill basin may result in significant reactions and risk to the environment or the facility. The cover memo for the proponent's KSH-authored report entitled "Secondary Containment and Spill Management Study", stated that in the event of a major spill, "a decision would be made on the correct action to take (either have it removed by an approved contractor or neutralized on site for example)". Since there are no provisions in the current for proposal for on-site neutralization or any other treatment, the remaining option would be collection and removal.

Another issue appears to be how the proponent proposes to operate the spill basin. In the Focus Report, the discussion is on using the spill basin primarily as a buffer for holding off-spec mill effluent. For dangerous goods, the Report notes that this basin "in normal conditions will never be full". This then appears to relate to volumes of materials that the basin can hold, not whether or not the materials are compatible or whether the released dangerous goods should be mixed with mill effluent. This differs from the report that the proponent had previously submitted, entitled "Secondary Containment and Spill Management Study", where it was stated "It is the intent of NPNS to have the emergency spill basin

empty most of the time". The qualifier "in normal conditions" also would appear to be a gap in protective systems, since spills or leaks would often be more likely to occur when the facility was not operating under normal conditions. It would be more protective to design for upset or worst-case conditions rather than average operations. It would also be prudent to design for separate collection systems, rather than a comingled sewer if the intent is to minimize potential harm.

Having reviewed the registration document and subsequent focus report, it is my opinion that the proponent has not included enough detail or perhaps an insufficient design to address all outstanding concerns regarding spill management for dangerous goods or waste dangerous goods. This may require updating the previously submitted KSH-authored report to address gaps and inconsistencies or possibly redesigning the spill containment facilities. These proposed steps could take place as part of an application for an industrial approval if the proponent is approved at the environmental assessment stage.

Date: November 5, 2019

To: Environmental Assessment Branch

Cc: Manager, Industrial Management Unit

From: Hydrologist, Industrial Management Unit, Sustainability and Applied Science Division

Subject: Northern Pulp Effluent Treatment Facility Focus Report Review Comments

Introduction

The scope of this Environmental Assessment review from the NSE Sustainability and Applied Science Division Hydrologist is to assess the potential environmental impacts and proposed mitigations of the proposed undertaking on surface water quantity and management. While comments may also include considerations for impacts on general surface water quality, groundwater, freshwater fish habitat, and wetlands, appropriate technical specialists for these areas should be consulted for specific review and comment. This review is specifically focused on freshwater resources, and not on any potential marine impacts.

Documents reviewed:

The documents outlined below formed the basis for this EA review, and is referred to as 'the submission' through the rest of this memorandum:

- Northern Pulp Nova Scotia Focus Report – Replacement Effluent Treatment Facility. Including Appendices related to surface water. Report by Dillon Consulting. Dated October 2019, and accessed from https://novascotia.ca/nse/ea/Replacement_Effluent_Treatment_Facility_Project/

Comments

Surface Water Management:

- Original EA submission comment: As it drives the design of the EFT and receiving water study, it is critical to have confidence in the 85,000 m³/day maximum water use. At current, it is unclear how this number was determined and whether it is

appropriate. Clarification surrounding the rationale for this number is required.

Updated comments from review of Focus Report:

- The submission outlines that “This proposed peak treatment capacity of 85,000 m³ was determined by review of the actual operating data from the NPNS mill for effluent flow at Point C, the mill’s current regulated outfall location at the BHETF...Point A flow data would have been used for the design review if the flow meter at that location possessed the accuracy required for the evaluation.”
 - It is noted that Point C is collected where the treated effluent leaves the operating BHETF and enters the Boat Harbour Basin
- It is reported in the submission that a ‘verification review of raw water flow from Middle River in to the mill was undertaken to confirm the accuracy of Point C data...The effluent flow is roughly 10% lower than the raw water flow due to water vapour lost through four wet scrubbers...’
- The submission outlines that ‘Cooling towers will be installed to recycle clean water for reuse within the mill during the summer months. New cooling towers are expected to reduce the peak summer effluent flow at the mill by approximately 5,000 m³/day below current levels...’
- The submission outlines that ‘Effluent quality metrics based on concentration will need to be re-evaluated after in-mill cooling towers are installed in the future as mill water reduction will increase the concentration of untreated effluent without increasing the amount of pollutants that the effluent contains.’
- Summary: Information has been provided in the submission to support the 85,000 m³ design info parameter. A level of uncertainty surrounding this value remains, as the assumption of 10% losses being contributed solely to evaporative losses related to in-mill processes do not consider the potential losses between the plant and the data source of Point C within Boat Harbour (e.g., infiltration, evaporation). Whatever potential losses in this part of the system that may contribute to the data used in their development of the 85,000 m³ design criteria would not be replicated in the new ETF, and could lead to larger design inflows than the 85,000 m³ design flow. This design parameter is a critical parameter that informs the design of the system, spill basin, pipeline, and diffuser/receiving water study.
- Original EA submission comment: The rationale for the adequacy of the proposed Spill Basin size is not clear in the current submission. It is recommended that details regarding the rationale and adequacy of the proposed Spill Basin size be provided to confirm the effectiveness of this proposed mitigation measure. Updated comments from review of Focus Report:
 - It is reported in the submission that ‘The sizing of the spill basin, to hold 10-13 hours of effluent, is in line with others across the country’.
 - It is reported that ‘The mill will not continue normal operation if there is a risk of overflow to the environment’. No discussion of how any potential overflows from the spill basin would be managed is provided in the submission.
 - It is stated that ‘In the event of a power outage, the Middle River raw water pumping station, which feeds the mill and its processes, will also shut

down...This effectively prevents raw water from flowing to the mill during a power outage.'

- A section on 'Flooding Event and Climate Change' is provided in appendix 3.4, but the details provided are not particularly relevant to this case. The reference provided is from a news report from Saint John, whose flooding would have been driven by drastically different factors than what is expected here (e.g., Bay of Fundy tides, St. John River). That being said, information is provided to highlight the vertical elevation of the spill basin wall above sea level, which at least provides information related to the risk of coastal flooding.
- Summary: Information has been provided to support the design provided for the spill basin. Questions remain regarding the appropriateness of the plans for the basin, and how the statements in the submission will be met through operations of the basin.

Water quantity and watercourses:

- EA submission comment: Considerations for risks to the environment from using the HDD method have not been provided in the submission. It is recommended that detailed plans for any Horizontal Directional Drilling be provided to the Department for review prior to use of this methodology, with considerations for any potential risk and mitigation to nearby watercourses associated with using this method. It is also recommended that alternatives to HDD are presented as part of the application process so that any watercourse alteration activities can proceed effectively if HDD is not deemed feasible in the field. Updated comments from review of Focus Report:
 - HDD appears to no longer be planned as part of the proposed works, as the submission highlights that 'because the size of the pipe and the construction requirements it is unlikely that HDD will be utilized'. Pipe jacking is proposed as an alternative to this. Similarly to with the EA submission, recommend assessment of the potential risks and mitigations to nearby watercourses using this method should be required prior to this method being used.
- Additional information from focus report:
 - The pipeline route has been modified from what was originally outlined in the original EA submission.
 - It is reported that 'The description of the on-land portion of the treated effluent pipeline provided below is a conservative estimate of the scope, footprint, and environmental considerations of the realigned route.'
 - Additional details surrounding the planned construction methodology have been provided in the submission.
 - It is reported in the submission that 'Where ground water is encountered dewatering will be necessary to allow pipe installation to proceed as the pipe shall not be laid in the trench with standing water.'
 - It is reported in the submission that 'the contractor shall also divert any surface water runoff away from the open trench. Any water pumped from pipe trenches must be discharged to appropriate sediment removal devices.'

Fish and fish habitat:

- Baseline fish habitat assessments were completed for the watercourses identified along the new proposed pipeline route.

Planning/Design Issues

- No planning/design issues identified at this time.

Operational Issues/Other Permitting Processes

- It is recommended that the installation of the cooling towers, as outlined in the submission, be completed prior to the operation of the new EFT. It is also recommended that a detailed monitoring plan (including considerations for data QA/QC) be developed to support validation of the inflows to the new EFT with a contingency plan to address cases where this criteria cannot be met. As outlined in the submission, it is recommended that effluent quality metrics based on concentration be re-evaluated as mill water reduction improves.
- It is recommended that as part of the application for the proposed works, a spill basin operations, maintenance, and surveillance manual be developed and submitted for review and Departmental acceptance that considers the content of the submission and provides details on how the basin will be operated to meet what is stated in the submission (e.g., the statement in the submission that ‘the mill will not continue normal operation if there is a risk of overflow to the environment’).
- Recommend assessment of the potential risks and mitigations to nearby watercourses using the ‘pipe-jacking’ method outlined in the submission. These details should be provided to the department as part of applications for these works and prior to this method being used.
- A detailed sediment and erosion control plan for the various activities proposed is to be developed by a qualified professional and is required to be submitted for NSE review and approval prior to construction activities, including clearing, grubbing, and stripping, take place.
- Applications for watercourse alteration approvals associated with the proposed works should consider the results of the fish and fish habitat assessments presented in the submission

Environment

Date: November 5, 2019

To: Environmental Assessment Branch, Nova Scotia Environment

From: Wastewater Engineering Staff
Water and Industrial Facilities Unit

Subject: Northern Pulp Effluent Treatment Facility Project

Operational Issues/Other Permitting Processes

Design Flows

- There was some concern related to conflicting flow rates presented in the original Environmental Assessment Registration Document (EARD) submission and flow monitoring results indicating flows exceeding the proposed design flow of 85,000 m³/day. The proposed Effluent Treatment Facility (ETF) does not have a long retention time like the current Boat Harbour lagoon facility so peak daily flows are more of a concern for facility design. Northern Pulp has indicated they do not expect daily flows to exceed 85,000 m³/day but clarification was not provided in the Focus Report submission. It is recommended that flow to the proposed ETF not exceed a peak daily flow rate of 85,000 m³/day.

ETF Influent Characterization

- In the EARD submission the human health evaluation identified more potential parameters of concern than considered in the receiving water study. Therefore, a full characterization of influent was requested in the Focus Report terms of reference which was provided in Appendix 2.3. The characterization was based on only two samples, both taken in the same month (May 29, 2018 and May 14, 2019). A sampling program that included a variety of seasons, flow rates, changes in sources of fiber or production would have presented a more representative and reliable influent characterization.
- The Human Health Risk Assessment has commenced under the Focus Report but has yet to be completed. The results of this work may impact the list of contaminants of potential concern for the ETF influent characterization.

Overland Portion of Pipeline

- A number of options were considered for the treated effluent pipeline where it crosses the Town of Pictou water supply protection area. In Appendix 2.1 (Construction Methodology and Design Report by Wood) the option of using a thicker wall pipe (SDR 13.5) is proposed. While this approach has merit in

protection against failure due to surge pressure or overpressure, it will not protect against leaks due to separation at joints, vandalism or physical damage. The selected approach relies entirely on the leak detection system to identify an issue.

- Containment, leak detection, and ongoing monitoring are multiple options to protect against the risk of an inadvertent release of treated effluent in the Town of Pictou's water supply area impacting their drinking water source. The Focus report does not adequately address this risk. Without a more detailed assessment it is difficult to comment on whether secondary containment and/or monitoring well programs must be in place to provide an adequate level of protection.
- The Focus Report indicates the use of thicker wall pipe in the area of the Town of Pictou's water supply to withstand potential surge pressures. Transient analysis of the pipeline at operating temperatures of 37°C should be undertaken to confirm if surge and vacuum pressures are an issue and determine appropriate selection of transient protection device(s).
- The discharge pressure for the range of discharge flow rates, including zero flow, will vary significantly. Any automated leak detection system should be synchronized to the operation of the treated effluent pumps (e.g. on/off, flow rate or variable speed).
- While the report indicates various leak detection methodologies there is no commitment to any specific methodology, stating that final selection will be made during the detailed design phase. The report also states automated leak detection will not be installed in the rest of the fused HDPE pipeline outside of this land-based section. A leak detection plan that includes non-land-based sections should be approved prior to potential construction of the force main.
- The potential for odour generation/release at the vacuum/air release valves was not addressed. If odour generation is a potential, including during startups and shutdowns, indicate what mitigation measures will be taken to address this.

Spill Basin

- The Spill Basin seems to be used for a number of functions including diversion of spilled chemicals or liquids (requiring removal for disposal offsite) and ETF influent that is out of the normal range for parameters such as flow, pH, temperature, and conductivity. Use of the Spill Basin to equalize excessive flow (which will be reintroduced into the feed to the ETF) will both take away from the availability of the volume for emergency storage of spilled chemicals as well as dilute and contaminate the spilled chemicals so that recovery/disposal is negatively affected.
- Secondary containment is not proposed for all chemicals (i.e. caustic) within the mill. There is a concern that discharge of caustic to the Spill Basin could affect the performance of the ETF. It is unclear if neutralization of the chemicals is

proposed to be undertaken on site.

- In order to accommodate different spilled chemicals at the Spill Basin, partitions may need to be considered to separate chemicals to prevent dangerous interactions/reactions.

Receiving Water Study

- In the case of colour the following criteria should be met as per CCME (1996) *Guidance on the Site-Specific Application of Water Quality Guidelines in Canada: Procedures for Deriving Numerical Water Quality Objectives*:
 - Adverse effects on the aesthetic qualities of the receiving water system (e.g., odour, colour, scum, oil, floating debris,) should be avoided.The receiving water study indicates colour will not reach the background concentration of 4.5 TCU until 200m, which is beyond the extent of the allowable mixing zone. However, the limiting distance for colour should be the lesser of the 100m mixing zone or when the plume reaches surface. The study suggests the plume will reach a concentration of 15 TCU within 5m from the diffuser (1:50 dilution). Rationale is provided that 15 TCU can be detected in a glass of water by most people and it is the aesthetic objective of the Canadian Drinking Water guidelines (*Health Canada, 1995*). However, lower TCU values can be detected in larger volumes of water (*Australian Drinking Water Guidelines Version 2.0 Updated December 2013*). The plume surfaces at 20m which corresponds to a dilution ratio of 1:100. Conservatively assuming no degradation, the colour value in the plume would be estimated at 7.5 TCU compared to the surrounding background concentration of 4.5 TCU. Based on CCME Guidelines the plume must not be visible at the surface.
- Scenarios A to C of the receiving water study apply a range of COD loadings to model potential worst-case scenarios. The COD loading for Scenario C was increased, however colour was not increased and 750 TCU was used for all three scenarios. Given the higher buoyancy in winter conditions (Scenario C) and potentially higher colour concentrations not being reflected in the model it is recommended to confirm if the worst-case scenario for colour is adequately addressed in the study.
- Field evaluation was conducted to further validate model calibration. The evaluation addresses some concerns related to original submission but was only conducted for one month. Further verification of the model based on actual discharge would further validate the model and assist with EEM studies, which is agreed to in response IR1-19 of Addendum 3.0 of the Focus Report.

Operator Oversight

- The submission does not comment on the specific training and experience of the proposed operator. Due to the complexity of the system, an individual with education and experience necessary to operate the new ETF or alternatively, an individual who has achieved minimum of a Level 4 Operator Certification as required by the *Water and Wastewater Facilities and Public Drinking Water Supplies Regulations* should be utilized. These qualifications should be demonstrated to the Department and the individual should be in direct

responsible charge of the operation of the ETF.

Standard Operating Procedure (SOP) for operation of the Spill Basin

- Development of a SOP for the operation of the Spill Basin should be submitted to the satisfaction of the Department.

Oxygen Delignification

- The proponent has committed to incorporation of Two-stage Oxygen Delignification technology into the process. The time frame of when that is to occur is not stated, other than it will be after the ETF project has been completed. Oxygen delignification would further reduce contaminant loading to the ETF and the receiving water body, address concerns related to colour, and improve the ability to consistently meet treated effluent criteria.

Cooling Towers

Addendum 1.0 of the Focus Report states cooling towers will be implemented at the mill, in addition to the ETF cooling towers. This would assist in the reduction of overall water consumption and wastewater generation. This would be an important project to manage the seasonal variations and the potential excessive flows to the ETF.

Date: November 5, 2019

To: Environmental Assessment Officer
Cc: Manager, Water Management Unit, Sustainability and Applied Science Division

From: Senior Hydrogeologist, Sustainability and Applied Science Division

Subject: EA Review - Focus Report: Replacement Effluent Treatment Facility
October 2019

Reviews for EA's from the Sustainability and Applied Science Division Senior Hydrogeologist focus on the potential for the proposed undertaking/project to adversely affect groundwater resources, including general groundwater quality, local water wells/water supply and groundwater discharge to surface water.

In January 2019, Northern Pulp submitted an environmental assessment registration document (EARD) for the approval to replace the Boat Harbour Effluent Treatment Facility (ETF) with an on-site ETF. Following the submission of the EARD, Nova Scotia Environment (NSE) requested additional information to support a final decision regarding the approval of the environmental assessment. The request for additional information was provided as a Terms of Reference for a Focus Report. This review is of the Focus Report (October 2019) information relevant to groundwater

Focus Report Comments:

The following comments relate to items in the Focus Report as requested in the Minister of Environment's Terms of Reference for the Focus Report relevant to groundwater.

Section 3.5 discusses the effluent pipeline leak detection. Leak detection is relevant to preventing leaks/spills that could impact groundwater – particularly in the Town of Pictou Source Water Protection Plan, SWPA (Source Water Protection Area).

While several types of leak detection design are discussed in Section 3.5.1, there are no preferred options that are identified. While the proponent identifies both “external” and “internal” leak detection, they do not say if both would be employed at the site and seem to focus on at least one of three internal methods. It is likely appropriate to include both external and internal methodologies. Alarms for unusual operating conditions and for leaks could also be incorporated.

Section 3.5.2 addresses Pipeline Protection. Enhanced pipe thickness for durability is recommended as a preferred option by the proponent as opposed to secondary pipe containment in the Town of Pictou Source Water Protection Plan, SWPA (Source Water Protection Area). However, no rationale is given for this decision. Planning for secondary pipe containment would seem to provide a much greater level of risk reduction and needs to be more thoroughly evaluated. No discussion of why it was not chosen was given.

Section 5.2 of the Focus Report addresses Monitoring Methodologies. It is noted that no groundwater monitoring is proposed for the pipeline route and no additional groundwater monitoring is proposed for the area of the new ETF (the existing facility has a groundwater monitoring network).

Appendix 9.2 discusses the Human Health Risk Assessment Problem Formulation. Appendix C of this looks at the Effluent to Groundwater used as Drinking Water Pathway for malfunction scenarios. Contaminants of Potential Concern (COPC) address only drinking water MAC or other health criteria.

Discussion:

In order to reduce risk from pipeline leaks or spills, particularly in the Town of Pictou Source Water Protection Plan, SWPA (Source Water Protection Area) but also in the other land component of the pipeline the proponent has made some useful suggestions but avoided others. No definitive groundwater protection plan is identified by the proponent. However, based on review of the Focus Report suggestions, relative to the potential risks to the municipal drinking water supply, the following may be concluded to be reasonable protection/risk reduction measures.

- Enhanced pipeline strength integrity
- Pipeline secondary containment in the Town of Pictou Source Water Protection Plan, SWPA (Source Water Protection Area)
- External leak detection and internal leak detection methods for the entire pipeline
- Leak and unusual conditions alarms
- Shallow monitor well installations in pipe backfill at watercourse crossings

It appears that no new groundwater monitoring locations in the area of the new ETF have been proposed in the Focus Report. This should be re-evaluated as additional features, such as the proposed spill basin or other infrastructure have the potential to impact groundwater.

The proposed Environmental Protection Plan (EPP) and/or Environmental Management Plan (EMP) should include monitoring during construction of encountered groundwater quality and mitigation plans.

Appendix 9.2, Human Health Risk Assessment provides in Appendix C a malfunction scenario for the “Effluent to Groundwater used as Drinking Water Pathway. The Contaminants of Potential Concern (COPC) parameters identified are stated as follows:

“The COPCs for the malfunction scenario of treated effluent infiltrating in to groundwater that is used as drinking water includes dissolved chlorite, nitrite, manganese, titanium, ethylene glycol, 1,1-dichloroethylene, 1,3-dichloropropene, ethylene dibromide, catechol, p-cresol, 6chlorovanillin, 2,4-dinitrophenol, guaiacol, bis(2-chloroethyl)ether, bis(2ethylhexyl)phthalate, 2,4 + 2,6-dinitrotoluene, hexachlorobenzene, and hexachlorobutadiene. In the HHRA these COPCs will be assessed further for residents who may drink groundwater from wells near the pipeline.” p. C.2

However, the COPC relevant to actual leaks/spills (not only for HHRA assessment) should include all relevant drinking water concerns, both health and aesthetic, and thus need to include parameters that are present in the treated effluent even at levels currently below Health Canada Maximum Acceptable Concentration (MAC) criteria, as well as Aesthetic Objective (AO) criteria identified by Health Canada for drinking water.

While AO drinking water parameters may not be health-based criteria, the exceedance of these may render drinking water non-useable due to objectional taste, colour or odour.

Based on a review of the treated effluent analysis at Point C (Appendix 2.3 Characterization of Effluent), the parameters potentially affecting drinking water present in treated effluent should additionally include the following list (and potentially others). Along with the COPCs identified by the proponent (and other industry standard monitoring parameters), these should be included in groundwater monitoring and assessment plans.

Antimony

Arsenic

Barium

Boron

Cadmium

Chromium

Iron (current process result exceeds AO)

Manganese (current process result exceeds MAC)

Mercury

Chloride

Sodium (current process result exceeds AO)

Colour (current process result exceeds AO)

(Hydrogen) Sulphide (current process result exceeds AO)

Sulphate

Total Organic Carbon

Turbidity

The treated effluent values that currently exceed a Health Canada MAC or AO are highlighted above. Of these, only manganese was identified in the Focus Report for the HHRA. In addition, other parameters were present at significant levels of MAC or AO objectives and thus any source variations could raise these above the criteria. It should be noted that the Appendix 2.3 Characterization of Effluent analysis uses averages based on only a few sampling events. In addition, an assumption is made that Point C location results would be comparable to effluent directly from the proposed new Activated Sludge Treatment (AST) process. The operational validity of this assumption is not known.

The identification of these parameters is critically important as this shows the fundamental physical characteristics of the effluent (i.e. high taste, colour and odour) and how the estimated treated effluent chemistry compares to potable drinking water quality. The Town of Pictou SWPA well field accesses groundwater supplies that could be impacted in a malfunction scenario. A pipeline leak or spill containing the indicated effluent chemistry levels for iron, manganese, sodium, colour and hydrogen sulphide (in addition to the other COPC identified by the proponent) could quickly render groundwater supplies non-potable depending on the location, magnitude of releases and their duration.

Additional:

Municipal Groundwater Supply

The proposal to construct an effluent pipeline crossing the Town of Pictou Source Water Protection Area and the zone of influence for its municipal groundwater supply wells remains incomplete with respect to plans for protection of the groundwater supply. Some of the incomplete aspects relate to protection/monitoring measures for the pipeline. Others relate to not having an adequate understanding of contaminant impacts and groundwater flows in the event of a pipeline malfunction scenario.

Information could be obtained (through numerical groundwater modelling or analytical calculations) to show relative time of travel to the municipal wells from pipeline leaks or spills and the effects of groundwater advection and dispersion on contaminant concentrations. This information could greatly inform and help in decision making with respect to the relative risk of pipeline malfunctions based on their location, magnitude and duration. For example, such an analysis could provide information about the relative risk to the Town of Pictou well field based on the volume of spill, the time until clean-up, the expected travel time of contaminants and concentration changes based on groundwater hydraulics.

Residential Groundwater Supply

It was previously noted by Nova Scotia Environment that over 60 residential water supply drilled wells are located within a 500 m distance from the centre line of the pipeline route (the proponent has estimated 121 water wells, but it is possible their search zone was different, as this number of wells could not be replicated using the NS Energy and Mines Groundwater Atlas identification tools with a 500 m radius buffer). These well locations would require field truthing for verification, and they are spread out over the entire length of the proposed pipeline route. For residential wells, and protection of local groundwater supply, effective monitoring of the entire land-based portion of the pipeline is important.

Summary

In order to fully protect the important groundwater drinking water supplies for the Town of Pictou and rural environs, the basics of source water protection - Understand, Protect, Monitor - need to be considered and the current submission improved upon during any operations, should the project proceed.

A. Understanding the Importance, Nature and Sensitivity of Groundwater Supplies

The potential risk of pipeline malfunctions that could affect municipal and private groundwater supplies has not been adequately addressed in the document and is currently not well understood. This issue has a number of contributing factors that combine to define potential impacts with respect to groundwater. Overall, additional information needs to be incorporated into the pipeline design and monitoring in order to demonstrate effective and reliable groundwater supply protection for decades to come. Lack of information or design in any one aspect would necessitate greater protection in other areas to compensate.

Areas where information is needed includes residential water well locations, baseline water well surveys and additional information on quantitative groundwater conditions related to the Town of Pictou pumping well fields.

B. Protection of Groundwater with respect to Proposed Industrial Activities

Information from A. should be combined into a groundwater risk evaluation and mitigation plan (Groundwater Protection Plan) to inform pipeline design, monitoring and leak mitigation contingencies. Pipeline leak detection using the best available technology should be employed. Potential additional redundancy in pipeline protection measures for the area of the Town of Pictou SWPA that would provide extra assurances.

C. Monitoring of Groundwater

Groundwater monitoring is an important, often final measure in detecting and determining the impacts of an activity on groundwater. Strategically located shallow or nested monitoring wells can be used to monitor, detect, prevent/allow early mitigation for a wide variety of activities/releases that could impact groundwater. Groundwater monitoring philosophy in this project needs to be adjustable and consider the various types of design and activities (e.g. ETF, Spill basin, buried pipeline) and the relative risks along the entire pipeline route.

Recommendations

The following recommendations are suggested for the proposed Northern Pulp ETF Facility and Pipeline, based on additional review of the Focus Report.

Operational Issues/Other Permitting Processes

Understanding Groundwater

Additional information on groundwater supplies needs to include both baseline residential water well surveys and the groundwater hydraulics related to the Town of Pictou pumping well field to better understand the active groundwater regime and how it may be affected.

- Field-truthing and locational mapping of water wells within 500 metres radius of the proposed activities (ie. 500 m from each side of the centreline of the pipeline route, or from the ETF site boundaries) should be conducted prior to construction.
- Pre-Construction Water Well Surveys should be conducted within 500 metres radius of the proposed activities (ie. 500 m from each side of the centreline of the pipeline route, or from the ETF site boundaries). These surveys should include both monitoring for drinking water quality parameters and well water levels and be conducted prior to any construction activities. Methodologies and monitoring proposed for the water well survey should be submitted to NSE for approval prior to implementation.
- The Town of Pictou SWPA two municipal pumping well fields and Well Head Protection Area (WHPA) zones should be evaluated and important groundwater hydraulic data determined for incorporation into a groundwater risk evaluation and mitigation plan (Groundwater Protection Plan). Previous SWPA work may need to be updated to provide more quantitative data. It may be necessary to employ groundwater modelling in some form to provide information, which should include:
 - Pumping well drawdown levels
 - Pumping well zone of influences/capture zones
 - Time of travel for standard Well Head Protection Area (WHPA) zones (e.g. 0-2 year (Zone A), 2-5 year (Zone B) and 5-25 year (Zone C))
 - Groundwater flow directions
 - Evaluation of groundwater flow advection and dispersion effects on potential contaminant releases

Protecting Groundwater Supplies

- Provide a Groundwater Protection Plan that incorporates baseline well data along the pipeline route, groundwater flow directions and well field capture zone travel times and other data to quantitatively evaluate potential spill /leak malfunction scenarios risks and provide appropriate mitigation measures. This plan should

include management/contingency response outcomes based on the evaluation and be acceptable to the Department.

- Provide a specific multi-faceted Leak Detection Plan with best available technology components (using external leak detection, internal leak detection and alarm measures such as proposed) acceptable to the Department.

Monitoring Groundwater

- Provide a Groundwater Monitoring Plan along the pipeline route that includes monitoring locations, measured parameters and frequency of monitoring. The plan should include rationale for shallow or nested monitoring wells at specific watercourse crossings and sensitive groundwater areas (near wells, SWPA etc.), acceptable to the Department.
- Provide a revised/updated Groundwater Monitoring Plan for construction/operation in the area of the new ETF, acceptable to the Department. Groundwater monitoring plans in the ETF area will need monitoring locations, measured parameters and frequency of monitoring to be enhanced to include the new activities proposed. This includes additional monitoring to include the area with the proposed new clarifiers, aeration basin and effluent spill basin. The effluent spill basin is proposed to be HDPE lined and this should incorporate leak detection monitoring.
- Provide Environmental Response and Contingency Plan (ERCP), Environmental Protection Plan (EPP) and/or Environmental Management Plan (EMP) documentation to specifically address contingencies for leaks/spills within the Town of Pictou Source Water Protection Area (SWPA) as well as mitigation and monitoring of any other contaminated groundwater encountered during construction or operation of the pipeline, acceptable to the Department.

Other Observations

- If the project proceeds, it is recommended that standard conditions be provided to the effect that the Proponent is responsible to replace or repair any water supply well found to be adversely affected by the project activities and operations to the satisfaction of the well owner.

Environment

Date: November 12, 2019

To: Water Management Unit Manager, Water Management Unit

From: Senior Surface Water Quality Specialist, Water Management Unit

Subject: Northern Pulp Nova Scotia Corporation – Review Comments & Recommendations

Scope of Review

As Senior Surface Water Quality Specialist with the Nova Scotia Environment (the Department) Sustainability and Applied Science Division, the following Northern Pulp Nova Scotia Replacement Effluent Treatment Focus Report review focuses on the following subjects:

- Surface water quality & its management (freshwater and marine)
- General surface and groundwater resources & their management, including marine resources

The following review considers whether the environmental concerns associated with the above subjects and the proposed mitigation measures have been adequately addressed in the Environmental Assessment. The recommendations provided below are meant to supplement the actions outlined in the EA submission documents.

While general comments on fish and fish habitat, wetlands, effluent discharge, surface water quantity, and groundwater quality and quantity may be included below, applicable technical specialists should be consulted for specific review and comment.

Reviewed Documents

The following document was the basis for this EA review:

Dillon Consulting. 2019. *Northern Pulp Nova Scotia Environmental Assessment Registration Document (EARD) Replacement Effluent Treatment Facility*. Northern Pulp Nova Scotia Corporation. 17-64631-1300.

Dillon Consulting. 2019. *Northern Pulp Nova Scotia Focus Report Replacement Effluent Treatment Facility*. Northern Pulp Nova Scotia Corporation. 17-6461.

Comments

Surface Water Quality and Quantity (Freshwater)

Pipeline

Receiving Water Environment (Baseline)

- A fish habitat assessment was conducted in watercourses proposed to be crossed by the Project works, which is predominantly along the land-based effluent treatment facility (ETF) pipeline route (Appendix 7.1). The assessment includes descriptions of each watercourse, including a photolog, quantification of substrate type, percent cover, dimensions and bank vegetation cover and type. This assessment aligns with the requested baseline survey in my EARD review comments for fish and fish habitat, as well as watercourse characteristics and will be helpful in supporting watercourse approval/notification applications.

Design

- A high-level engineering review of whether secondary containment for the pipeline is required, including for the land-based section, is presented in Appendix 2.1 and Section 3.5.2. The discussion identifies that based on the proposed use of conveying treated effluent, a single layer high-density polyethylene (HDPE) with an increased thickness (Standard Dimension Ratio 13.5) is sufficient for the full land-based section in comparison to the EARD pipeline design. The revised design plans to use butt fusion or flange joints and discusses that the likelihood of a leak occurring is small but does not quantify the risk. The other two methods assessed in the review were:
 - use of a clay liner within the pipeline bed, which was identified as potentially causing pooling of leaked treated effluent; and,
 - use of a primary pipeline installed within a secondary pipeline, referred to as secondary containment.

Beyond the statements about the robustness of proposed pipeline material and that joints when installed properly will be leak free there is no additional engineering review indicating why single wall pipe is adequate, particularly within the Town of Pictou drinking water supply area. Flow maintenance to prevent spills, leaks or releases within the pipeline is identified as being controlled via three monitoring parameters (Section 3.5.1). Assessment information is not provided on how resistant to fatigue are the pipeline flanges or expected pipeline resistance to external factors, such as potential pipeline strikes (e.g., excavation activities) and pipeline movement (e.g., frost heave).

- A list of three external and three internal potential leak detection monitoring methods is provided along with a couple of sentence details on each method (Section 3.5.1; Appendix 2.1). Three operational flow maintenance methods are also listed. The presentation of potential leak detection methods aligns with my EARD review comments. The specific methods that will be applied for this project are proposed to be determined during the final design phase. The methods are described as being applicable to HDPE pipeline systems, with some having low leak detection rates (e.g., 60 L/hr), but the specific method and whether the low leak detection rate was measured in an HDPE pipeline is not discussed.
- Automated leak detection systems, which consist of two external and three internal options are identified to not be installed and used on the marine-based pipeline sections. Beyond visual checks and operational flow maintenance no leak detection is proposed for the pipeline sections within Pictou Harbour and Caribou Harbour. No

release of treated effluent is planned to occur within the Pictou Harbour area for the Project.

Construction

- The Focus Report identifies that the main construction method for pipeline installation will be trench and bury, including within watercourses and wetlands (Section 3.5). Trenching has the potential to intercept shallow groundwater tables, and seepage from the adjacent watercourses and wetlands. Pumping out this collected water within the trench may be required to allow construction in the dry. Trench dewatering mitigation measures are discussed in Appendix 0.0, including use of erosion and sediment controls and discharging to vegetated areas. Discussion of dewatering mitigation measures aligns with what was requested in my EARD review comments. Some potential contaminants of concern associated with trench dewatering could include total suspended solids (TSS) and chloride. Chloride can be elevated within shallow groundwater, watercourse and wetland systems adjacent to roadways due to winter de-icing activities. pH is another water quality parameter that may differ between groundwater and surface water systems.
- At road crossings it is proposed to use a pipe jacking/micro-tunneling technique to install the pipeline (Section 3.5). This method would replace the use of horizontal directional drilling (HDD), which is no longer proposed as a pipeline installation method. Pipe jacking techniques can potentially use lubrication and soil conditioning fluids on the outside of the pipe being pushed through the soil profile. Additionally, if rotating cutting heads are used for micro-tunneling then fluids may be used for lubrication and to transport soil out of the tunnel as a slurry. These fluids are under pressure during the pipeline installation process, and there is the potential for their inadvertent release to the ground surface and into surface water resources, sometimes referred to as a frac-out. Appendix 0.0 discusses that for trenchless methods that additional geotechnical information will be collected, and mitigation measures developed using the Canadian Association of Petroleum Producers (CAPP) Pipeline Associated Watercourse Crossing Fish and Fish Habitat Impact Assessment Tool (2018).
- In support of trenching activities to install the pipeline sections within watercourses and wetlands, alteration approval applications are proposed to be developed and submitted, including development of mitigation measures to reduce potential sediment loading (Section 3.5; Appendix 0.0).
- Monitoring is proposed to support work near surface water resources (Section 5.2) for TSS and pH during storm events. Trench dewatering and surface water diversions during in-water works are expected to occur during the pipeline construction phase. Monitoring during storm events would not be adequate to identify potential sediment releases to surface water resources from dewatering and water diversion activities. As discussed above, chloride is a potential contaminant of concern that should be considered for the monitoring program.
- An erosion and sediment control plan is proposed to be developed in support of the pipeline construction phase (Appendix 0.0). Construction activities related to watercourse and wetland crossings, trench dewatering and excavation are identified as having erosion and sediment controls implemented as mitigation measures to reduce sediment loading.

Operation

- Figure 3.5-1 is discussed as presenting the direction of surface water runoff within the pipeline corridor and areas of flow accumulation. Discussion of flow

accumulation and mapping aligns with what was requested in my EARD review comments. Flow accumulation mapping is provided to indicate where surface water flows will drain to in the case of a surface spill, leak or release. Figure 3.5-1 is not included in the Focus Report. Appendix 7.1 includes what is expected to be Figure 3.5-1, which is identified as Figure A7.1-2.

Surface Water Quality and Quantity (Marine)

Receiving Water Environment (Baseline)

Water Quality

- Baseline marine water quality samples were collected and analysed as part of the following two programs:
 - Six samples were collected by Stantec staff at varying depths on May 24 and 25, 2019 within Caribou Harbour with chemical analysis for the same suite of parameters as the effluent characterization monitoring (Section 4.1). The results were indicated to be included as part of Appendix 4.1, but no laboratory data or discussion of the marine water sampling program was presented. Appendix 2.3 provides copies of the laboratory results for the six samples.
 - Appendix 7.3 identifies 8 water quality samples collected along the proposed pipeline route and 14 samples collected in the proposed diffuser area/mixing zone in October 2018, May 2019 (assumed to be the above samples collected for the marine baseline study) and June 2019 by NPNS personnel and EcoMetrix staff (Appendix 7.3; Appendix 9.2). No monitoring locations are displayed within the Focus Report for the October 2018 and June 2019 sampling events.

The physical and chemical analysis included general chemistry, nutrients, total metals, volatile organic compounds (VOCs), phenols, dioxins and furans, petroleum hydrocarbons, glycols, total polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs). This program aligns with the requested baseline marine water sampling in my EARD review comments. Results were compared against potentially applicable guidelines, such as the Canadian Council of Ministers of the Environment (CCME) marine water quality guidelines for protection of aquatic life and Environmental Protection Agency (EPA) Priority Marine Screening Level Criteria and listed based on whether the value exceeded the criteria, but without the values or number of exceedance results (Table 3-2 & Appendix B-1, Appendix 7.3). The maximum cadmium result was equal to the CCME criteria value, but no other parameters were at or above the CCME criteria. There were a number of parameter exceedances for the New Hampshire and Maine EPA results, including several where the reportable detection limit exceeded the criteria value. In Table A.5 (Appendix 9.2) the number of background samples for each parameter is identified and ranged from 1 (fluoride, glycols, select PAHs, select phenols) to 14 individual samples. Average parameter values of the six marine water quality samples collected by Stantec were assessed against the Point A and C average discharge values in Appendix 2.3. The Human Health Risk Assessment (HHRA) in Appendix 9.2 used median parameter values to assess marine baseline water quality.

The baseline marine surface water quality results at the diffuser site were used to

represent background water quality in the receiving water study (RWS) models (Appendix 2.4). This aligns with the requested model update in my EARD review comments.

The baseline marine surface water quality data have not been indicated in the Focus Report as being used to assist with screening to identify Contaminants of Potential Concern (COPCs) in the HHRA, including identifying baseline values that exceed applicable guideline values.

No discussion is provided on whether the number of samples collected and analysed for the parameter groups is sufficient to characterize marine baseline water quality, particularly for parameters with one sample result. No assessment of baseline marine water quality and potential seasonal effects is provided. There is insufficient information provided to confirm that the marine baseline water quality data adequately characterizes the proposed diffuser area baseline conditions. Section 3.1.1 of Appendix 7.3 indicates additional sampling efforts are planned and data will be made available. No additional details on the scope of this monitoring are provided.

No assessment is provided on whether the background water quality samples have been potentially influenced by existing Boat Harbour effluent treatment facility (BHETF) discharge into Pictou Road (part of the Northumberland Strait). The influence of existing BHETF discharge within Caribou Harbour would be expected to be minimal due to the estimated far-field distribution of effluent for the BHETF discharge point (Point D) (Appendix 4.2).

- Appendix 4.2 field measured temperature and salinity profiles during the flood tide (May 24, 2019) and ebb tide (May 25, 2019) observed high salinity values with low variation for both tide cycles indicating a well mixed water column. These observations were used to support the hypothesis that there is little impact from freshwater inputs into the Northumberland Strait at the proposed diffuser site location. No discussion is provided on potential seasonal effects on salinity values and freshwater inputs.

Sediment

- Sediment samples were collected at 25 locations in April and May 2019 as surface grabs (8, including duplicates) and composite cores in Pictou Harbour and Caribou Harbour along the proposed pipeline route. This aligns with the requested baseline marine sediment sampling as part of my EARD review comments. The sediment samples were analysed for a suite of parameters including grain size, metals, general chemistry, nutrients, cyanide, dioxins and furans, TPHs, VOCs, PCBs and PAHs (Section 4.1; Appendix 4.1). The assessment of sediment quality results included both grab and composite core samples with respect to marine pipeline construction activities (e.g., excavation and backfilling, disposal of excess materials). The composite samples were compared to the Canadian Council of Ministers of the Environment (CCME) interim sediment quality guidelines (ISQGs) and Canadian Environmental Protection Act (CEPA) Disposal at Sea criteria (Appendix 4.1; Appendix 7.3).
 - The results assessment (Appendix 4.1; Appendix 7.3) identified exceedances in Caribou Harbour sediment quality results for arsenic, copper, a couple of chlorinated dioxins for CCME ISQGs, but the results did not exceed the

probable effect level (PEL) criteria. None of the Caribou Harbour sediment quality results exceeded the CEPA Disposal at Sea screening criteria.

- Within Pictou Harbour sediment quality results exceeded CEPA Disposal at Sea screening criteria for cadmium and total PAHs in samples VC-53-3 and VC-50C-1, respectively (Appendix 4.1; Appendix 7.3). Two sample site results had several individual PAH results that exceeded the CCME ISQG PEL criteria. All locations had arsenic concentrations that exceeded the CCME ISQG PEL criteria. A number of sites had copper and lead results that exceeded the CCME ISQG PEL criteria.

Appendix 7.3 identified that during the marine pipeline construction there is potential for mixing of the sediments due to excavation and backfill that may change sediment quality. The mitigation measures proposed for marine pipeline construction include alternative dredging/excavation methods to limit sediment disturbance and transport, silt curtains and land-based disposal (Appendix 2.5). The Pictou Harbour sediment quality results potentially indicate that land-based disposal of the excavated material will be required. No discussion is provided on whether additional sediment sampling will be conducted in support of excavation activities and mitigation measure development.

- The proposed preferred dredging methods of clam-shell and long-reach backhoe are expected to produce less turbid water than the side-casting dredging method of cutting suction dredging (Appendix 2.5). These variety of proposed methods for excavation would be expected to have varying potential effects on marine ecosystems due to the level of sediment release and disturbance.
- Appendix 0, Section 0.2.2.11 proposes to conduct visual turbidity inspections during marine pipeline construction and if a distinct colour difference is observed that will trigger an investigation to determine the cause. This monitoring technique may not be adequate to observe a sediment release event and ensure a quick response, as the proposed mitigation measure does not indicate monitoring frequency. Automated or measurement-based monitoring (e.g., turbidity meter, TSS analysis) is commonly used in sediment release monitoring programs.

Tissue

- Tissue sampling was conducted on two species of crustaceans (lobster & rock crab) and one mollusc (quahog) for 4 to 5 individuals that were collected in the vicinity of the proposed outfall discharge (Section 9.1; Appendix 9.1).
 - The approximate areas/locations from which they were collected are not provided, and there is no discussion on whether the sample sizes of 4 to 5 are adequate for baseline characterization of tissue.
 - The lobster hepatopancreas and quahog non-shell tissue samples were not analysed for PAHs and phenols.
 - Results are compared to Canadian Food Inspection Agency (CFIA) edible guidelines, but unlike other results comparisons in the Focus Report no additional guidelines were used to supplement the federal guideline.
 - The results discussion of the observed arsenic exceedance indicates that organic forms of the compound pose a lower potential risk to human health. No references are provided to support the discussion provided of common forms of arsenic and their potential toxicity to humans.
 - No discussion is provided on the general tissue analysis results and how they compare to reference marine areas for similar waters that are not in areas within the Northumberland Strait that would be exposed to treated pulp and

paper effluent discharge. Additionally, no assessment is conducted on parameter concentrations and potential health/toxicological effects to the organisms themselves (Appendix 9.1; Appendix 7.3).

- Additional tissue sampling and analysis is proposed (Section 9.1; Appendix 9.1), including three mollusc species and three fish species. No discussion is provided on whether organic forms of arsenic will be potentially analysed in the additional samples to confirm the hypothesis of arsenic being in a potential less toxic organic form within the tissue samples. No information is provided on whether the number of tissue samples will be similar to the number of samples for lobster, rock crab and quahog in the Focus Report.
- The results of the tissue sampling program have not been used to identify or confirm potential COPCs using observed elevated concentrations within the samples themselves for expected constituent parameters within the Effluent Treatment Facility (ETF) discharge (Appendix 4.2; Appendix 7.3; Appendix 9.2).

Water Quantity

- To support RWS modeling activities, bottom-mounted (approx. 490 m northwest of discharge point) and vessel mounted acoustic doppler current profilers (ADCPs) were used, which collected water velocity and direction data for approximately 1 month (June 2019) and two transects in late May 2019, respectively (Appendix 4.2). Water level loggers were also installed at Skinner Cove and Arisaig for 12 and 34 days, respectively, to measure tide levels with an installation date of May 24, 2019. The observed results indicated that the water column was weakly stratified at the proposed diffuser site (Addendum 3.0). The following issues were identified with respect to RWS modeling activities:
 - No assessment is provided to indicate these monitoring time periods are sufficient to calibrate the model to simulate effluent discharge during the two scenario periods assessed (Summer and Winter), including level of stratification.
 - No discussion is provided on whether seasonal stratification would require use of a 3-D far-field model instead of the 2-D model developed in the Focus Report and EARD.
 - No validation observed dataset is used to confirm acceptability of the calibrated model inputs.

Further discussion on the observed dataset length, calibration and validation processes and results would potentially better communicate modeler confidence in the overall model and its predictions.

- Bottom-mounted ADCP measured waves for the one-month period were compared to far-field model results (MIKE 21) visually along with min, max, mean and standard deviation values with discussion of calibrated parameters (Appendix 4.2). The visual comparison of observed and modeled water levels is similar in the hydrodynamic model component. There is more visual discrepancy between the measured and simulated water temperatures. The reasoning provided for the water temperature discrepancies is it is potentially due to no air clearness observations at the Environment and Climate Change Canada Caribou meteorological monitoring site and an assumed value was used, and the ADCP measured temperatures were from the ocean floor (~20 m below surface) and the observed Fisheries and Oceans Canada temperatures were collected from 9 m below surface depth and located 1.2 km north of the ADCP station. The following issues were identified:

- The discussion does not provide the water temperature depth that was modeled.
- No statistical comparisons are provided for the MIKE 21 spectral wave model (e.g., Nash-Sutcliffe efficiency, standard error, root mean square error, percent bias) to assess the adequacy of the model results.
- A one-month comparison is potentially too short of a comparison and calibration period.
- No validation period (independent comparison of observed and simulated results without calibrating input parameters) was included.
- No winter data is used for calibration for water level and tide level prediction, which may limit the accuracy of the model for this period.

In-field verification using a conservative tracer study is proposed to confirm model predictions and potential model input revisions to improve model simulations of the plume and receiving water environments (Addendum 4.0).

- Observed water temperature data were not available as inputs for the winter scenario model, and no rationale is provided on how these temperatures were estimated (Appendix 4.2). Salinity for the winter scenario was setup based on May and June 2019 sampling results with no explanation on how this would be expected to be constant and applicable to the winter scenario.
- Section 4.2 and Appendix 4.2 discussed that due to the lower salinity in the proposed effluent the lower density plume is estimated to be buoyant within the marine water column.
- The calibration process description indicates how input values were selected for the various far-field model components (spectral wave and hydrodynamic) (Appendix 4.2). No quantitative results are provided on calibration input parameter range of values and whether finalized parameter values were reasonable/realistic.

Discharge Quality and Quantity

In-Mill Improvements

- In-mill non-contact cooling towers are proposed to be installed in conjunction with the ETF Project to reduce water usage requirements during the summer months of approximately 5,000 m³/day (Section 3.2; Addendum 1). The ETF is designed considering the cooling tower water-use reductions and therefore should be in operation prior to the ETF. There is no commitment provided in the Focus Report that this project will occur prior to start of ETF operation.
- The ETF has a performance guarantee for effluent quality based on design input criteria, including a maximum daily total flow volume of 85,000 m³ (Appendix 2.4). There is discussion provided that peak hourly flow rates, etc. may exceed the proposed maximum daily flow rate and that the system will be designed to handle those higher peak hourly flows. Appendix 2.4 indicates lab bench-scale testing was conducted that estimated the system should be able to handle a maximum daily total flow volume of 90,000 m³. The 85,000 m³/day is the maximum flow volume evaluated in the RWS (Appendix 4.2). No discussion is provided on whether if the total maximum daily flow rate is exceeded how the discharge quality will be maintained.
- Within the existing facility industrial approval there is a January 2020 BHETF influent quality target of Chemical Oxygen Demand (COD) concentrations being less than 950 mg/L with an accompanying value of 2x1,900 mg/L that triggers an investigation and subsequent reporting to the Department (Addendum 2). The Focus Report

discusses that daily peak COD values will continue to be investigated and reported that are 2x1,900 mg/L as part of the Project. The above COD influent quality target to the mill treatment facility was developed to improve in-mill operation and reduce black liquor spills within the plant. As this COD influent target has led to improved in-mill improvements that have subsequently improved effluent quality, the continuation and lowering of this target could lead to further in-mill improvements and improved treated effluent quality.

- An O₂ delignification project is proposed to be developed as a separate project to improve effluent quality from in-mill processes, which would subsequently improve ETF effluent quality, particularly for Absorbable Oxygen Halides (AOX), COD, 5-day Biochemical Oxygen Demand (BOD₅) and colour (Appendix 2.4; Addendum 1). Additional justification that could be applied for installing the O₂ delignification project as soon as feasible would be to further reduce BOD₅, COD and colour loading into the Northumberland Strait.
 - Martel et al. (2017) identified that treating pulp and paper effluent having a BOD₅ content of less than 20 mg/L, based on assessment of 81 effluent samples from 20 Canadian mills including 8 Kraft mills, reduced the likelihood of an effect on fish reproduction. The performance guarantee for the existing system predicts an average BOD₅ content of less than 25 mg/L (Appendix 2.4). Further reductions to BOD₅ and COD loading from the ETF would potentially increase the likelihood of no adverse effect on fish reproduction.
 - The Health Canada 1979 (reprinted 1995) document referenced in the Focus Report is used to support the statement a minimum colour level of 15 True Colour Units (TCU) value can be detected by the human eye and that the estimated discharge plume mixing zone will not be distinguishable to the human eye when it reaches the water surface (Appendix 4.2). The effluent is estimated to be at 15 TCU at 5 m from the diffuser discharge site for the slack tide scenario (B) and even lower by the surface (Appendix 4.2). When the plume reaches the water surface at approximately 20 m, based on the near-field RWS Scenario B dilution ratio of 1:100.1, it would be estimated to be 7.5 TCU (Appendix 7.3) with a surrounding background colour estimated to be 4.5 TCU (Appendix 4.2). The Health Canada (1995) reference also states that in larger bodies of water (e.g., bathtubs) the human eye can detect 5 TCU as visible colour. Given that the Northumberland Strait is a large body of water, the rationale provided that a 15 TCU colour level would not be discernable is questionable, based on additional information provided in the Health Canada reference document. The plume should not be visible to the human eye, which is a typical design practice for establishing the mixing zone (CCME Technical Supplement 3, Canada-wide Strategy for the Management of Municipal Wastewater Effluent [2008]). The mixing zone area for colour to reach the background value of 4.5 TCU is predicted for Scenario B in the RWS to be less than 200 m. Typically, mixing zone areas are 100 m or less in area and is proposed as a boundary limit within the Focus Report (Addendum 3.0).

Effluent Treatment Facility

Design

- A spill basin is proposed to capture out of normal range mill effluent and tank spills, leaks and releases prior to it entering the ETF. The spill basin has a design storage volume of 35,000 m³ and is evaluated based on mill daily discharge volumes to be

able to store 10 to 13 hours of flow when in an empty condition. The influent piping and sump pumps will be located within the bottom of the basin and during winter months are proposed to be maintained using a warm effluent recirculation loop. The storage volume is compared against other Canadian mills to indicate the adequacy of the sizing (Appendix 3.4). The information provided does not discuss the potential to capture a dangerous goods spill event and indicate it is sufficiently sized to handle the largest volume expected to be diverted (e.g., largest tank volume). It is unclear on whether the spill basin will be maintained in an empty state following an upset event occurring and how quickly it will be emptied to handle a subsequent event. There is no discussion of the warm effluent recirculation loop and potential issues with managing non-compatible liquids that may be diverted to the spill basin. There are potential risks for an overflow event from the basin or inability to manage two upset events in sequence via the proposed spill basin and its planned management.

- The proposed spill basin will be constructed as an earthen structure with a 1.9 mm thick HDPE liner placed on the surface. A ramp is proposed to be in the basin to allow access for clean out (Appendix 3.4). There is no discussion on how the ramp will be constructed and maintained to allow equipment access and protect the HDPE liner. There is no discussion provided on how the exposed HDPE liner will be managed and protected to prevent inadvertent punctures or tears without a protective top layer. There is no discussion of whether secondary containment and/or a leak detection system will be installed as part of the spill basin design to minimize the potential for spills, leaks or releases of dangerous goods that could migrate to local surface water and groundwater resources.
- The ETF influent was characterized using comprehensive physical and chemical analysis of two samples collected at Point A (2018 and 2019) (Appendix 2.3). A number of additional parameters (COD, TSS, pH and BOD₅) were sampled more frequently (daily or sub-weekly). This information aligns with the influent quality information requested in my EARD review comments but is potentially inadequate with respect to sample size and representing seasonal changes. No rationale is provided to support why the two comprehensive samples are sufficient to characterize the raw influent to the ETF to be used to identify potential COPCs and support ETF design. No discussion is provided on whether there would be expected to be seasonal changes in ETF influent and what expected changes would potentially occur due to incoming wood type changes (e.g., hardwood vs. softwood).

Discharge & Mixing Zone

- The RWS assessment (Appendix 4.2), marine environment impact assessment (Appendix 7.3) and HHRA problem formulation (Appendix 9.2) used the treated effluent water quality results from a minimum of two samples collected at the existing BHETF discharge point (Point C) in 2019 to represent expected effluent quality discharged from the ETF. Daily samples were collected for TSS, TP, TN, colour and pH, and BOD₅ and COD samples were collected three times per week. Metals and dioxins & furans were sampled once per year. The effluent quality data aligns with the requested characterization data in my EARD review comments but is potentially insufficient as it relies predominantly on the existing BHETF discharge quality and a limited sample number for a number of COPCs. Appendix 2.3 for in-text tables presents 'ND' instead of actual reportable detection limit for parameters, which limits review of whether reportable detection limits are below applicable guideline criteria values. No rationale is provided on why analysis of two samples collected at Point C is sufficient to characterize a number of COPCs (Appendix 2.3).

- The RWS near-field (CORMIX) and far-field (MIKE21) models were revised from the EARD for the Focus Report, including inclusion of observed data for model setup, to estimate the ETF discharge plume dynamics in Caribou Harbour (Appendix 4.2). The far-field model did not incorporate outputs from the near-field model and simulated effluent discharge conservatively as a single point instead a three-port diffusor. As requested in the Focus Report Terms of Reference and my EARD review comments two scenarios were simulated using observed data measurements: July 2019 (summer/warm water conditions) and February 2019 (ice-cover conditions). The far-field model estimated that no effluent discharge buildup would occur along local shorelines and within basins.
- The near-field model simulated the three-port diffusor for the following three scenarios during summer receiving water conditions (Appendix 4.2), representing different flow rates, effluent discharge concentrations and receiving water conditions. The number of parameters simulated using the model was increased to include cadmium, total dioxins and furans, phenanthrene (a PAH), total resin acids, total fatty acids and total pulp and paper phenols and estimated to not react, settle or degrade within the receiving water environment as a conservative approach. The addition of potential COPCs aligns with what was requested in my EARD review comments. The results were evaluated using a proposed 100 m mixing zone boundary limit, based on the CCME technical standard (2009) and Atlantic Canada Wastewater Guidelines Manual (2006). Colour was the only simulated parameter for Scenario B (high flow, low concentration, slack tide, summer discharge) to not be at background levels at the 100 m boundary limit (5.1 vs 4.5 TCU background), and is estimated to be at background in less prior to 200 m from the diffusor location.
- To support RWS model output assessment for the proposed ETF, a far-field model (MIKE21) was developed to estimate the effluent plume for the BHETF at Point D (Appendix 4.2). The model was setup to simulate a 30-day period representing July 2016 and estimated the effluent to be highly constrained by the Pictou Road channel and remain concentrated along south shoreline prior to discharge to the Northumberland Strait with an approximate dilution factor of 1:10.
- A number of the parameters identified in the HHRA screening process were not input into the RWS near-field model to specifically assess dilution and mixing at the discharge point (Appendix 4.2), and instead were assessed using output dilution ratios for the BHETF discharge at Point C (Appendix 9.2). Additionally, bench-scale testing and assessment used for the ETF design basis did not include parameters initially screened by the HHRA problem formulation (e.g., manganese, mercury, guaiacol, catechol, ethylene dibromide and cadmium) (Appendix 2.4).
- Total nitrogen (TN) concentration in the ETF discharge was revised from 3 to 6 mg N/L for the RWS in the EARD and Focus Report. The rationale provided was that the Veolia lab treatability tests had a TN discharge concentration of 5 mg N/L, which was considered lower than what would be expected from the proposed ETF. Therefore, the TN discharge concentration was increased to 6 mg N/L (Addendum 2.0; Appendix 2.4). The 6 mg N/L value is potentially sufficiently conservative for use in the RWS assessment.
- The marine environment impact assessment evaluated dilution of COPCs using baseline median water quality samples, BHETF Point C maximum concentrations, comparison of values to CCME marine water quality guidelines for protection of aquatic life and dilution ratios from the RWS near-field model for the slack tide Scenario B (Table 4-4, Appendix 7.3). This assessment estimated that the majority

of COPCs would be mixed sufficiently to match background conditions within 5 m or less with several parameters (manganese, total nitrogen) being completely mixed within 50 m. The estimation that the aluminum concentration within the discharge plume would be equivalent to background within <2 m is an underestimate given the input value was 2,330 µg Al/L. The colour mixing zone area is predicted to be less than 200 m for Scenario B in the RWS Appendix 4.2 and not approximately 100 m as discussed in the marine environmental impact assessment written sections (Appendix 7.3) and Focus Report (Section 1.0). Based on the estimated discharge concentration and predicted dilution ratios, two of the assessed metals, aluminum and manganese, would require dilution ratios that exceed 1:100 to reach background concentrations.

- The HHRA Problem Formulation (Appendix 9.2) screened a number of parameters potentially present in the ETF discharge (select metals, phenols, volatile organic compounds, polyaromatic hydrocarbons, dioxins & furans) that are proposed to be assessed further in the final HHRA to be completed in the spring of 2020 (Section 9.1). Step #1 of the screening process used existing maximum ETF discharge (Point C) results from up to 2 effluent samples in comparison to median background water quality results from the diffuser discharge area (up to 14 samples) (Appendix 9.2). Parameters were also flagged if the Point C lab reportable detection limit exceeded the background median concentration. The rationale for this approach was that discharge from the new ETF would be similar in quality to that from the existing BHETF.
- Evaluation of benthic interactions from the plume were not conducted as the RWS predicted the discharge plume would not interact with the ocean floor creating scour and re-suspension (Addendum 3.0; Appendix 4.2; Appendix 7.3). The sediment transport modeling exercise (Appendix 4.3) applied a simplified model (Stokes Law) using particle size distributions from two existing pulp and paper mills with slack tide current speeds to estimate how long particles would take to settle out to the seabed. Suspended particles are conservatively estimated to not degrade within the water column. This assessment aligns with the requested assessment of impacts on the benthic environment in my EARD review comments. The estimation method predicts no sediment accretion from the Project; however, the following issues are identified:
 - No rationale is provided as to why this settling assessment was completed using Stokes Law calculations instead of estimating using the near-field CORMIX model, which does have a sediment transport module (<http://www.cormix.info/cormix-gts.php>) and/or within the far-field MIKE 21 model.
 - No rationale is provided on whether the use of horizontal low current speeds is adequately conservative to estimate suspended solids settling times given the complex currents modeled within the Northumberland Strait conducted using the far-field and near-field models.
 - No follow-up monitoring is proposed to confirm the particle size distribution of the ETF discharge matches the predicted sediment transport processes. Although, operational sediment monitoring in support of the PPER requirements is proposed to be implemented (Appendix 7.4).
 - A general statement is provided indicating that the suspended particles are organic and biodegradable (Appendix 4.3). These particles remain after biological treatment and it is questionable as to the level of biodegradability within the receiving water environment and subsequently would accrete in

quiet areas in the receiving water environment.

- The PPER monitoring discharge criteria, RWS inputs (Appendix 4.2), marine environmental impact assessment (Appendix 7.3) and HHRA problem formulation (Appendix 9.2) identify a number of COPCs related to the ETF discharge. The EARD and Focus Report propose discharge criteria following the PPER requirements and existing COD influent target (Industrial Approval).

Operation

- To support verification of the near-field and far-field modeling results, an in-field plume delineation study is proposed using a conservative tracer with tracking to the 1:1,000 dilution limit, including plans to update the RWS models as required (Addendum 4.0).
- The estimated mixing zone is expected to be less than 1% of the initial effluent concentration in less than 100 m of the diffusor port and not trigger PPER requirements for a fish community and benthic invertebrate community studies as part of an Environmental Effects Monitoring (EEM) program (Section 7.4; Appendix 4.2). These studies are proposed to be conducted as part of the first EEM cycle and subsequent EARD follow-up monitoring. The details of what would be expected for this follow-up EEM program are discussed further in Appendix G of the EARD, including deployment of caged bivalves within near-field and far-field plume areas, and an appropriate reference site. Toxicity testing using lobster larvae and herring embryos is proposed using treated effluent for acute and various sublethal effects. Fish tissue testing for dioxins and furans is not expected to be conducted following the start of operation as it is not a PPER EEM monitoring requirement given the size of the mixing zone.

Groundwater Quantity & Quality

- Groundwater levels are proposed to be monitored during the land-based pipeline construction phase (Section 5.2), but no details are provided on how this monitoring will be conducted (e.g., piezometers, monitoring wells). In addition, the existing groundwater monitoring well network within the NPNS site is indicated to be continued to be used before and after ETF construction with no discussion of whether additional monitoring wells will be installed to expand the network around the proposed ETF works. Additional monitoring wells at the NPNS site and along the land-based section of the pipeline route may be required to adequately assess groundwater quality and elevations, and identify potential project impacts, including from inadvertent releases (e.g., extents of spills or leaks).

Recommendations

Design/Planning Issues

Surface Water Quality and Quantity (Marine)

Water Quantity & Sediment

- Additional information on the adequacy of the observed dataset length and seasonality used for far-field model calibration should be provided, including discussion of whether it is sufficient for the modeling exercise. Additional information should be provided on why the model was not validated using an independent observed dataset. Statistical methods should be used to assess goodness of fit for the model results to the calibration observed data. If the additional model assessment identifies that the model calibration observed dataset is insufficient to represent receiving water conditions, including seasonal variation, additional model calibration and validation activities should be conducted. The revised model results

should be assessed to identify if there are potential changes to the predicted environmental effects. Assessment should be also be included within respect to the sediment transport modeling and its adequacy in predicting long-term contaminant transport and accretion within receiving water environment, particularly for the sediment transport model and its results. Additional mitigation measures and/or project changes should be proposed to address the changes in predicted effects. The additional assessment and its results should be submitted to the Department and appropriate Federal Government agencies for review and consideration of acceptability prior to commencement of construction. If project changes and/or mitigation measures are proposed as part of the assessment they should be implemented when considered acceptable by the Department.

Effluent Treatment Facility Operation

Design

- To confirm that the ETF influent quality (Point A) has been adequately characterized by the limited sampling for a number of COPCs in the Focus Report, additional influent quality sampling and comprehensive analysis should be conducted. This monitoring program should be adequate to characterize ETF influent with incorporation of expected seasonal and incoming wood type changes. The results should be compared to the Focus Report ETF influent quality and assessed to identify if there are potential changes to the design influent quality. Additional mitigation measures and/or project changes should be proposed to address the changes in influent quality, if required. The proposed monitoring program should be submitted to the Department for review and consideration of acceptability. The monitoring program results and recommendations for mitigation measures and/or project changes should be submitted to the Department for review prior to finalization of detailed design. If project changes and/or mitigation measures are proposed as part of the additional assessment they should be implemented when considered acceptable by the Department.

Discharge & Mixing Zone

- Testing (e.g., bench-scale) and/or detailed treatability assessments should be conducted on the final HHRA, baseline tissue sampling and baseline marine water quality identified COPCs within the ETF influent to confirm the observed treated discharge concentrations at Point C from the existing BHETF adequately represent the expected effluent quality from the ETF. The assessment should include determining whether additional mitigation measures and/or project changes are required to maintain no significant effects from the Project. The assessment should incorporate the results of the above requested additional ETF influent quality assessment results. The assessment results and recommended modified mitigation plans and/or project changes should be submitted to the Department and appropriate Federal Government agencies for review. The Proponent should implement the recommended mitigation measures and project changes once they are considered acceptable by the Department.

Operational Issues/Other Permitting Processes

The following recommendations could be potentially developed as conditions in support of applicable Department of Environment and other jurisdictional permits, approvals and authorizations for the Project:

Surface Water Quality (Freshwater)

Pipeline

Design

- The high-level engineering evaluation of whether secondary containment is required for the pipeline inadequately assesses the following design features in relation to preventing a leak, spill or release of treated effluent:
 - Resistance of the pipeline flanged connections to fatigue over the operational lifespan and potential for leaks?
 - Resiliency of the pipeline and its connection points to pipeline movement due to external forces (e.g., adjacent road work activities, accidental equipment strikes, frost heave)?

The Proponent should provide additional information to confirm that the above listed single-wall HDPE pipeline design features are enough to reduce the likelihood of a leak, spill or release. This information should then be used in combination with the pipeline design and operation details to develop a quantitative probability-based risk assessment of the full pipeline system (both marine and land-based) to identify the system components that are most probable to fail. The results of the evaluation should be submitted to the Department for review.

Based on the results of the risk assessment, pipeline design, mitigation measures and monitoring requirements, including leak detection methods, should be re-evaluated and potentially revised to minimize the risk of a pipeline leak, spill or release, particularly within the Town of Pictou water supply area.

- The details provided for the potential internal and external pipeline leak detection methods are inadequate to confirm a leak, spill or release from the proposed HDPE pipeline within the land-based pipeline section will be detected, including within the Town of Pictou water supply area. Considering the results of pipeline leak, spill and release risk assessment recommended above, a leak detection system should be designed for expected operating conditions and section types (marine/land-based). The system should consider additional or alternative leak detection methods within the Town of Pictou water supply area to improve measurement sensitivity and response times to a leak, spill or release. An overview of the leak detection system design, including details on sensitivity and redundancy, and the supporting monitoring plan should be submitted to the Department for review. The Proponent should implement the plan once it is considered acceptable by the Department.

Construction

- The erosion and sediment control plan proposed to be developed in the Focus Report and EARD should be completed. The plan should be comprehensive in minimizing erosion and sediment loading from pipeline trenching, pipe jacking, watercourse and wetland alterations, and dewatering and submitted to the Department for review. The Proponent should implement the plan once it is considered acceptable by the Department.
- As part of the pipeline construction Environmental Protection Plan (EPP), mitigation measures should be developed to manage trench dewatering discharge, as initially outlined in Appendix 0.0. These measures should consider minimizing erosion, scour and sediment loading, and monitoring requirements. Monitoring should be conducted when dewatering discharge is being received by a surface water resource regardless of whether a storm event has occurred. Monitoring parameters should

include, but not be limited to, TSS, turbidity and pH. The plan should provide a communication/reporting plan for sharing monitoring results with the Department that exceed criteria and what actions were taken (e.g., within 3 months of the end of construction). The measures and monitoring requirements should be submitted to Department staff for review. The Proponent should implement the plan once it is considered acceptable by the Department.

- Mitigation planning to support trenchless methods as proposed in Appendix 0.0 should be done to support pipe jacking/micro-tunneling activities, including monitoring and contingency planning to manage potential inadvertent releases. The plan could potentially be part of the pipeline construction EPP and should be submitted to the Department for review. The Proponent should implement the plan once it is considered acceptable by the Department.
- Watercourse and wetland alteration notifications/approvals should be developed and applied for by the Proponent for the watercourse and wetland crossing works as indicated in the Focus Report (Section 3.5). These notification/approval applications should be developed in consultation with and submitted to the Department for consideration of acceptability.

Surface Water Quality and Quantity (Marine)

Receiving Water Environment (Baseline)

Water Quality

- The limited number and seasonal marine water quality analysis results to characterize baseline conditions is inadequate, additional baseline marine water quality monitoring should be conducted in the area of the proposed diffuser location. The suite of parameters to be analysed should match those in the laboratory results in Appendix 2.3. A monitoring plan should be developed and designed to collect a sufficient number of samples to characterize baseline marine water quality that considers seasonal changes and appropriate water sample depths occurring prior to the commencement of pipeline and diffuser construction. The plan should be developed in consultation with the Department and appropriate Federal Government agencies. The Proponent should implement the plan once it is considered acceptable by the Department.
- The additional marine water quality results should be assessed to confirm if they have substantially changed from the initial baseline dataset. Results should be compared against applicable guideline criteria, such as CCME marine water quality guidelines for protection of aquatic life. The appropriate results should be incorporated into the RWS models and HHRA and re-assessed to confirm whether the predicted environmental effects have substantially changed and proposed mitigation measures are adequate. The marine water quality results and planned revised assessments should be submitted to the Department and appropriate Federal Government agencies for review and confirmation of acceptability. Based on the revised assessments, the Proponent should make any necessary modifications to mitigation plans and/or changes to Project operations to prevent unacceptable environmental effects. The revised assessment results and recommended modified mitigation plans and project changes should be submitted to the Department and appropriate Federal Government agencies for review. The Proponent should implement the recommended mitigation measures and project changes once they are considered acceptable by the Department.

Sediment

- The sediment quality exceedances observed in the Pictou Harbour for a couple of parameters (cadmium and total PAHs) for the CEPA disposal at sea criteria potentially require the excavated material to be sent for land-based disposal. Prior to the commencement of pipeline construction, the Proponent should develop and submit a marine excavation material management plan that includes approvals/agreements allowing excavated materials to be transported and disposed of at a licensed facility. The plan should also include mitigation measures to reduce sediment transport within the water column and outside the area of the works. The plan should include monitoring techniques beyond the proposed visual methods, including consideration of measurement-based monitoring with action criteria/levels for triggering implementation of mitigation measures or stopping dredging/excavation activities. The plan should include communication/reporting of criteria exceedances and follow-up actions (e.g., summary report 3-months following completion of construction). The plan should be submitted to the Department and appropriate Federal Government agencies for review. The Proponent should implement the recommended plan once it is considered acceptable by the Department.

Tissue

- In combination with the additional baseline tissue sampling and assessment discussed in the following section, the lobster, rock crab and quahog tissue quality results should be re-assessed with inclusion of approximate locations of sample sites, comparison to other applicable jurisdiction guidelines and assessment and interpretation of results. The jurisdictional guideline comparison should include discussion of the identified HHRA COPCs identified in the screening process. Rationale should be provided as to the adequacy of the tissue sample size for each species. The results assessment should include discussion of results with respect to sample collection within an environment that is currently exposed to existing treated pulp and paper effluent discharge, including potential comparison to applicable reference tissue results. The results of the assessment should identify whether additional sampling should be conducted to expand the baseline dataset and potentially capture an appropriate reference site. The results of the re-assessment should be submitted to the Department and relevant Federal Government agencies for review and consideration of acceptability. If additional monitoring and assessment is recommended, it should be implemented prior to the commencement of marine construction activities.
- The proposed additional baseline tissue sampling, analysis and assessment of mollusc and fish species for analysis for metals, phenols, dioxins & furans and other COPCs should be conducted prior to the commencement of marine pipeline and diffuser construction. Reference samples should be considered for marine areas within the Northumberland Strait that would be expected to not be influenced by existing treated pulp and paper effluent discharge. Locations of mollusc and fish sample sites should be documented and assessed with respect to the existing and proposed treated effluent discharge locations. Analysis of tissue from applicable fish muscle and organs should be considered and conducted if appropriate. Analysis of various forms of arsenic should be considered to support the hypothesis of the majority of arsenic compounds in tissues being organic. Additional information should be provided including comparison to other relevant jurisdiction guidelines, including marine organism toxicology/health-based tissue guidelines, as conducted for other media (e.g., fresh and marine surface waters, groundwater). The jurisdictional guideline comparison should include discussion of the identified HHRA

COPCs identified in the screening process. This additional baseline tissue assessment could potentially be combined with the re-assessment of the previously sampled tissue results discussed above. The additional assessment results should be submitted to the Department and appropriate Federal Government agencies for review and consideration of acceptability.

- COPCs identified by the baseline tissue sampling program should be compared against Project COPCs and if not included be subsequently added with appropriate environmental effects and risk assessments conducted to confirm whether there would be potential environmental effects. If changes in effects are predicted appropriate mitigation measures and/or project changes to reduce those effects should be developed. Monitoring programs should be subsequently updated to include these identified COPCs, including influent and effluent sampling, if appropriate. The results and recommendations of the additional COPC assessment should be submitted to the Department and applicable Federal Government agencies for review prior to the finalization of detailed design. The recommendations should be implemented when considered acceptable by the Department.

Fish and Fish Habitat & Benthic Invertebrate Communities

- Although not required by PPER based on expected effluent plume mixing limit (~100 m), baseline fish community and benthic invertebrate community studies that follow PPER design requirements should be developed and submitted for review and consideration of acceptability to the Department and appropriate Federal Government agencies prior to the commencement of construction. Additional benthic invertebrate field work is proposed to be conducted in the fall of 2019 and plankton studies in the summer of 2019 at the proposed diffuser area (Section 7.3). These studies would provide potentially valuable baseline data to support future project EEM studies and confirmation of estimated Project effects.

Discharge Quality and Quantity In-Mill Improvements

- The in-mill cooling towers should be installed and be operational prior to the ETF commencing operation to ensure maximum peak flow rates are reduced and treatment processes function as proposed in the Focus Report.
- The ETF performance guarantee effluent maximum daily flow volume of 85,000 m³ should be set as a maximum daily ETF influent volume to ensure COPCs are adequately treated prior to discharge.
- The influent COD concentration target of less than 950 mg/L to be met by January 2020 as part of the existing facility Industrial Approval should continue to be applied and potentially lowered further to continue to improve ETF discharge quality. A new target could be applied to effluent quality instead of influent quality as mean monthly and daily maximum values, which would be align with the discharge criteria in the Federal PPER program.
- In support of further COD reductions within the mill to assist with meeting a revised effluent target, as well as reducing BOD₅, AOX and colour ETF discharge concentrations the proposed O₂ delignification project to be implemented at a later unknown date, should instead be implemented as soon as feasible to further improve discharge quality and increase the likelihood of the it having no adverse effect on fish reproduction.

Effluent Treatment Facility Operation Design

- The spill basin detailed design should follow the liner system requirements in the Nova Scotia Municipal Solid Waste Landfill Guidelines (2004) to provide a robust liner system to store spills, leaks and releases within the mill, including dangerous goods. The design should consider the proposed equipment access and clean out methods used to manage the spill basin. A design overview should be submitted to the Department for review prior to the commencement of construction. The design should be implemented when considered acceptable by the Department.
- To maintain operational integrity of the spill basin and ensure adequate storage volume to handle potential spills, a spill basin management plan should be developed. The plan should include managing different types of materials, sequential spills/leaks/releases, clean-out and liquid/solid removal procedures for the different types of collected materials, and appropriate final disposal procedures that observe applicable provincial and federal regulations. The plan should be submitted to the Department and appropriate Federal Government agencies for review prior to the commencement of construction. The plan should be implemented following acceptance by the Department.

Discharge & Mixing Zone

- Monthly average and daily maximum discharge criteria should be potentially developed for the Project to mitigate potential environmental effects. The development of the criteria should consider RWS model inputs, marine environmental impact assessment results, current and proposed Federal PPER discharge criteria and the results of the HHRA to be completed in the spring of 2020.
- The 100 m mixing zone boundary limit proposed in the RWS (Appendix 4.2) should be used as the basis to evaluate project effects as part of the operational EEM study programs. In support of the mixing zone boundary, the zone should not be visible (e.g., colour).

Operation

- An operational phase water quality monitoring plan should be developed to assess discharge mixing zone quality at appropriate distances in relation to the discharge plume dimensions to confirm dilution and mixing is occurring as predicted. The monitoring parameters should include the full list of COPCs identified through the HHRA, baseline tissue sampling and baseline marine water quality. The monitoring program should include temperature profiles within the plume to assess dynamics and should align with requirements for the environmental effects monitoring program in support of the PPER requirement. Sampling frequency and timing should account for seasonal changes and applicable ocean current conditions. The plan should be developed in collaboration with the Department and appropriate Federal Government agencies and submitted for review prior to the commencement of operation. Once considered acceptable by the Department the plan should be implemented and results reported to the Department.
- An operational phase sediment monitoring plan should be developed to assess sediment deposition and quality at appropriate distances in relation to the discharge plume dimensions to confirm accretion is not occurring. Particle size distribution sampling of the ETF discharge should be conducted to confirm it is similar to sediment transport model inputs. This plan could be developed as a combined operation phase marine water quality and sediment monitoring program.
- The proposed near and far field model verification activities in Addendum 4.0, should be develop as a in-field plume delineation monitoring program. The program should include use of a conservative tracer with appropriate measurement locations to

adequately delineate the spatial extents of the ETF discharge plume. The program should be submitted to the Department and appropriate Federal Government agencies for review prior to the commencement of operation. Once considered acceptable by the Department the plan should be implemented and its results submitted.

- The proposed EEM study (Section 7.4 [Focus Report] and Appendix G [EARD]) should be developed and executed as proposed, including fish community and benthic invertebrate community studies. Due to the importance of recreational, commercial and indigenous fisheries, aquaculture and recreational water uses within the Northumberland Strait, identification of several COPCs, and that the final HHRA is not yet completed, additional EEM monitoring studies of fish communities and benthic invertebrate communities beyond the first EEM cycle and PPER requirements should be developed and conducted. An EEM program should be developed that includes:
 - the proposed studies in the EARD and Focus Report, including deployment of caged bivalves within the plume area and applicable reference sites, and full-strength ETF effluent acute and chronic toxicity testing
 - ETF influent and effluent quality monitoring for a comprehensive suite of parameters that includes the COPCs
 - operation phase tissue testing for same species and suite of parameters as listed in Appendix 9.1 within the plume and applicable reference areas
 - consideration of acute and sub-lethal toxicity testing on fathead minnow, mummichog or equivalent fish species eggs as per test methods in Martel et al. (2017) study to confirm no adverse effects of full-strength ETF effluent
 - fish community and benthic invertebrate community studies following PPER requirements

The above program should be developed in collaboration with the Department and appropriate Federal Government agencies and submitted for review prior to the commencement of operation. The plan could potentially follow a three year cycle to coincide with the Federal EEM program. Once considered acceptable by the Department, the program should be implemented and its results provided to the Department for review.

The results of the first EEM cycle should be submitted to the Department and appropriate Federal Government agencies for review. The results should be assessed with consideration of whether mitigation measures or project changes are required to reduce observed effects (if applicable), and potential requirements for the second EEM cycle. Once considered acceptable by the Department, the second EEM cycle program should be implemented and its results provided to the Department for review.

Groundwater Quantity & Quality

- The groundwater and surface water monitoring plan to support the existing Industrial Approval requirements should be expanded to include monitoring wells and stations near the site of the ETF works and the proposed land-based pipeline route. The locations should be selected to adequately monitor groundwater quality and levels, and surface water quality with a focus along the pipeline route on potentially intercepting spills, leaks or releases. The monitoring parameters should be

expanded to include the COPCs identified in the final HHRA. The revised plan should be submitted for review to the Department prior to the commencement of operation. Once considered acceptable by the Department, the plan should be implemented.

References

Martel, P.H., B.I. O'Connor, T.G. Kovacs, M.R. van den Heuvel, J.L. Parrott, M.E. McMaster, D.L. MacLatchy, G.J. Van Der Kraak and L.M. Hewitt. 2017. The Relationship between Organic Loading and Effects on Fish Reproduction for Pulp Mill Effluents across Canada. *Environmental Science & Technology*. 51: 3499-3507

Date: November 15, 2019

To: Environmental Assessment Officer, Environmental Assessment Branch
Cc:

From: Wetland Specialist, Water Resources Management Unit, Sustainability and Applied Sciences

Subject: Wetlands
Northern Pulp Replacement Effluent Treatment Facility

Introduction

Concerns following review of the EARD for the proposed project included uncertainty around the ability of the proponent to construct the effluent pipeline as presented. At that time, no formal wetland delineations had been conducted along the land-based pipeline route from the Pictou Causeway to Caribou marine pipeline connection. It was also noted that other natural resource field surveys were also lacking along the pipeline route.

The addendum documents identify a revised land-based portion of proposed effluent pipeline includes approximately 1 km of pipeline within the existing NPNS facility and approximately 9 km of pipeline to be constructed within the existing Highway 106 Right-of-Way, from Pictou causeway to Caribou, where it will join the marine pipeline section. As per the terms of the focus report, field delineation and functional assessment of wetlands that will be impacted within the ROW were conducted and reported in the revised assessment of the project.

Based on review of the addendum documents and EARD submitted by the proponent, I provide the following comments:

Planning/Design Issues

ETF Facility

- No changes to the predicted impacts to wetlands on NPNS portion of the project. WL1 and WL2 will be impacted by construction of components of the ETF.

Land-based Pipeline

- The re-alignment has shifted the proposed pipeline route to the “outermost eastern portion of the ROW” and will be installed within undeveloped/unmaintained areas.

- A basic wetland baseline study, including, field delineations and function assessment of wetlands within the Highway 106 ROW has been completed. Descriptions of wetland conditions and a summary of key wetland function were provided. Additional data may be required to address monitoring requirements based on final design of pipeline route and detail crossing information. This could include additional hydrology and/or shallow groundwater measurements to confirm post-construction changes to wetland characteristics and functions of any remnant/adjacent wetland.
- Basic flora/fauna baseline surveys have been completed within the Right of Way. Additional work may be required to further assess priority species, including avian species that have the potential for long term associations with wetland habitat along the pipeline route. Two wetlands along the proposed route have the potential to be considered as Wetlands of Special Significance based on an occurrence of a Species at Risk. Additional field surveys for wetland priority species and development of suitable mitigation plans will be required.
- Field delineations included identification of additional wetlands (WL13-B, WL5-E, WL19 and WL20) that were not previously identified through the preliminary assessment completed at the time of the EARD. As a result of re-alignment
 - Wetlands to the west of Highway 106 will no longer be directly impacted by construction activities.
 - The proponent intends to avoidance direct impact to wetlands outside of the existing ROW
 - The proponent intends to avoidance direct impact to WL3 (salt marsh)
- Descriptions of wetlands appear to be generally consistent with the information provided and are based on classes included in the Canadian Wetland Classification System and the NS Wetland Conservation Policy. Identification of key wetland functions was conducted via rapid assessment using the WESP-AC method. Assessments focused on portions of wetland within the ROW, but also considers surrounding area via desktop review and field observations. The WESP-AC outputs were not included in the Focus Report.
- It is anticipated that up to two hectares of wetland will be directly impacted as a result of land-based construction activities. This is based on the work area required to trench and install the pipeline. Impacts to individual wetlands are not proposed to permanently remove the entire wetlands but are limited to a small work area based.
- Installation of the pipeline will be conducted via trench and bury technique within wetlands and watercourses along the proposed route. Best management practices associated with pipeline construction to reduce the impact on wetlands have been identified and included in the addendum and, if the project is approved, should be included in site specific design and construction plans and related water resource approval applications:
 - Minimization of disturbance footprint in and around wetlands and promotion of protective buffers for wetlands and watercourses and priority species and their habitat. This should include identification of designated work/laydown areas

- and/or jacking pits.
 - Surface water control and management plans (ditch plugs, re-establishing drainage patterns, trench de-watering and water discharge)
 - Soil/vegetation management plans to separate and re-use suitable materials (wetland soils and vegetation/seed bank) to minimize permanent losses and facilitate rehabilitation.
 - Development of site-specific sediment and erosion control and environmental protection plans to minimize potential for water quality reductions
- If the project is approved, the proponent has committed to conducting post-construction monitoring and progressive rehabilitation further mitigate impacts to wetlands and changes in local hydrology patterns as a result of construction activities.

Marine Pipeline

- No direct impact to tidal wetlands anticipated as result of construction of the marine portion of the pipeline.
- Indirect impacts to coastal wetlands may occur as a result of sedimentation and water quality reductions during construction. Mitigations to minimize impacts during marine construction activities have been presented and should be included in development of project specific management plans and referenced in any approvals.
- Indirect impacts as a result of unintended releases of treated effluent to marine and coastal wetlands may occur as a result of equipment malfunction. This scenario should be addressed and included in the facilities operation management and project specific contingency plans. Marine environmental quality monitoring should be required to confirm effectiveness of the effluent treatment, assumptions made respecting the receiving water study and in compliance with relevant environmental guidelines and/or discharge criteria.

Operational Issues/Other Permitting Processes

ETF

- Given proximity of the spill basin to the remaining portion of WL2 and potential for interaction via operational upset and release into the environment, it will essential that the spill basin is constructed and operated in a manner to ensure overflow scenarios are prevented. Design and operational management of this component of the EFT should be prepared by a qualified Professional Engineer and accepted by NSE. If the project is approved, site specific operational management plans and contingency plans should be required to consider operational water levels in the basin (including winter maintenance and maximum capacity), suitability as a dual purpose spillway for effluent spillway and mill facility upset basin and the potential for flooding/storm surge.

- If the project is approved, wetland monitoring will be a requirement for WL2 (proposed partial wetland alteration) to determine indirect impact (if any) following construction of the ETF. Surface water and/or groundwater monitoring requirements associated with the existing pulp facility and/or as required in future monitoring plans can be used to support wetland monitoring. Wetland monitoring plans, at a minimum, should include details for assessing changes in wetland vegetation, wetland hydrology, soil substrates, and boundary conditions.

Land-based Pipeline

- Once operational, the pipeline represents a potential concern to wetlands through equipment malfunction and upset conditions leading to a loss of effluent to the environment. Proper design and installation of the pipe is integral to minimizing risk of malfunction. Pipeline design should consider best methods to be protective of sensitive areas, such as the wetlands associated with watercourses or areas within the water supply area. Additionally, overall quality of the treated mill effluent, operational/facility improvements in the mill and pipeline operational monitoring programs should be considered to maximize protection to the environment and reduction of potential risks associated with longevity of pipe joint sections, including land to marine sections, pipe thrust from freeze/thaw cycles, and adequate buoyancy protections.
- If the project is approved, surface water and groundwater monitoring should be conducted by the proponent to enhance proposed pipeline monitoring via automatic detection, particularly in relation to wetland, watercourses, areas of flow accumulations and within the water supply watershed boundaries, and general compliance with construction and operational management requirements.
- If the project is approved, the proponent has committed to monitoring the degree of wetland disturbance adjacent the proposed pipeline. This will be conducted through assessment of grade comparisons, changes in hydrology, water quality, changes in vegetation communities. Additional monitoring requirements may be required based on final, site specific pipeline design and crossing details. A detailed wetland management plan should be prepared and submitted to NSE prior to any construction activities.

Marine Pipeline

- Once operational, the marine pipeline has the potential to impact coastal wetlands via equipment malfunction. Impacts of a potential release can be reduced via effective treatment of effluent, careful preparation of operational management plans and rapid environmental/emergency response planning. The suitability of proposed monitoring of marine portion of the pipeline should be considered to maximize protection to the environment. Additional leak detection and compliance monitoring along marine sections of pipeline should be considered.

Other Observations

- The disturbance to wetlands as a result of construction activities can be mitigated through proper construction techniques and post-construction rehabilitation to re-establish wetland or wetland like functions within the existing disturbed habitats encountered along the proposed pipeline route. Ensuring that efficient and effective treatment of mill effluent and ensuring pipeline breaches are prevented, quickly detected and addressed appropriately will be essential to ensuring overall protection of the environment.
- If the project is approved, the proponent should be required to identify and pursue additional in-mill processes that will ultimately improve effluent quality and/or reduce the overall impact of the mill on the environment. This should include initiatives included in the review documents (i.e. water-cooling towers, O2 delignification) or other mill process that would be beneficial in improving overall mill effluent quality and/or effluent treatment quality.

Recommended Terms and Conditions:

- Prior to any construction, the proponent must obtain Wetland Alteration Approvals for any wetland directly altered by the proposed ETF and associated effluent pipeline.
- The proponent must develop a wetland monitoring plan, which shall include:
 - Details of baseline conditions before construction (including tree/vegetation clearing and grubbing) begins. This should include boundary conditions indicators of hydrology, water quality parameters and vegetation community.
 - Post-construction rehabilitation details and inclusion of adaptive management options to address final rehabilitation
 - How changes in hydrology of partially impacted wetlands will be monitored and proposed performance indicators
 - How changes in the vegetation community of wetlands will be monitored, especially regarding the proportions of wetland specific plants, invasive species and proposed performance indicators
 - How changes in water quality of the impacted wetlands will be monitored and proposed performance indicators
 - Re-assessment of priority species, if applicable
 - Maintenance requirements relating to the operation of the pipeline
- As per the wetland alteration approval(s), the proponent must develop a Wetland Compensation Plan. The Wetland Compensation Plan and associated reporting requirements must be developed to establish specific objectives intended to prevent the net loss of wetlands and functions in accordance with the Nova Scotia Wetland Conservation Policy, with a preference for compensation projects within the local watersheds, followed by compensation opportunities elsewhere in the province. Consultation with local stakeholders should also be considered.
- Prior to any construction, the proponent must develop project specific environmental

protection, surface water/groundwater management, sediment and erosion control and wildlife management plans to the satisfaction of NSE and other relevant regulatory authorities.

- Prior to operation, the proponent must develop operational management and contingency plans relating to optimal operation of the ETF and effluent pipeline.
- Results of baseline surveys for natural resources should be provided to NS Lands and Forestry for inclusion into relevant inventories. GIS data should be provided in the format preferred.
- Project operations shall be completed and rehabilitated as required by the Department.
- Re-vegetation of disturbed areas shall be limited to the use of native species, unless otherwise authorized in writing by the Department.



RECEIVED
MINISTER'S OFFICE

OCT 29 2019

October 21, 2019



NOVA SCOTIA ENVIRONMENT

Environmental Assessment Branch
Nova Scotia Environment
PO Box 442 Halifax Nova Scotia B3J 2P8

Re: Northern Pulp Nova Scotia Corporation - Focus Report for the Replacement Effluent Treatment Facility

Town of Pictou
40 Water Street
PO Box 640
Pictou, Nova Scotia
B0K 1H0

T 902.485.4372
F 902.485.8110

www.townofpictou.ca

Dear Minister Wilson,

The Caribou/ Pictou Source Water Protection Committee (SWPC) met on the evening of October 9, 2019 to receive updates and discuss issues associated with the source water supply. At this meeting, the SWPC supported the Town of Pictou's response, dated March 8, 2019 to the Department of Environment, regarding the February 7, 2019 environmental assessment documentation from Northern Pulp Nova Scotia for the replacement of their Effluent Treatment Facility.

The Town of Pictou Statement of Position March 8, 2019:

The Town of Pictou hereby informs the Nova Scotia Department of Environment that it can not support the Northern Pulp Nova Scotia plan for the Replacement Effluent Treatment Facility. Additional risk, however small, to the domestic water supply is unacceptable.

The plan creates additional risk to the Town water supply by the on-land portion of the proposed transmission pipe carrying treated effluent to Caribou Harbour.

The proposed on-land portion of the pipe carrying treated effluent to Caribou Harbour will cross both the Pictou wellfield, which is completely within the Town of Pictou boundaries, and, the Caribou wellfield which is situated completely within the boundaries of the Municipality of Pictou County. Both wellfields are located within the delineated boundary of the Caribou/Pictou Watershed protected area...

The Town has been granted Permits from the Province of Nova Scotia to draw approximately half of the Town's potable water from wells within the Caribou wellfield and the rest from the Pictou wellfield. As part of the permitting process, the Caribou/Pictou Source Water Protection Committee was formed, and the Pictou/Caribou Source Water Protection Plan was completed.

Residents of the Town of Pictou depend on the groundwater drawn from the Pictou/Caribou watershed for their drinking water. The Caribou and Pictou wellfields are the only viable sources of potable water and it would be safe to conclude that without this dependable source of water there could be no town. It is the Town's position that we can not be supportive of any activity that would add additional risk to our water supply regardless of the many references to 'insignificant' risk in the Environmental Registration Document. More specifically, we cannot support the planned construction of a pipe carrying the treated effluent containing 'residual contaminants' (Registration Document, Pg. 32) along TCH 106.

The SWPC thanks the Minister for the consultation process.

Respectfully submitted (on behalf of the Source Water Protection Committee):

Councillor Malcolm Houser, Chair of the Caribou/ Pictou Source Water Protection Committee

From: [Jim Ryan](#)
To: [Environment Assessment Web Account](#)
Subject: Northern Pulp Focus Report
Date: November 8, 2019 3:37:16 PM
Attachments: [NP Focus Report Submission November 2019- final.pdf](#)

**** EXTERNAL EMAIL / COURRIEL EXTERNE ****

Exercise caution when opening attachments or clicking on links / Faites preuve de prudence si vous ouvrez une pièce jointe ou cliquez sur un lien

Good afternoon!

Attached is the Town of Pictou response to the Northern Pulp Nova Scotia Focus Report for the Replacement Effluent Treatment Facility.

Jim Ryan
Mayor
Town of Pictou
40 Water Street
PO Box 640
Pictou, NS B0K 1H0



Town of Pictou

Response to

Northern Pulp Nova Scotia
Focus Report
Replacement Effluent Treatment Facility

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1. Re-Statement of the Town of Pictou Position
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 - A: Potential for Accidental Ground Water Contamination
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 - C: Other Concerns
4. Appendices

James Ryan, Mayor

1. Town of Pictou Re-Statement of Position:

The Town of Pictou hereby informs the Nova Scotia Department of Environment that it can not support the Northern Pulp Nova Scotia plan for the Replacement Effluent Treatment Facility. Additional risk, however small, to the Town's domestic water supply is unacceptable.

1. Context for Responding to the Focus Report:

The Town of Pictou submitted a formal response to the Northern Pulp Environmental Assessment Registration Document on March 8, 2019. In that response (Appendix A), the Town expressed significant concern in three areas:

- Potential for Accidental Groundwater contamination within the Pictou and Caribou Wellfields,
- Potential negative effects of changes in air emissions and odours associated with the burning of sludge at Abercrombie Point and the
- Potential for negative Economic effects during the construction period.

A number of managers and scientists within numerous Divisions of Nova Scotia Environment and other Provincial and Federal Departments also expressed positions in their responses to the Northern Pulp Nova Scotia EA Registration document that support the Town of Pictou's reasoning. Assessments and recommendations were also made within the Department memos regarding the ability to reduce the risks associated with the potential environmental impacts of the project.

The former NS Minister of Environment, Margaret Miller, in the *Terms of Reference For The Preparation of a Focus Report Regarding the Replacement Effluent Treatment Facility Project* recognized the Town of Pictou's water and air emission concerns.

2. Responses to Areas of Concern within the Focus Report:

******Note: Comments in this response should not be interpreted as to imply that there could be an acceptable plan to run the pipeline through the Town of Pictou Watershed.**

A. Potential for Accidental Ground Water Contamination

The modified route proposed for the on-land portion of the pipe carrying treated effluent to Caribou Harbour fails to address the previously stated concerns of the Town of Pictou. This plan continues to propose crossing the Pictou Watershed creating new risks to the groundwater supply. The following points identify items in the Focus Report that remain as concerns contributing to its' failure to meet the 'no additional risk' standard set by the Town.

- Moving the effluent pipe to the east side of Highway 106 and away from the shoulder does nothing to reduce risk to the Town water supply as it will remain within the watershed area.
- Thickening of the HDPE pipe to 67.7 mm from 53.8 mm does not address concerns of the Town or support recommendations by NSE Senior Surface Water Quality Specialist for the Water Management Unit regarding trench lining and/or secondary containment. (Appendix B, Page 7)
- Both trenching (Approximately 2.5 metres deep) and 'pipe jacking' can cause significant disturbance to soils and surface water along the pipeline route which could, in itself, lead to groundwater contamination in both the short and long term. (eg. Acid Rock Drainage (ARD), Appendix C, Page 8)
- The proposed fibre-Op monitoring for leakage is only being installed on that section of pipe from Pictou Town to Caribou Harbour (Focus Report, Page 62) and has not demonstrated the ability to detect leaks of less than 60L/Hr. What about smaller leaks buried 1.5 – 2.5 meters below surface?
- Preferred methods and standards of performance for the HDPE electrofusion and/or flange connectors in critical locations where the pipe moves from water to land or land to water have yet to be confirmed.
- The location of Vent approximately 1300 m from Caribou Harbour would place it very close to the watershed area. Despite the expectation of negative pressure (except when the pipe is "filling'), a collapse of the pipe beyond that point (land or water) could force the treated effluent from the pipe into the watershed area.
- No 'isolation valves' will be installed other than one for potential repairs to proposed vents.

- The Focus Report does not recognize, or account for, a recently commissioned well in the Caribou Wellfield. Although Well 17 is located south of Priests Road, it is the Town well closest to the 106 Highway corridor.

B: Changes in Air Emissions and Odours Associated with the AST (Activated Sludge Treatment), Burning of Sludge and Transmission of Treated Effluent

The Pictou West area receives a significant portion of the air emissions from Northern Pulp operations. Studies of wind direction prevalence (Focus Report, *(Stantec)Expanded Air Dispersion Modelling Study 2019* Appendix 6.2, Page 33, and, *Pilot study investigating ambient air toxics near a Canadian kraft pulp and paper facility in Pictou County, Nova Scotia*; Hoffman, Guernsey, Walker, Kim Sherren, Andreou, 2017) confirm that the Town of Pictou, located to the northeast of Northern Pulp (and the proposed ETF), is a regular recipient of the Ground Level Contaminants (GLCs). Residents and visitors alike have complained about the emissions including concerns for the longterm effects on health.

Below are samples of items from the Focus Report that raise concerns about increased levels of air emissions:

- Discrete Receptor 10 (Focus Report, *Expanded Air Dispersion Modelling Study 2019* Appendix 6.2, Figure 5.4, Page 37) does not adequately measure emissions throughout the Town of Pictou and portions of Pictou West. Personal observations and wind direction models would indicate that emissions are more frequent and significant in eastern portions of the Town where there are no receptors identified.
- The maximum predicted GLCs for ammonia, chloroform, and TRS exceeded applicable criteria at one or more of the discrete receptors.
- Projected emission Rates are Based on a calculated assumption that precipitator working at (only) 81.3% efficiency indicating new emissions. (Focus Report, *Expanded Air Dispersion Modelling Study 2019* Appendix 6.2)
- Projected exceedances of Ground Level concentrations (GLCs) of some contaminants (Total Reduced Sulfur) could possibly affect health outcomes and produce odours) (Focus Report Appendix 6.2 *Expanded Air Dispersion Modelling Study*, Table 6.1)
- The Focus Report confirms that new odorous emissions will be evident as a result of the re-location of the proposed treatment facility. The proposed AST ETF' is a more advance treatment technology compared to the current ASB ETF' and 'It is expected that odourous emissions from the new system will be lower than the current ETF.' (Focus Report, *Expanded Air Dispersion Modelling Study 2019* Appendix 6.2, Page 47)

- Total Reduced Sulphur (TRS) measurements, although below Ontario standards most receptors, could represent new (increased) effects on Pictou residents 'Although not based on health effects, a number of epidemiological studies suggest that the effects of exposure to TRS (Total Reduced Sulphur) are similar as that observed with exposure to hydrogen sulphide (e.g., irritation, respiratory and central nervous system effects)' (Ontario 2007). (Focus Report, *Expanded Air Dispersion Modelling Study 2019* Appendix 6.2, Page 47)

C: Other Concerns:

Despite assurances of minimizing traffic disruptions during the construction of the on-land and marine portions of the pipe, we are concerned that the 18+ month construction period will affect tourism traffic.

Changes to the plan that involve positioning of the pipe in a trench below Pictou Harbour (Parallel to the Causeway) without leak detection. Based on elevations and plans for 'venting' in the Central Caribou area, it is expected that the liquid treated effluent will be under significant pressure in the submerged portion of the pipe.

3. Appendices:

Appendix A: *Town of Pictou Response to Northern Pulp Nova Scotia Environmental Assessment Registration Document Replacement Effluent Treatment Facility -March 8, 2019*

Appendix B: NP EA Review Memo from **NS Environment**, Senior Surface Water Quality Specialist to Acting Water Management Unit Director -March 6, 2019

Appendix C: NP EA Review Memo from **NS Environment**, Senior Hydrogeologist in the Sustainability and Applied Science Division to the Manager of the Water Management Unit Specialist to Acting Water Management Unit Director -March 6, 2019

Appendix D: *Terms of Reference For The Preparation of a Focus Report Regarding the Replacement Effluent Treatment Facility Project -NSE, April 23, 2019*

Appendix A: *Town of Pictou Response to Northern Pulp Nova Scotia
Environmental Assessment Registration Document Replacement
Effluent Treatment Facility -March 8, 2019*



Town of Pictou

Response to

**Northern Pulp Nova Scotia
Environmental Assessment Registration Document
Replacement Effluent Treatment Facility**

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 - A: Potential for Accidental Ground Water Contamination
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 - C: Economic Effects for the Town During the Construction Phase of the Project
5. Appendices

1. Town of Pictou Statement of Position:

The Town of Pictou hereby informs the Nova Scotia Department of Environment that it can not support the Northern Pulp Nova Scotia plan for the Replacement Effluent Treatment Facility. Additional risk, however small, to the domestic water supply is unacceptable.

2. List of Concerns to be Addressed:

- A. The plan creates additional risk to the Town water supply by the on-land portion of the proposed transmission pipe carrying treated effluent to Caribou Harbour.
- B. The limited information in the Environmental Assessment Registration Document regarding the potential for increased (new) toxins and/or odours produced as a result of the re-location of the Activated Sludge Treatment (AST) facility to Abercrombie Point, the burning of sludge in the power boiler, and the venting of air as part of the transmission of warm effluent through the Town of Pictou.
- C. Economic effects of potential disruption(s) to tourism traffic to and from the (Caribou, NS – Wood Island, PEI) ferry terminal during the construction phase of both the on-land and under water portions of the effluent pipe.

3. Context for Responding:

The Town of Pictou is a community of approximately 3200 residents located on the north shore of Pictou Harbour approximately three kilometers from the Northern Pulp Nova Scotia facility. The Trans-Canada Highway (TCH) 106 runs through the west end of the Town and proceeds to the Northumberland Ferry Terminal at Caribou Harbour. The Harvey A. Veniot Causeway connects the Town of Pictou to Abercrombie Point where Northern Pulp is located.

For 52 years Northern Pulp and its previous owners have provided a reliable and, depending with whom you speak, a greatly appreciated source of income for many members of the community through direct employment at the processing facility and the integrated forestry and trucking industries. The mill and its air emissions are visible from most (all) locations in the Town of Pictou. In November 2017, Pictou Town Council passed a Resolution to request

consideration for Federal oversight of the Northern Pulp project and that there be 'no harm to the Northumberland Strait fishery' (Appendix F, Pg. 1)

In the 1990s The Town of Pictou created the Pictou Waterfront Development Corporation with the goal of improving the waterfront/downtown district while promoting the tourism sector. The signature attraction for the development was the construction of a full-size replica of the *Ship Hector*. The \$10M project was completed with financial support from the Atlantic Canada Opportunities Agency (ACOA), the Province of Nova Scotia and the Town of Pictou. The Pictou Waterfront has since been and is expected to continue to be significant focus of economic interest within the Town.

Pictou is the home of Advocate Printing and Publishing, AECON Fabco (Shipyard), CMS Steel Pro Mechanical. Council continues to embark on projects promoting the Town as the service and entertainment centre for Pictou West and a tourist destination.

Within the past 15-20 years the Town of Pictou, with financial support from Provincial and Federal governments, has completed several significant additions and upgrades to important infrastructure ensuring the comfort and security of residents and visitors. This work is aimed at ensuring long term sustainability and compliance with health and safety standards.

Construction and commissioning of a municipal Wastewater Treatment Facility for the Town of Pictou and surrounding area took place in 2011. The facility processes one hundred percent (100%) of the Town's sewage and, unfortunately, a large portion of the storm water. Our tests reveal one hundred percent (100%) compliance in achieving standards for effluent and the development of a storm water plan for the Town is now underway so future wastewater needs can be met. We are extremely proud of our advances in service to the community and the protection of our environment.

The Town of Pictou has, in the past, consistently experienced issues associated with water discolouration and mineral build-up in the distribution pipes. A new 'state of the art' Water Treatment Plant was commissioned in October 2019 to centralize water treatment and distribution while removing high levels of manganese and iron from the supply. We are very pleased that initial scientific testing and a positive public response indicate great success as we continue to upgrade our infrastructure to ensure safe and reliable water for home and commercial use.

4. Environmental Assessment Concerns (In Order of Significance):

A. Risk of Ground Water Contamination

The proposed on-land portion of the pipe carrying treated effluent to Caribou Harbour will cross both the Pictou wellfield which is completely within the Town of Pictou boundaries, and, the Caribou wellfield which is situated completely within the boundaries of the Municipality of Pictou County. Both wellfields are located within the delineated boundary of the Caribou/Pictou Watershed protected area identified of in Figure 1 of Appendix D (Pg 6).

The Town has been granted Permits from the Province of Nova Scotia to draw approximately half of the Town's potable water from wells within the Caribou wellfield and the rest from the Pictou wellfield. A total of approximately 600K cubic meters are pumped annually from eight active wells. Limits for water extraction from the various wells can be found in Table 2 of the Permit (Appendix B, Pg. 8). As part of the permitting process, the Caribou/Pictou Source Water Protection Committee was formed, and the Pictou/Caribou Source Water Protection Plan was completed (Appendix D). This plan identifies risk and best management practices for mitigating risk should accidents occur.

Residents of the Town of Pictou depend on the groundwater drawn from the Pictou/Caribou watershed for their drinking water. The Caribou and Pictou wellfields are the only viable sources of potable water and it would be safe to conclude that without this dependable source of water there could be no town. It is the Town's position that we can not be supportive of any activity that would add additional risk to our water supply regardless of the many references to 'insignificant' risk in the Environmental Registration Document. More specifically, we cannot support the planned construction of a pipe carrying the treated effluent containing 'residual contaminants' (Registration Document, Pg. 32) along TCH 106. In the original Source Water Protection Program from 2005 the hydrologist representing *ADI Limited* identified a 'Zone of Influence' which shows the extent of the sand and gravel aquifer where surface water could affect the Town water supply (Appendix A, Pg. 4). A large stretch of TCH 106 is situated well within the aquifer and, therefore, we should assume that any accidental spills in the area could be harmful to our citizens.

It should also be noted that, as a 'General Term' within the Town's Permit To Withdraw Water, the Town has indemnified the Province against our (the Town) actions in causing 'damage resulting from the activities performed pursuant to this Approval' (Appendix B, Sec. 3(v)).

B. Additional Air Emissions and Odours Associated with the AST (Activated Sludge Treatment) and Transmission of Effluent

The Pictou West area, including the Town of Pictou is the recipient of a significant portion of the air emissions from the mill operations as shown in (Appendix E, Figures 1 and 2, Pages 3 and 5). As a result of this, residents and visitors alike have complained about the emissions including concerns for the long term effects on their health. Numerous studies suggest that higher levels of certain illnesses are evident in the area. For many years, dining and accommodation operators have also expressed concern about lost revenue as the result of odours associated with the air emissions from the mill.

Despite significant improvements to overall emissions with the recent construction of the Precipitator Unit, emissions and associated odours continue to affect the Town on a regular basis.

With the relocation of the Activated Sludge Treatment (AST) Facility to Abercrombie Point we are concerned that new odours, similar to those that have been a problem around Boat Harbour since the mill was made operational, might have a tendency to 'drift' in the Town's direction. Additional contaminants in the emissions from the Power Boiler when the sludge from the new treatment facility is incinerated will also be of concern. The Environmental Assessment fails to provide comfort that particulate emission and odours will be handled to the Town's satisfaction.

An additional concern exists regarding the proposed venting along the on-land portion of the effluent pipe. It is our understanding the vent must be placed at a high point in the transmission line which could be between the Harvey A. Veniot Causeway and the Pictou Rotary. If this is to be the case, we expect that there could be additional odours from the warm treated effluent at that location. Also, should any unintended blockages of the pipe occur beyond that point, it could be concluded that the vent would provide a release point for effluent until the flow is stopped. It is important to note that this point is within the Town limits and is above the Pictou Wellfield.

C. Potential Economic Effects of the Pipe Construction Phase on the Economy

The Town of Pictou is located approximately eight kilometers from the ferry linking Nova Scotia to Prince Edward Island. This is a major entry and exit point to Nova Scotia where approximately 20 000 vehicles use the ferry each year between April and December.

Our community is, not only, a service centre for the Pictou West area but also a stopping place for travellers and a tourist destination. Many of the Town's businesses and tourist attractions are seasonal operations and depend on the high traffic volumes from May to October.

The timeline for construction outlined in Table 5.4-1 (Registration Document, Pg. 82) indicates that land clearing, construction and watercourse construction for the land portion of the pipe will take place from November 2019 until possibly September 2020 and the Marine portion from April 2020 to October 2020.

Should travellers choose to avoid the Northumberland or TCH 106 due to construction, financial impacts would be felt by the businesses and seasonal operators in the Town and the surrounding area.

5. Appendices:

Appendix A: Source Water Protection Program (Prepared by ADI Limited, September 2005)

Appendix B: NSE Approval to Withdraw Groundwater from Pictou and Caribou Wellfields (Approval No: 2002-026956-R01, June 21, 2013)

Appendix C: NSE Permit to Operate a Water Supply System (Approval No: 2012-080096-R02, March 4, 2016)

Appendix D: Pictou Caribou Source Water Protection Plan (2013, Revised in 2014 and 2017)

Appendix E: *Pilot study investigating ambient air toxics emissions near a Canadian kraft pulp and paper facility in Pictou County, Nova Scotia (Hoffman, Guernsey, Walker, Kim Sherren, Andreou, 2017)*

Appendix F: Correspondence on the Matter of the Effluent Treatment Facility Proposal(s).

- To: NS Minister of Environment, Federal Minister of Environment and Climate Change, Federal Minister of Fisheries and Oceans (December 2017)
- From: Canadian Environmental Assessment Agency (CEAA), (March 27, 2018)
- To: General Manager, Northern Pulp Nova Scotia (October 24, 2018 and November 2, 2018)
- From: (October 26, 2018)
- To: Canadian Environmental Assessment Agency (CEAA) (February 24, 2019)

Appendix B: NP EA Review Memo from **NS Environment**, Senior Surface Water Quality Specialist to Acting Water Management Unit Director -March 6, 2019

Environment

Date: March 6, 2019

To: Acting Water Management Unit Manager

From: Senior Surface Water Quality Specialist, Water Management Unit

Subject: Northern Pulp Nova Scotia Replacement Effluent Treatment Facility
Environmental Assessment – Review Comments & Recommendations

Scope of Review

As Senior Surface Water Quality Specialist with the Nova Scotia Environment (NSE) Sustainability and Applied Science Division, the following Northern Pulp Nova Scotia Replacement Effluent Treatment Facility (ETF) Environmental Assessment (EA) review focuses on the following subjects:

- Surface water quality & its management
- General surface and groundwater resources & their management

The following review considers whether the environmental concerns associated with the above subjects and the proposed mitigation measures have been adequately addressed in the Environmental Assessment. The recommendations provided below are meant to supplement the actions outlined in the EA submission documents.

While general comments on fish and fish habitat, wetlands, effluent discharge, surface water quantity, and groundwater quality and quantity may be included below, applicable technical specialists should be consulted for specific review and comment.

Reviewed Documents

The following document was the basis for this EA review:

Dillon Consulting. 2019. *Northern Pulp Nova Scotia Environmental Assessment Registration Document Replacement Effluent Treatment Facility*. Northern Pulp Nova Scotia Corporation. 17-64631-1300.

Comments

Surface Water Resources

- Section 8.4.2.1 provides a listing of watercourses, wetlands and other surface water features that will be potentially intersected by the Project footprint or are immediately adjacent.
 - The proposed ETF is within the tertiary watershed 1DP-SD8, which discharges into Pictou Harbour. One mapped unnamed watercourse (WC2) is identified within the footprint and the spill basin construction

area, which will require realignment and/or partial removal. The adjacent WC1 unnamed watercourse may require reconfiguration as well for proposed site activities. Both watercourses receive site drainage from the existing NPNS site and will continue to receive localized surface water runoff following Project construction.

- The pipeline alignment route crosses three tertiary watersheds, which are 1DP-SD8 (1 unnamed watercourse [WC4]), 1DP-SD3 (seven unnamed watercourses [WC5 – 6; WC12 - 16]) and 1DP-SD4 (five unnamed watercourses [WC7 – 11]). All of these are shore direct drainage areas that drain into either Pictou Harbour or the Northumberland Strait directly. The pipeline also directly crosses Pictou Harbour and within the Northumberland Strait to the discharge location near Caribou Point. These watercourses would be potentially impacted during the construction phase by the pipeline installation and in the case of an inadvertent release (leak or spill)
- Baseline surface water quality (Section 8.4.2.2) has been collected on a quarterly basis since 2012 from the watercourses WC1 (upstream and downstream of existing NPNS surface water runoff), WC2 (downstream of existing NPNS surface water runoff) and WC3 (upstream of proposed pipeline crossing). The results for the December 11, 2018 sampling event with analysis for general chemistry, total suspended solids (TSS) and metals was provided with discussion of observed exceedances in comparison to the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines for Freshwater Aquatic Life (CEQG-FAL). No reasoning was provided why surface water quality data collected since 2012 was not included in the baseline assessment. General discussion of exceedances was provided.
- Within the pipeline route, surface water quality grab samples were collected on Dec 3, 2018 along with *in-situ* field measurements using a water quality probe (Section 8.4.2.2). The results were compared against the CCME CEQG-FAL as well as CCME CEQG for marine aquatic life for watercourses with a direct marine connection. No additional criteria are provided as to what designates a watercourse a direct marine connection. General discussion of the water quality results in comparison to applicable CCME CEQG criteria is provided.
- Section 8.4.5 indicates that follow-up baseline surface water quality monitoring is not required within the proposed ETF site. Section 8.5.5 indicates additional baseline surface water quality monitoring may occur in areas identified as potential areas where surface water is expected to infiltrate into the local groundwater table along the pipeline footprint area. No other surface water baseline monitoring is proposed prior to Project construction along the pipeline corridor.
- An existing surface water quality monitoring program for the existing NPNS facility is proposed to be continued and expanded for this Project. The minimum surface water quality analysis package proposed is general chemistry, TSS and metals for at least three seasons.

Surface Water Quality

- The quality of the influent from the existing mill to be discharged into the ETF is not fully characterized using field and laboratory quantitative analysis for physical, chemical and biological parameters applicable to the pulp production

process. This characterization is used to identify potential contaminants of concern to be assessed by this EA. Identifying the project contaminants of concern at the influent stage of an ETF supports the following EA activities:

- Treatment system design
- Assessing treatment effectiveness
- Understanding end receiving environments for each contaminant following the treatment process (soil, water, air)
- Assessing potential effects of contaminants of concern to Project valued environmental components (VECs)
- Developing mitigation measures to address potential effects

The following is the level of characterization related to influent to the proposed ETF:

- Concentrations of total suspended solids (TSS) and soluble chemical oxygen demand (COD) of the influent to the ETF are presented and discussed in Sections 5.2.2.4 and 5.2.2.6, respectively.
- Section 9.2.4.2 *Current NPNS Mill Effluent Chemistry* discusses potential contaminants of concern within a single sample collected in 2018 from the plant influent discharge to the Boat Harbour Treatment Lagoon that underwent comprehensive contaminant analysis. No quantitative data, including concentrations or loads, is provided in the section and no reasoning as to why it is not included. No full list of parameters analysed in the sample is provided. No discussion on why one influent sample is enough to characterize the influent is provided. Contaminants of concern are identified as the following: hydrocarbons, toluene, cyanide, metals and metalloids, phenol, o-cresol, a phthalate ester compound, chloroform, total trihalomethanes, phenanthrene and pyrene. The potential contaminants were present at concentrations close to the laboratory reportable detection limits with no inclusion of what those specific quantitative limits were. Mercury, 2,3,7,8-TCDD and 2,3,7,8-TCDF were identified as parameters that were not analysed.

Without quantitative full characterization of the influent quality to identify potential contaminants of concern to be received by the ETF, there is insufficient information to assess the potential Project effects to receiving water systems and their associated VECs, and to support the subsequent selection of appropriate mitigation measures to address those effects.

- The Environmental Effects Assessment (Section 8) and Human Health Effects (Section 9) sections of the Registration Document identify potential contaminants of concern groups associated with the discharge from the proposed ETF. Potential contaminants of concern for the project following treatment are discussed in several sections with varying levels of assessment for each parameter, which are based on *Pulp and Paper Effluent Regulations* (PPER), literature review, characterization of Boat Harbour Treatment Lagoon discharge and review of other relevant historical water quality data:
 - Table 5.6-1 lists the anticipated daily maximum water quality of the treated effluent to be discharged by the Project and its associated concentrations, which are assessed in the discharge receiving water study (Appendices

E1 to E3). The table does not identify whether it is a comprehensive list of potential contaminants of concern.

- Dioxins and furans are listed within the Registration Document as below laboratory analysis detection limits in the effluent (Table 6.7-1) with no listing of the detection limit value. The metals manganese, cadmium and aluminum are listed in Table 6.7-1 as being potential parameters of concern within the Project effluent during the Operation phase.
- During the Project construction phase there is the potential for petroleum hydrocarbon spills from stationary and mobile equipment. Petroleum hydrocarbons were also measured above reportable detection limits in the untreated effluent sample in 2018 (Section 9.2.4.2). Reportable detection limit values are not provided.
- Section 9.2.4.2 *Candidate Contaminants of Potential Concern in Treated Effluent Summary and Path Forward* lists potential contaminants of concern to be evaluated in a Human Health Risk Assessment (HHRA) (if required for the project) which consists of the following:
 - some metals/metalloids (unidentified, except for mercury);
 - some polycyclic aromatic hydrocarbons (PAHs);
 - polychlorinated dibenzo-p-dioxins and dibenzofurans (PCCD/F);
 - some resin compounds;
 - a couple or few chlorophenolic compounds;
 - non-chlorinated phenolic compounds; and
 - chlorinated volatile organic compounds (VOCs)

The specific number of 'some' compounds is not defined. The list of compounds is expected to be reduced further with the completion of a detailed HHRA. The assessment used to develop this list of potential contaminants discusses concentrations with respect to reportable detection limits and background water quality without quantitative values.

As with the above influent contaminants of concern characterization comment, the identification of potential contaminants of concern in the treated effluent discharge are discussed using qualitative methods (Section 9). The discussions reference potential sources of quantitative data, but no reasoning is provided as to why this data is not provided in the Registration Document to support the contaminants of concern assessment. A detailed quantitative approach to estimate discharge contaminants of concern concentrations and loads from a treatment system, using a variety of information sources (e.g., literature review, background water quality and similar facility effluent data) would typically be expected as part of an EA Registration Document.

- The effluent water quality listed in Table 5.6-1 and subsequently evaluated with respect to discharge into the marine receiving waters (Appendices E1 to E3) did not include metal compounds, hydrocarbons and several organic compounds listed in Section 9 as potential contaminants of concern. The Registration Document does not discuss why the contaminants of concern listed in Section 9 are not included in Table 5.6-1 and its associated detailed assessments.
- In the Appendix E1 receiving water study, the single port diffuser option at the CH-B site has a simulated discharge plume that does not interact with the seabed for a distance greater than 200 m from the port, while the preferred three

port diffuser is simulated as interacting with the seabed at approximately a 10 m distance from the ports. The receiving water study indicates that dilution rates at this distance are enough to not impact the benthic environment. The effluent water quality is indicated as being primarily diluted to match ambient conditions prior to the 10 m distance for the Table 5.6-1 parameters. There is no detailed assessment of the discharge plume effluent and its interaction with seabed and benthic environment beyond the statement it is unlikely to have adverse effects. The lack of an assessment or further discussion beyond this statement is insufficient information to assess if there are adverse effects to the marine benthic environment.

- The receiving water study (Appendix E1) used the water quality results from the Pictou Road Area (Appendix E3) to represent the ambient water quality at the CH-B discharge point. Discussion was provided to indicate the Pictou Road Area water quality results represented a conservative worst-case estimate than what would be expected at CH-B near Caribou Point, based on existing land uses within the Pictou Harbour watershed. No discussion was provided in the Registration Document about whether follow-up monitoring and assessment at Caribou Point would be used to confirm the input parameter assumption.
- The Appendix E1 receiving water study presents in Figures 3.4 and 3.5 predicted plume dimensions in plan and side views. Two temperature scenarios are discussed prior to these Figures, which are for the winter and summer seasons. No indication is provided as to which seasonal temperature scenario is presented in the Figures. It would be expected that the plume dimensions may be different given the temperature differentiation between the effluent and ambient water for the two seasons. This information would support the effects assessment for the marine environment associated VECs.
- Table 8.4-3 and Appendix M4 present the field and laboratory analysis results from the freshwater surface water quality samples collected during at least one site visit. The samples were analysed for a suite of parameters that included general chemistry including nutrients, select total metals and TSS. The marine baseline water quality is presented in Table 3.1 in Appendix E.3. Table 5.6-1 lists the expected maximum daily effluent water quality of the NPNS effluent, while Section 9 lists several potential contaminants of concern that are not included in the above baseline assessment (e.g., total petroleum hydrocarbons (TPHs), PAHs, resin compounds, phenols (chloro and non-chloro)). Having pre-construction analysis results for the full list of potential contaminants of concern in the freshwater and marine systems within the Project footprint provides a comprehensive baseline for evaluating project effects.
- Appendix H, Section 2.5 presents a list of proposed sediment analysis parameters for a baseline follow-up benthic invertebrate community monitoring study. The list of parameters includes some that are listed as project contaminants of concern in Table 5.6-1 and Section 9 (metals, mercury, AOX, dioxins, furans). Three sites are proposed to be sampled along the pipeline route without discussion and/or supporting references as to whether that is a sufficient sampling density for the proposed length of marine pipeline. No sampling is proposed within the discharge plume area. There is no discussion of reportable detection limits for the associated laboratory analysis of the parameters, and applicable federal/provincial criteria for results assessment. Sampling for select parameters (Footnote 3) is proposed to occur as part of another pre-construction

assessment study proposed by Stantec (2017), Registration Document Appendix E3. The following are sediment quality analysis parameters that are listed in Table 5.6-1 and Section 9 as potential contaminants of concern that are not listed in the follow-up study:

- Nutrients (nitrogen and phosphorus compounds)
 - pH
 - PAHs
 - Specific chlorophenolic compounds
 - Specific non-chlorinated phenolic compounds
 - Specific resin compounds, in addition to resin fatty acids
 - Chlorinated VOCs
 - Total petroleum hydrocarbons, and/or other relevant hydrocarbon parameters
- Appendix H, Section 2.6 presents a list of proposed water quality analysis parameters for the baseline follow-up water quality monitoring study. The list of parameters includes many that are listed as potential contaminants of concern in Table 5.6-1 and Section 9 (pH, colour, TSS, metals, mercury, biochemical oxygen demand [BOD₅], nutrients, dioxins, furans, AOX). There is no discussion of reportable detection limits for the associated laboratory analysis of the parameters, and applicable federal/provincial criteria for results assessment. The following are potential water quality analysis parameters that are listed in Table 5.6-1 and Section 9 as contaminants of concern that are not listed in the follow-up study:
 - Chemical oxygen demand (COD)
 - PAHs
 - Specific chlorophenolic compounds
 - Specific non-chlorinated phenolic compounds
 - Specific resin compounds, in addition to resin fatty acids
 - Chlorinated VOCs
 - Total petroleum hydrocarbons, and/or other relevant hydrocarbon parameters
 - Appendix G, Section 3 lists the benthic invertebrate community assessment and fish population assessment pre-discharge surveys as 'proposed only' with respect to schedule. The pre-discharge studies are recommended by EcoMetrix to be conducted to improve interpretation of biological monitoring program results.
 - Horizontal direction drilling (HDD) is proposed as a pipeline installation method under watercourses/wetlands (Section 5.3.1.8). Drilling muds are listed as predominantly consisting of a mix of water and bentonite clay. Typically HDD mud mixtures also include the addition of polymers and surfactants to stabilize soils and disperse clay particles, respectively (<http://factsheets.okstate.edu/documents/pss-2916-can-urban-horizontal-directional-drilling-mud-be-land-applied-2/>).
 - HDD has the potential to inadvertently release drilling fluid into a wetland or watercourse that is above the borehole, which is sometimes referred to as a frac-out (<http://trca.on.ca/dotAsset/105401.pdf>). There is no direct discussion of this potential inadvertent release mechanism in the Registration Document and mitigating its impacts to aquatic ecosystems.
 - The mixing zone dilution ratio in Appendix E.1 for the CH-B site with a three-port

diffuser is stated as 144 times at 100 m from the discharge point, while the HHE listed the dilution ratio as 168 times at 100 m from the discharge. There is a discrepancy between the two dilution ratios used in the Registration Document.

- Appendix G, Section 2.5 lists proposed sediment analysis parameters for a pre-construction baseline benthic invertebrate community study along the pipeline route, which includes acid-volatile sulphide and low-level mercury. Both parameters have a Footnote 4 listed next to them with no associated footnote in the document with that number.
- The follow-up monitoring program proposed field verification of fish habitat within watercourses in the vicinity of the Project footprint, which would be conducted prior to the Construction phase.

Surface Water Quantity

- The ETF design includes a spill basin with a design capacity of 35,000 m³ to handle untreated effluent, which is predicted to handle 10 to 13 hours of full mill effluent diversion assuming an empty condition. The existing plant currently discharges into the Boat Harbour ETF, which would be expected to have substantially more storage capacity volume than the proposed spill basin for handling treatment system upsets. There is no discussion about the change in holding capacity within the proposed ETF compared to the existing process and what impacts to mill operations will be expected, and the robustness of the proposed design capacities in handling ETF system issues without inadvertently discharging into the environment.
- Table 8.4-1 indicates classification of watercourse types (intermittent, small and large permanent) based on site visits with those along the pipeline route only having one site visit in December 2018. Section 8.4.2.1 provides further details on the watercourse observations. One site visit is typically insufficient to assess whether a watercourse has a permanent or intermittent flow regime.
- Flow observations for each watercourse in Appendix M3 are subjective and based on one site visit conducted in December 2018. One site visit is typically insufficient to assess whether a watercourse has intermittent flow, particularly as per the photos in Appendix M2 where several the watercourses have partial ice coverage, which effects flows.
- Flows (Appendix M3) should also have been measured during the site visit for non-ice-covered sites using a velocimeter and calculated using the velocity-area method (or other standard method), instead of general categorization based on visual observations.
- Section 8.6.2.3 refers to watercourse widths and depths for the watercourses within or adjacent to the Project footprint. No table or field notes are provided listing these observed measurements. Having these values in a table or field notes would provide baseline data to support impact assessment and potential future watercourse alteration approval applications.

Groundwater Quantity & Quality

- Section 8.5.3.2 proposes lining the trench within the Town of Pictou source water protection area with an impermeable or low conductivity material/liner. No details are provided as to what type of liner would be considered 'impermeable' and where flows from a leak would potentially go and their potential impacts with reduced vertical infiltration. Understanding how leak flows will be managed within

these lined pipeline trench sections would assist with evaluating impacts to various VECs, including surface water resources, and development of appropriate mitigation measures (if required).

- Section 8.5.3.2. indicates that a system will be installed for the pipeline and associated pumping works that will detect leaks or significant drops in pressure during operation and maintenance. No details are provided as to the types of detection systems that are technically feasible for the proposed discharge pipeline and its preliminary design criteria.
- The ETF spill collection system proposes to include a 1.9 mm thick HDPE liner to avoid leakage. No details are provided on whether a monitoring system/program will be instituted around the basin area with respect to detecting leaks. As the spill collection basin will contain untreated effluent, it will be important to confirm the adjacent VECs are being adequately protected or identify if there is an inadvertent release.
- Dewatering activities as part of below grade excavations for the pipeline installation are discussed in general terms within Section 5.3.1.7. There is no mention of whether expected dewatering rates and pumping periods for the project will be assessed with respect to the 'Application Requirements for Water Withdrawal Approvals'. These dewatering activities may trigger the need for the Project to obtain an NSE Water Withdrawal Approval or Approvals.

Recommendations

Planning/ Design Issues

Surface Water Quality

- There is insufficient quantification of the potential contaminants of concern being input into the ETF and subsequently discharged in receiving environments (soil, water and air). A quantitative full characterization of the influent quality to be received by the ETF is required to identify potential contaminants of concern, support treatment system design, evaluate effects on VECs associated with receiving environments for the ETF discharges (e.g., sludge, effluent and air) and develop appropriate mitigation measures to reduce those effects.
- A more detailed quantitative assessment is required to estimate the expected discharge contaminants of concern concentration and/or load ranges to the marine discharge area and other receiving environments. This assessment potentially could use treatment system models or mass balances to support the quantitative estimations. The results of this detailed assessment would then be used to evaluate effects on VECs associated with those ETF discharge receiving environments and develop appropriate mitigation measures to reduce those effects.
 - The effluent receiving water models (Appendix E) should be updated to simulate any potential contaminants of concern that are identified within the discharge effluent that have not been previously modeled. The results of these model runs should be used in the subsequent assessment of their impacts. Additional mitigation measures should be developed to address potential impacts that are identified.
- Further discussion and potentially quantitative assessment of the impacts on ambient marine water quality and the benthic environment with respect to the plume interacting with the seabed at 10 m away from the discharge ports should

be conducted to support the unlikely potential adverse effect statement in Appendix E1. If potential adverse effects are estimated by the additional assessment, then appropriate mitigation measures should be developed.

Groundwater Quantity & Quality

- Although a specific leak or significant pressure drop detection system is expected to be developed during detailed design, examples of relevant leak detection and/or pressure measurement technological options for this type of effluent discharge pipeline and operating flows should be provided to NSE for review. This will indicate to the reviewer whether the leak detection monitoring method types are adequate for the proposed effluent discharge pipeline design. The detailed design and operating parameters of the leak detection and/or pressure drop monitoring system for the pipeline should also be provided to NSE for review, comment and approval prior to the Construction phase.

Operational Issues/Other Permitting Processes

Surface Water Quality

- Additional baseline freshwater surface water quality and marine water sampling within the Project footprint should be conducted, and the field and laboratory analysis should include a suite of parameters that represents the full-list of potential contaminants of concern associated with the ETF influent (e.g., AOX, COD, BOD, mercury, cyanide, PAHs, PCCD/F, resin compounds, chlorophenolic compounds, non-chlorinated phenolic compounds, chlorinated VOCs). This list of parameters would be based on the results of the above requested influent and effluent characterization. A qualified professional should develop the list of additional baseline monitoring parameters to determine which parameters would not be expected to be present in existing water systems, and therefore not require baseline monitoring. This supplemental baseline water quality monitoring will support assessment of potential Project effects.
- Additional baseline marine sediment sampling within the Project footprint should be conducted as part of the EEM program, and the field and laboratory analysis should include a suite of parameters that represents the full-list of potential contaminants of concern associated with the ETF influent. A qualified professional should develop the list of additional baseline monitoring parameters to determine which parameters would not be expected to be present in existing water systems, and therefore not require baseline monitoring.
- Baseline marine water quality sample results within the discharge receiving area near Caribou Point should be compared against the Pictou Road Area water quality results, which were used as inputs in the receiving water study (Appendix E1 & E3). The receiving water study models should be updated, and results re-evaluated if the Caribou Point results represent a more conservative receiving water condition than the Pictou site.
- As part of EMP and/or EPP for the operations phase, the management of the spill containment basin, and associated plant operations, including shutdown, should be discussed with respect to preventing basin overflows.
- Detailed design for the HDD alignments should be conducted, including appropriate geotechnical investigations (including boreholes) and topographic surveys. These designs should be submitted to NSE for review and approval prior to commencement of activities.

- In support of the HDD alignment installations, a Project frac-out monitoring and contingency plan should be developed, particularly focusing on areas immediately adjacent to or within watercourses and wetlands. The monitoring and contingency plan should be submitted to NSE for review and approval prior to commencement of activities. This activity can potentially be done in conjunction with the proposed construction surface water quality monitoring program.
- The Registration Document proposed field verification of fish habitat within watercourses in the vicinity of the Project footprint, prior to the Construction phase, which should be conducted.
- The proposed construction surface water quality monitoring program (Section 8.4.5) should as described in the Registration Document be developed in consultation with NSE and include appropriate upstream and downstream monitoring during storm events. Monitoring should also be conducted when there are in-water activities occurring. Appropriate monitoring compliance criteria (e.g., Canadian Council of Ministers of the Environment Canadian Environmental Quality Guidelines for Freshwater Aquatic Life TSS and/or turbidity criteria [<http://st-ts.ccme.ca/en/index.html>]) should be part of the program to determine compliance and when to implement additional mitigation measures.

Groundwater Quantity & Quality

- An assessment should be conducted on where flows resulting from a pipeline leak would go with the use of a low permeability liner within certain sections of the pipeline trench during the Operations phase. This assessment should include determining whether flows would be diverted into specific local surface water features. If impacts are determined appropriate mitigation measures should be developed.
- A leak detection system or monitoring program should be developed for the ETF spill collection system. The details of this system/program should be provided to NSE for review, comment and approval prior to the Construction phase.
- The pipeline and ETF excavation dewatering activities should be evaluated with respect to the 'Application Requirements For Water Withdrawal Approvals' and appropriate Approval applications be submitted (if required), including development of mitigation measures to manage discharge flows. This assessment should include an estimation of expected daily dewatering rates and time periods for the Project, and whether they will or will not trigger requirement for an application or applications.

General

- The project specific construction and operations environmental management plan (EMP) and environmental protection plan (EPP) to be developed as part of detailed design within the Registration Document should be provided to NSE for review, comment and approval prior to commencement of applicable Project phases.
- The proposed approval application activities associated with the alteration and/or removal of wetlands and watercourses, and subsequent works within, should be implemented to minimize potential impacts to those aquatic ecosystems, and fish and fish habitat. In support of the approval application process, it is recommended that consultation with appropriate provincial and federal

government departments occur prior to submission of appropriate Approval applications.

Surface Water Quantity

- At least one additional watercourse site visit should be conducted during ice-free conditions to at least the pipeline route intercepted watercourses. The site visits should document qualitative and quantitative channel bed and bank measurements and characteristics (e.g., bed materials, vegetative cover) at an appropriate cross-section and potentially support watercourse and/or wetland applications (if required).

Appendix C: NP EA Review Memo from **NS Environment**, Senior Hydrogeologist in the Sustainability and Applied Science Division to the Manager of the Water Management Unit Specialist to Acting Water Management Unit Director -March 6, 2019

Date: March 5, 2019

To: Manager, Water Management Unit, Sustainability and Applied Science Division

From: Senior Hydrogeologist, Sustainability and Applied Science Division

Subject: Review of Class 1 Environmental Assessment – Northern Pulp Replacement Effluent Treatment Facility (ETF) Project

This EA review from the Sustainability and Applied Science Division Hydrogeologist focuses on the potential for the proposed undertaking/project to adversely affect groundwater resources, including general groundwater quality and local water wells/drinking water supply.

The purpose of the Project is to replace the existing Northern Pulp effluent treatment facility (ETF) with a new one to treat wastewater received from the Northern Pulp pulp mill at Abercrombie Point, Pictou County. The Project includes a new ETF and a new effluent pipeline that will carry treated effluent to be discharged in the Northumberland Strait.

Once treated, effluent would be sent via an approximately 15.5 kilometres-long pipeline. The effluent pipeline would follow the Highway 106 for approximately 11.4 kilometres, then enter the marine environment near the Northumberland Ferries marine terminal, and continue for approximately 4.1 kilometres through Caribou Harbour to the Northumberland Strait where the treated effluent would be discharged via an engineered diffuser.

Comments

1. There are no provincial Protected Water Area (PWA) near the proposed ETF or along the proposed pipeline route. PWA's are not required for drinking water supplies. The nearest PWA is for the New Glasgow Forbes Lake water supply approximately 17 km southeast of the Northern Pulp proposed ETF.
2. The Town of Pictou does have a Source Water Protection Area (SWPA) that extends to the town boundaries and in areas to the north. In particular, the SWPA covers significant sections (>50%) of Highway 106 to Caribou along the proposed

pipeline route. This SWPA is discussed in more detail under comment 4.

3. The nearest Registered Public Drinking Water Supplies (RPDWS from NSE records) to the ETF and pipeline route are as follows:

ETF –

- Country Villa Park RPDWS owned by Rivers Trailer Park company has registered a drilled well located approximately 1 km southeast of the proposed ETF
- Northern Pulp Nova Scotia Corporation has a RPDWS for the Pictou Mill ETF location

Pipeline Route north of the causeway –

- Piper's Landing Restaurant approximately 2.9 km west of the proposed pipeline route
- Several RPDWS located in the Braeshore area north of the Town of Pictou located >3 km east of the proposed pipeline route (Harbour Light Campground, Pictou Lodge Resort/Maritimes Inn and Caribou – Munroe's Island Provincial Park)

4. Municipal wells – Town of Pictou Wellfields and Source Water Protection Area

The Town of Pictou operates two municipal water supply wellfields containing 13 wells as reported in their 2013 System Assessment Report to Nova Scotia Environment.

The Caribou Wellfield is located mainly to the north of the existing town boundary (north of Division Road) and contains 5 wells. The Pictou Well Field is located almost entirely within the town boundaries and contains 8 wells.

These two wellfields have similar sedimentary bedrock geology, although in the Caribou Wellfield area there is an overlying surficial geological unit of gravel and sands that has potential use as a distinct shallow aquifer. To the south, in the Pictou Wellfield area the surficial geology consists of a silty ground moraine till and is likely not suitable for significant aquifer supplies. Data from the Pictou Group bedrock underlying both wellfields however does show both well and aquifer yields that can provide sustainable long-term supply.

The nearest municipal well to the proposed pipeline route is the "Public Works Well" located at the Pictou Public Works building about 150 m west of Highway 106, near the causeway. The next closest wells are > 1 km away, including the Caribou Wellfield wells to the north of the town boundary (and south of Highway 106).

It should be noted that many of the Town of Pictou municipal supply wells are located in urbanized municipal areas and have existing risks related to maintaining source water protection, unrelated to the proposed pipeline. The Town of Pictou has

developed a Source Water Protection Plan (latest revision Oct 2017) to address potential risks. Potential risks related to pipeline routing are not specifically addressed. The attached Figure 1 here shows the SWPA delineated boundary. In comparison to Figure 2 (pipeline route also attached) it can be seen the pipeline route along Highway 106 crosses the SWPA delineated boundary in two areas.

5. The registration document from Northern Pulp identifies in Figure 8.5-1 (p. 192) two sets of dashed lines estimating the Pictou and Caribou wellfields extent, and a delineation boundary from the Pictou Source Water Protection Committee (SWPP report). It should be noted that neither of these estimated boundaries represent a strong scientifically valid description of the wellhead protection zones. However they may be useful for planning purposes. Quantitative hydrogeological determination of the well head protection area (WHPA) (numerical computer modelling) showing wellfield zones of contribution and expected times of travel would be beneficial in managing specific risks to the wellfields.
6. The online Nova Scotia Groundwater Atlas (Energy and Mines) was used (by this reviewer) to estimate the number of residential drilled wells within a 500 m radius buffer (on either side) of the proposed pipeline route from the ETF to Caribou. See the attached Figure 2 showing the 500 m buffer zone. The Atlas identified 62 water wells within the 500 m buffer distance. The majority of these are identified as for domestic use, but two are listed as public (non-municipal).

In the registration document, the proponent reports 121 existing residential water supply drilled wells within a 500 m buffer of the proposed pipeline route. However, it is possible their search zone was different, as this number of wells could not be replicated using the Atlas identification tools with a 500 m radius buffer.

It has been noted previously that the Well Logs Database Records and any mapping based on these records need to be considered in terms of locational errors/accuracy of the original data. In addition, the Well Logs Database does not contain a complete listing of every water supply well in the province and some areas may contain water supply wells not reported. Field truthing and field surveys for water supply well locations is necessary. This is particularly important given the discrepancies in the registration document concerning the number of water supply wells.

7. The treated effluent will likely contain natural chemicals found in the wood chips, added chemicals from processing and the effects of treatment which can reduce, create or alter chemicals. The chemical characterization is important from a groundwater and drinking water perspective, primarily with regards to the potential for any leaks, spills or other releases that are uncontrolled and enter groundwater or surface waters. Characterization is beneficial in order to plan potential monitoring and mitigation strategies.

The chemical characterization of the treated effluent that would flow through the proposed pipeline is not determined, mainly because the new treatment processes proposed are not yet operational and no samples can be analysed. However, the

registration document does look at similar treatment plants from around the world. The document presents some lists of "candidate Chemicals of Potential Concern" or COPC that show the potential scope of chemicals in the treated effluent.

The document presents chemicals determined by similar pulp mill process in Tasmania, Australia. The "Toxikos (2006) study is considered to provide a reasonable interim indication of what may be expected in relation to NPNS project effluent chemical composition and characteristics" (p. 508). However, one uncertainty pointed out is that the wood chips used in the Tasmania are largely hardwood eucalyptus whereas at Northern Pulp they are softwood coniferous. The Tasmania project list of candidate COPC's include:

From page 508:

- "Metals and metalloids.
- Selected plant sterols and steroids (phytosterols and phytosteroids).
- Methylphenols and other alkyl-substituted phenols.
- Nitrophenols.
- Phenol.
- Plant-based hydrocarbons such as pinenes, camphenes, carenes, limonene.
- Petroleum hydrocarbons (primarily long chain aliphatic hydrocarbons).
- BTEX (benzene, toluene, ethylbenzene, xylenes).
- Polycyclic aromatic hydrocarbons (PAHs).
- Alkyl and chloro-substituted PAHs.
- Numerous chlorinated volatile organic compounds (VOCs).
- Chlorinated benzenes and methoxybenzenes.
- Dehydrojuvabione.
- Juvabione.
- Furanones (chlorinated and non-chlorinated).
- Hydroxy and/or methoxy chlorinated diones and pyranonestals and metalloids.
- Thiolignins.
- Thiosulphates.
- Chloroacetic acids.
- Resin acids (chlorinated and non-chlorinated).
- Fatty acids.
- Various aliphatic and aromatic aldehydes and ketones (chlorinated and non-chlorinated).
- Aniline and chloroanilines.
- Chlorinated anisoles.
- Numerous chlorinated phenolic compounds including chlorinated phenols, catechols, cymenes, guaiacols, guaiacones, vanillins, veratroles.
- Vanillones (chlorinated and non-chlorinated).
- p-Cymene.
- Syringol and syringaldehydes.
- Various aliphatic alcohols.
- Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/F).
- Chloromethyl sulfones.
- Chlorohydroxypyron.
- Thiophenes and chlorinated thiophenes.
- Hexachlorocyclopentadiene.
- Various ions such as ammonia, nitrate/nitrite, chloride, sulphate, hydrogen sulphide, carbon disulphide, chlorate, chlorite."

Candidate COPCs for Northern Pulp Effluent

The proponent has gone further by considering other studies from the present Northern Pulp/Boat Harbour effluent and other Canadian studies that may be more relevant. They have reported another similar list, that is more specific regarding candidate COPC's expected for the Northern Pulp effluent. However, the focus here does seem to be on the ocean as the receiving environment.

From page 514:

"The chemicals that merit consideration as candidate COPCs from the review of previous studies and sediment or sea water data include the following:

- Metals (including mercury) and metalloids
- PAHs.
- PCDD/F.
- Phytosterols.
- Resin and fatty acids (non-chlorinated).
- Petroleum hydrocarbons, oils and greases.
- Chlorinated VOCs.
- Chlorinated phenols, catechols, guaiacols, vanillins and veratroles – [only detected in the ASB and other effluent-treatment process lagoons and basins, and primarily during the early 1990s; these compounds have not been detected in the marine receiving environment influenced by the current mill effluent discharge point].
- H₂S and other sulphides.
- Chlorate/chlorite.
- Cyanide.
- Syringaldehydes."

On page 516 of the document, the proponent presents a description of sampling results from the untreated mill effluent. Actual sample results were not provided.

A recent (2018) sample of untreated mill effluent (collected from Point A) underwent a very similar suite of chemical analyses as the 2018 Point C and D samples. This sample represents worst case effluent chemistry as it was collected at a point prior to the current effluent treatment process. Comprehensive chemical analysis of this sample shows that most candidate COPCs are below detection limits even in untreated mill effluent. The only candidate COPCs that were measurable (above RDLs) in this Point A untreated effluent sample (also generally at low concentrations near RDL values or within typical natural ranges in water) were: hydrocarbons, toluene, cyanide, metals and metalloids, phenol, o-cresol, a phthalate ester compound (likely from pipe materials rather than due to mill processes), chloroform, total trihalomethanes, and trace PAHs (phenanthrene and pyrene only). Mercury was not tested for in this sample, nor was 2,3,7,8-TCDD; 2,3,7,8-TCDF (as testing of untreated effluent for these dioxin and furan parameters is not required under the PPER).

The above lists of potential COPCs include a variety of metal and chemical parameters that are of potential concern if accidentally released into groundwater or surface water. The potential COPCs from a groundwater, surface water and drinking water quality perspective need to be considered separately from those determined important for the receiving ocean environment.

8. Groundwater is identified as a Valued Environmental Component (VEC) by the

proponent in Section 8.5 of the registration document. The document states:

“Groundwater was selected as a VEC because it contributes to drinking water aquifers in potable areas and may discharge to surface water and aquatic habitat.” (page 185)

Section 8.5 also documents a number of groundwater conditions including numbers of municipal and residential wells along the proposed pipeline route and ETF, as well as in the Town of Pictou wellfield. Statistics based on well construction details are also provided such as well yield and depth. Most wells in the area are very capable of providing adequate yields for domestic water supplies and as demonstrated by the Town of Pictou wellfield, for municipal drinking water supplies. Groundwater quality is also generally good, with some well-specific issues potentially related to chemicals such as chlorides, manganese and other generally natural contaminants (or effects of road salting/salt water intrusion in the case of chlorides).

9. ETF Groundwater Monitoring

The project proponent describes existing groundwater sampling networks at the Northern Pulp Nova Scotia (NPNS) site. One of these networks is the Industrial Landfill Monitoring Network (27 shallow monitoring wells). The other is the operational NPNS Monitoring Network, near the ETF (6 shallow monitoring wells). These networks are being monitored following Approval Conditions specified for the existing plant operation.

Groundwater in the ETF area is relatively isolated in that it is surrounded on three sides by water (Pictou Harbour). To the south of the ETF, there are isolated private well water supply systems, but the nearest of these is about 650 m to the southeast.

Details of the ETF groundwater monitoring program are not fully provided in the registration document (Figure 8.4-1 page 173 does show the existing monitoring well locations and page 194 summarizes some of the results). However, as new facilities are to be constructed on the Northern Pulp site (including clarifiers, aeration basin and effluent spill basin) the monitoring network plan needs to be revised to include these new activities and locations. Groundwater monitoring needs to provide adequate testing to ensure any operational issues are identified and addressed before they become a significant risk to the environment.

10. Pipeline Route Groundwater Monitoring

The project proponent recognizes the critical nature of the groundwater VEC, particularly in relation to drinking water supply. Although the actual proposed monitoring is not specific, the proponent does state (page 202):

“NPNS will develop a surface water monitoring program to monitor runoff within the pipeline footprint both during and subsequent to construction in areas where surface water can infiltrate to groundwater. As part of this program the frequency of monitoring and parameters to be assessed will be identified in consultation with NSE, particularly with respect to surface waters that could infiltrate

to groundwater within the municipal groundwater watershed areas identified within the SWPP and more populated residential neighbourhoods along the un-serviced portion of the pipeline footprint.”

Groundwater monitoring along the proposed pipeline route is also an important function for protection regarding potential post-construction accidental spills from leaks, ruptures or other damage to the pipeline. Groundwater monitoring would need to include two components:

- Baseline monitoring of water wells (residential well survey)
- Monitoring of the pipeline itself for potential leaks, with particular focus on sensitive groundwater use areas and important surface water features (e.g. watercourse crossings and installations of the pipeline below the water table).

11. Pipeline Installation Below the Water Table

The proposed pipeline route may need to include installation below the water table in some areas such as wetlands and watercourse crossings. Some pipeline installation by Horizontal Directional Drilling (HDD) under watercourses is being proposed (page 65). The registration document provides a general description of methodologies to be used, however, if employed, each site using HDD, or with pipe installed below the water table, would need detailed assessment by the proponent and probable NSE approvals.

12. Pipeline Monitoring and Mitigation Measures

Pipeline monitoring for potential leaks resulting from accidental damage is perhaps one of the most important measures for protection groundwater and surface water supplies. Monitoring as close to the potential contaminant source is critical. For a long pipeline, as proposed, this does represent some challenges. The proponent provides some of their potential monitoring/mitigation measures on page 197-198.

“In light of the pipeline route crossing over the Town of Pictou’s source water area, additional mitigative measures during construction of the pipeline will include:

- Lining the trench with an impermeable (or low conductivity) material so that, if a leak occurred, it would be contained and prevent vertical infiltration;
- The pipe will be constructed of >2 inch thick HDPE which combines strength and flexibility to withstand stresses as well as being resistant to corrosion;
- The pipeline will be constructed with fusion technology to eliminate most, if not all, jointed sections.
- Having a system in place to detect leaks (or a significant drop in pressure) during operation and maintenance; and
- Inclusion of the Pictou watershed area in the mill ERCP, including contacting the Pictou Water Utility, property owners with potable water wells along the pipeline route, and other stakeholders.”

The measures proposed seem preliminary and would need to be expanded upon to provide sufficient risk mitigation. For example, leak detection using only pressure monitoring detection may not be sufficient given the chemical quality expected of the treated effluent, the large volumes of treated effluent passing through the pipe daily and the likelihood that even small accidental release volumes could adversely affect a water supply based on drinking water criteria.

13. Acidic rock drainage (ARD) due to surface water contact with disturbed soils or bedrock geology is a potential concern for both groundwater and surface water where construction excavation projects occur. Acidic rock drainage is not expected by the proponent, based on their review of geological conditions (page 164, 166). They state that the "Underlying Pictou Group bedrock is not known to produce ARD." However, ARD testing of any bedrock encountered during excavation may be a reasonable expectation in order to confirm this.
14. Although the project does not anticipate involving blasting during construction (page 201), should any blasting be necessary, water wells in the vicinity of blast locations should be included in pre-blast surveys for the ability to determine potential effects to groundwater quantity and quality (see document page 95).

Recommendations

The following recommendations relevant to the groundwater evaluation are made regarding the Northern Pulp proposed ETF industrial activity.

Planning/Design Issues

1. Monitoring design plans for detecting potential spills/leaks resulting from accidental damage to, or malfunctions of the pipeline should be prepared with methodologies for further evaluation.

Plans should include more details on methods to be used for monitoring for pressure drops/leaks. In addition, plans should address monitoring immediately adjacent to the pipeline where the pipeline is installed in areas of significant risk including: below the water table, in significant wetlands, in areas of watercourse crossings and in the two areas where the pipeline route crosses the Source Water Protection Delineated Boundary for the Town of Pictou Wellfields. The proponent should evaluate and present the use of pressure monitoring systems and shallow groundwater monitoring wells among other potential options.

2. Risk mitigation measures need to be more completely described for further evaluation regarding design to prevent/contain spills/leaks from pipeline accidental damage or malfunction, particularly in areas of significant risk. Description should be made of the practical operational efficacy of measures such as the trench lining proposed, as well as the potential need/benefits of secondary containment of the pipeline in areas of significant risk.

Operational Issues/Other Permitting Processes

1. Field-truthing and locational mapping of water wells within 500 metres radius of the proposed activities (ie. 500 m from each side of the centreline of the pipeline route, or from the ETF site boundaries) should be conducted prior to construction.
2. Pre-Construction Water Well Surveys should be conducted within 500 metres radius of the proposed activities (ie. 500 m from each side of the centreline of the pipeline route, or from the ETF site boundaries). These surveys should include both monitoring for drinking water quality parameters and well water levels and be conducted prior to any construction activities. Methodologies and monitoring proposed for the water well survey should be submitted to NSE for approval prior to implementation.
3. Groundwater monitoring plans in the ETF area will need to be enhanced to include the new activities proposed. This includes additional monitoring to include the area with the proposed new clarifiers, aeration basin and effluent spill basin. The effluent spill basin is proposed to be HDPE lined and this should incorporate leak detection monitoring. The ETF area monitoring plans should be reviewed and approved by NSE.
4. More details on the potential Chemicals of Potential Concern (COPCs) from a groundwater, surface water and drinking water quality perspective need to be provided and evaluated by the proponent in order that their contingency plans for monitoring and mitigation can appropriately include these parameters. Details should include a final list of COPCs and their range of concentrations expected both in untreated influent and treated effluent that could be released accidentally into the environment at the ETF site, or along the pipeline route.
5. Consideration should also be made for including specific measures in Northern Pulp's Environmental Response and Contingency Plan (page 97) that relate to contingencies that potentially involve the Town of Pictou Source Water Protection Plan, SWPA (Source Water Protection Area) and the Town of Pictou water supply wellfields.
6. If the project proceeds to the next stage, it is recommended that standard conditions be provided to the effect that the Proponent is responsible to replace or repair any water supply well found to be adversely affected by the project activities and operations to the satisfaction of the well owner.

Other Observations

1. The current Source Water Protection Plan for the Town of Pictou includes a conceptual indication of the groundwater zones contributing to the two wellfields and a larger Source Water Protection Area. As a greater protection measure, the Well Head Protection Area (WHPA) zones would be updated by better definition and quantitative (numerical) computer modelling to demonstrate the 0-2 year

(Zone A), 2-5 year (Zone B) and 5-25 year (Zone C) time of travel zones for the wells/wellfield. This would be useful in many ways for the beneficial management of the town's wellfield.

This would allow:

- a) greater definition of the capture zones of the wellfields,
- b) estimated times of travel for various contaminants to the wells which will be useful in providing greater definition and management of source water protection risks for the Town's SWPP
- c) greater confidence in a hydrogeological model and wellhead zone protection

It is noted that the Source Water Protection Plan (SWPP) for the town water supply is the responsibility of the Town of Pictou and additional work to better define WHPA zones in the SWPP would require their cooperation and involvement.

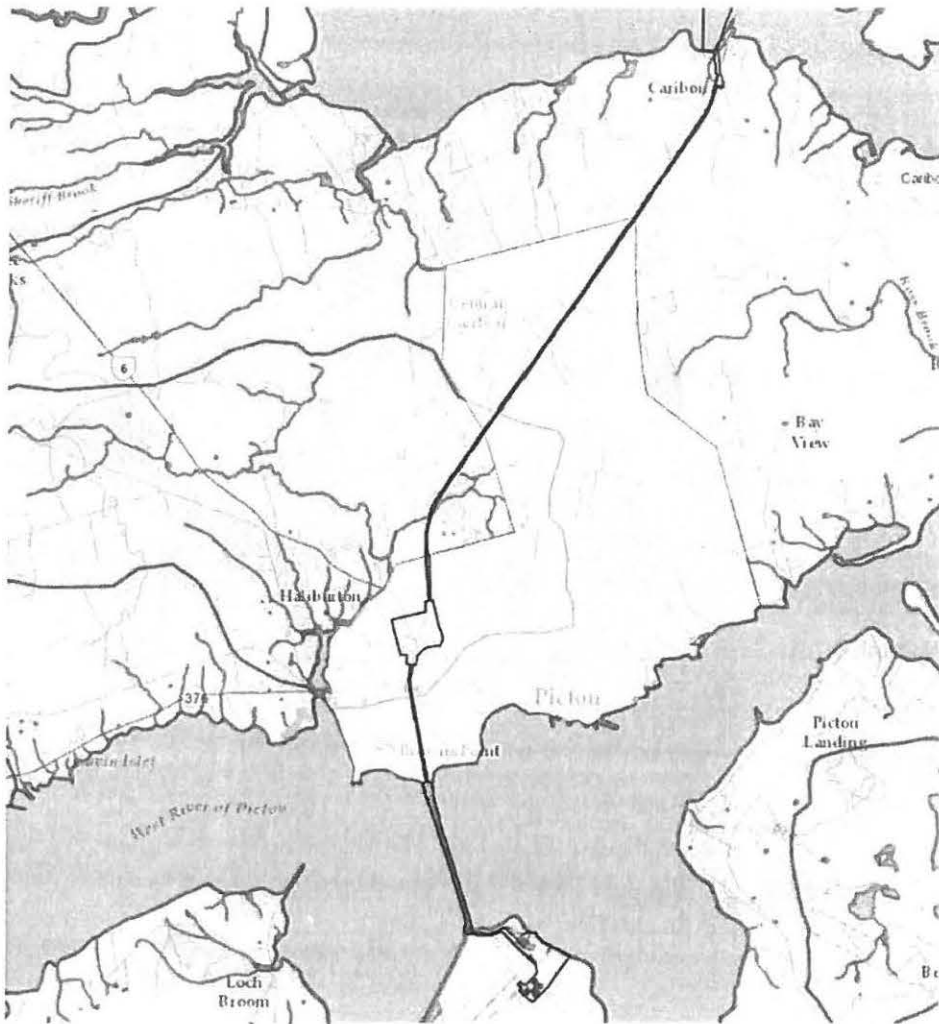


Figure 1 Town of Pictou Source Water Protection Committee Delineated Boundary (Town of Pictou, Pictou / Caribou Source Water Protection Plan 2017, NSE webmapping)

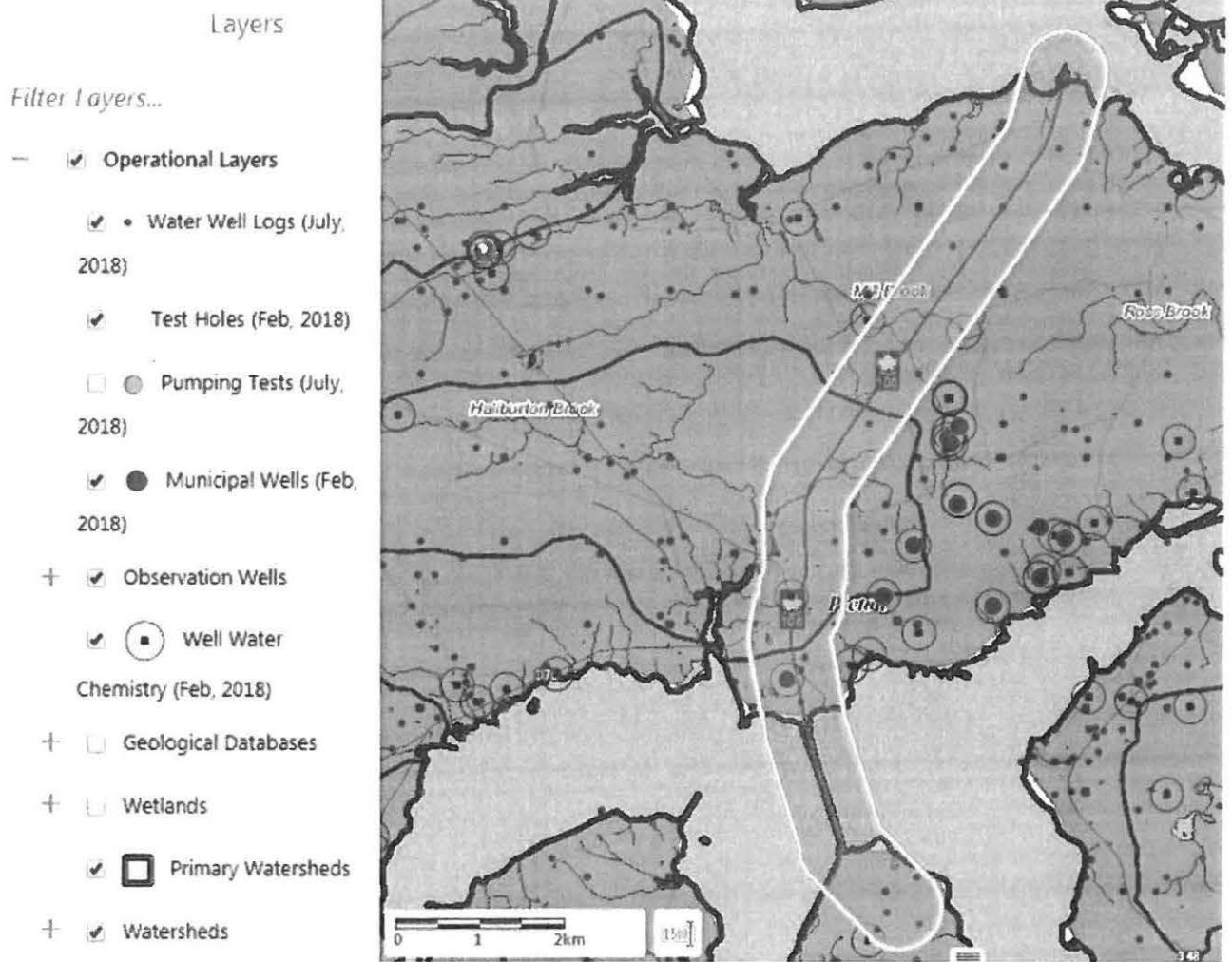


Figure 2 Proposed Pipeline Route 500 m radius buffer zone and water wells (NS Groundwater Atlas, Energy and Mines 2019)

Appendix D: *Terms of Reference For The Preparation of a Focus Report Regarding the Replacement Effluent Treatment Facility Project - NSE, April 23, 2019*

TERMS OF REFERENCE FOR THE PREPARATION OF A FOCUS REPORT

**Regarding the Replacement Effluent Treatment Facility Project
Proposed by Northern Pulp Nova Scotia Corporation**

NOVA SCOTIA ENVIRONMENT

April 23, 2019

INTRODUCTION

The Replacement Effluent Treatment Facility Project (the Project or undertaking) proposed by Northern Pulp Nova Scotia Corporation (NPNS) was registered on February 7, 2019 for environmental assessment (EA) as a Class 1 undertaking pursuant to Part IV of the *Environment Act* and the Environmental Assessment Regulations.

On March 29, 2019, the Minister of Environment released a decision concerning this review. The Minister has determined that the EA Registration Document (EARD) is insufficient to make a decision on the Project, and a Focus Report is required in accordance with clause 13(1)c of the Environmental Assessment Regulations, pursuant to Part IV of the *Environment Act*.

NPNS is required to submit the Focus Report within one year of receipt of the Terms of Reference. Upon submission of the Focus Report by NPNS, Nova Scotia Environment (NSE) has 14 days to publish a notice advising the public where the Focus Report can be accessed for review and comment.

A 30-day public consultation period of the Focus Report follows. At the conclusion of the 30-day public consultation period, NSE has 25 days to review comments, and provide a recommendation to the Minister.

The Minister of Environment will have the following decision options, following the review of the Focus Report:

- a. the undertaking is approved subject to specified terms and conditions and any other approvals required by statute or regulation;
- b. an Environmental-Assessment Report is required; or
- c. the undertaking is rejected.

During the preparation of the Focus Report, it is strongly recommended that NPNS continues to engage with relevant stakeholders and the Mi'kmaq including Pictou Landing First Nation, and to share relevant studies and reports.

Within the Focus Report, all impact assessment, mitigation and impact conclusions outlined in the Environmental Assessment Registration Document must be updated based upon the information requirements outlined below. The Addendum to this document includes additional questions for consideration and response. Consultation with NSE in the development of the Focus Report is required.

TERMS OF REFERENCE

The following items must be included in the Focus Report submission:

1. PUBLIC, MI'KMAQ AND GOVERNMENT ENGAGEMENT

1.1 Provide a response (via a concordance table) to questions and comments raised by the public, Mi'kmaq and government departments, and incorporate these comments in the Focus Report where applicable. Comments may be summarized prior to providing the response.

1.2 Provide a plan to share future reports and/or studies relevant to this Project with the public and the Mi'kmaq such as the Pictou Landing First Nation, including but not limited to the future Environmental Effects Monitoring results for the new effluent treatment facility.

2. PROJECT DESCRIPTION

2.1 Provide the following information regarding the on-land portion of the effluent pipeline:

- a re-alignment route for the effluent pipeline, given Department of Transportation and Infrastructure Renewal does not permit the pipeline to be placed in the shoulder of Highway 106;
- maps and/or drawings of the new pipeline location;
- a list of properties (ie., Premises Identification number or PID) that will intersect with the new pipeline alignment.

2.2 Conduct geotechnical surveys and provide the survey results to confirm viability of the marine portion of the pipeline route. The surveys must determine the potential impacts of ice scour on the pipeline.

2.3 Submit data regarding the complete physical and chemical characterization of NPNS' raw wastewater (ie., influent at Point A for the Project), to support the assessment of the appropriateness of the proposed treatment technology. The influent characterization results must be compared against the proposed treatment technology specifications.

2.4 Submit a complete physical and chemical characterisation of NPNS's expected effluent following treatment by the proposed technology. To assess the efficacy of the proposed treatment technology, the following must be included:

- Data from laboratory trials on NPNS's raw wastewater that were conducted at Veolia/AnoxKaldnes in Lund, Sweden in May 2018;
- Modelling results using the raw wastewater parameters and quality;
- A comparison of the effluent characterization results from the laboratory trials and modelling work, against appropriate regulations and/or guidelines.

2.5 Provide any proposed changes to the pipeline construction methodology and other associated pipeline construction work, related to the potential changes to the marine portion of the pipeline route (e.g., infilling, trenching, temporary access roads, excavation, blasting, disposal at sea, and others where applicable).

3. FACILITY DESIGN, CONSTRUCTION & OPERATION AND MAINTENANCE

3.1 Submit treatment technology specifications (e.g., optimal performance range of the technology) and an assessment of the efficacy of the proposed treatment technology for use at the NPNS facility, to the satisfaction of NSE. For example, peak effluent temperature is proposed to be above the generally accepted range of temperatures to achieve optimal biological treatment. Explain how the proposed higher than optimal treatment temperature would affect the treatment performance.

3.2 Provide effluent flow data to support the proposed peak treatment capacity of 85,000 m³ maximum flow of effluent per day. At a minimum, data from 2017 and 2018 is required. Provide flow data for Point A, clarify source of the effluent flow volumes given in the EARD, and provide other relevant data and information to support the proposed treatment system design. If the 85,000 m³ cannot be justified based on historical data, identify water reduction projects, or re-evaluate the treatment system design and update the receiving water study accordingly.

3.3 Effluent discharge parameters must be updated (where necessary) based upon the results of the effluent characterization in Section 2.4 and relevant additional studies. Refer also to Addendum item 2.0

3.4 Provide the following information regarding the spill basin:

- Submit information to assess the sizing and appropriateness of the design of the spill basin. The EARD indicates a retention time of 10-13 hours at a design capacity of 35,000 m³. The basis of this design has not been provided. If flows exceed 85,000m³ per day on a consistent basis (e.g., during summer months), confirm that there will be sufficient recovery time in the treatment system to empty the basin before the additional volume is required;
- Explain where the overflow will be directed in the event of unforeseen scenarios (e.g., power outage).

3.5 Provide the following information regarding the effluent pipeline:

- Provide viable options including the selected option for leak detection technologies and inspection methodologies, with specific consideration to any portion of the pipeline located in the Town of Pictou's water supply protection area;
- Provide viable options including the selected option for the enhanced pipeline protection, such as trench lining and justify how the chosen option is an adequate option for secondary containment. Be sure to address any potential changes in flow regimes, especially within the Town of Pictou's water supply protection area, due to the installation

of the pipeline and secondary containment. If different options are provided for different areas of the proposed re-aligned pipeline route, the locations for each option must be identified.

3.6 Clarify where the potential releases of waste dangerous goods at the Project site will be directed for treatment and/or disposal. It is important to note that the new treatment facility is not proposed to treat waste dangerous goods based on the information provided in the EARD and requirements of NSE.

4. MARINE WATER AND MARINE SEDIMENT

4.1 Conduct baseline studies for the marine environment (such as marine water quality and marine sediment) in the vicinity of proposed marine outfall location.

4.2 Update the receiving water study to model for all potential contaminants of concern in the receiving environment (based on the results of the effluent characterization and/or other relevant studies such as Human Health Risk Assessment). Baseline water quality data for Caribou harbour must be applied to this study. Refer also to Addendum 3.0.

4.3 Provide results of sediment transport modelling work to understand the impacts of potential accumulation of sediment within near field and far field model areas. This should include chemical and physical characterization of the solids proposed to be discharged by NPNS as well as a discussion of how these solids will interact with the marine sediments and what the potential impact will be on the marine environment as a result.

5. FRESH WATER RESOURCES

5.1 Complete a wetland baseline survey along the proposed re-aligned effluent pipeline route (if wetlands are expected to be altered).

5.2 Provide monitoring methodologies for areas with significant risk of pipeline leaks or spills (e.g., two areas where the pipeline crosses the Source Water Protection Delineated Boundary for the Town of Pictou wellfields; below water table; important wetlands; watercourse crossings; etc.).

6. AIR QUALITY

6.1 Provide a revised inventory of all potential air contaminants to be emitted from the proposed project, including but not limited to, speciated volatile organic compounds, semi-volatile organic compounds, reduced sulphur compounds, polyaromatic hydrocarbons and metals.

6.2 Update the air dispersion modelling for the pulp mill facility for all potential air contaminants of concern related to the Project.

6.3 Complete an updated ambient air monitoring plan for the Project site based on the air dispersion modelling results. This plan must include the potential air contaminants to be monitored and proposed air monitoring location(s).

7. FISH AND FISH HABITAT

7.1 Conduct fish and fish habitat baseline surveys for the freshwater environment, to the satisfaction of Fisheries and Oceans Canada.

7.2 Conduct fish habitat baseline surveys for the marine environment, to the satisfaction of Fisheries and Oceans Canada.

7.3 Conduct additional impact assessment of treated effluent on representative key marine fish species important for commercial, recreational and Aboriginal fisheries. This must be based upon updated information, additional studies and/or an understanding of expected movement of contaminants. Assessment methodology must first be agreed upon by NSE in consultation with relevant federal departments.

7.4 Submit an updated Environmental Effects Monitoring (EEM) program based on the results of various relevant baseline studies and an updated receiving water study. Refer also to Addendum item 4.0

7.5 Clarify what contingency measures will be in place to mitigate potential impacts (e.g., thermal shock to fish) due to potential large and rapid fluctuations in water temperature in the winter at the diffuser location during low production or maintenance shut down periods.

8. FLORA AND FAUNA

8.1 Complete a plant baseline survey along the proposed re-aligned effluent pipeline route.

8.2 Complete a migratory bird survey along the re-aligned pipeline route.

8.3 Complete a bird baseline survey for common nighthawk (*Chordeiles minor*), double crested cormorants (*Phalacrocorax auratus*), owls, and raptors and raptor nests, for the entire project area which includes the re-aligned pipeline route.

8.4 Complete a herptile survey for the Project area which includes the re-aligned pipeline route.

9. HUMAN HEALTH

9.1 Complete baseline studies for fish and shellfish tissue (via chemical analysis) of representative key marine species important for commercial, recreational and Aboriginal fisheries in the vicinity of the proposed effluent pipeline and diffuser location.

9.2 Commence a Human Health Risk Assessment (HHRA) to assess potential project-related impacts on human health. The risk assessment must consider human consumption of fish and other seafood, consumption of potentially contaminated drinking water, exposure to recreational water and sediment, outdoor air inhalation, and any other potential exposure pathways. The analysis must inform the identification of contaminants of concern and updating of the receiving water study.

10. ARCHAEOLOGY

10.1 Complete an Archaeological Resource Impact Assessment for the marine environment related to the Project.

10.2 Complete shovel testing for areas in the terrestrial environment that are identified to have elevated or medium potential of archaeological resources, to confirm the presence or absence of these resources.

11. INDIGENOUS PEOPLE'S USE OF LAND AND RESOURCES

11.1 Complete a Mi'kmaq Ecological Knowledge Study (MEKS) for the Project.

ADDENDUM: Items Raised by Reviewers Requiring Clarification

The following items must be addressed with NSE and included in the Focus Report where appropriate:

1.0 Provide information regarding whether and when new technology and equipment will be installed at the NPNS pulp mill to improve the effluent quality, including but not limited to the following:

- Will O₂ delignification be installed at the NPNS pulp mill?
- What other technology and equipment will be installed at the NPNS pulp mill?
- How will each proposed new technology and/or equipment improve the effluent quality?

2.0 With respect to the effluent discharge parameters:

- Explain why the total nitrogen parameter has changed to 6 mg/L (daily maximum) from the 3 mg/L (proposed in the August 11, 2017 receiving water study);
- Provide data to support assertions that chemical oxygen demand (COD) can be reduced to the proposed limit.

3.0 With respect to the updating of the Receiving Water Study:

- Provide a response to questions and comments on the receiving water study (not already outlined in this document) from Environment and Climate Change Canada's EARD review submission dated March 18, 2019, and update the receiving water study as applicable;
- Explain how the initial mixing and dispersal of the plume was taken into account when simulating far-field extent and concentrations of effluent in Section 3 of Appendix E1 of EARD. It appears that the far-field model simulations were run before the near-field model. One could expect that the behaviour of the plume further afield depends a large extent on how it behaved at the diffuser, i.e. how quickly it mixed and spread and rose to the surface;
- Confirm dilution ratios and distances required to achieve background level for water quality parameters in Appendix E1 of the EARD, as the dilution ratios and distances may be overestimated;
- Explain if the salinity and temperature differential between the effluent and the receiving waters has been accounted for in the model. When the buoyancy differential between the effluent and receiving waters are greater in winter, it results in a faster rising plume. This can potentially affect the visibility of the effluent in the receiving environment. Has this been accounted for in the model? Also provide results for winter conditions;
- Explain if re-entrainment of effluent and sediment at the diffuser location was accounted for in the one-hour period surrounding slack tide. Support this explanation with model results using a smaller time step (30 minutes) if necessary.

4.0 It is important to note that the following field study and monitoring are likely to be required as part of an EEM program regulated under the Pulp and Paper Effluent Regulations for the Project if it is approved:

- Field delineation of treated effluent plume to confirm the prediction from the receiving water study;
- Monitoring of marine water quality and marine sediment quality;
- Sublethal toxicity testing and chemistry testing of the treated effluent; and
- Biological monitoring studies including benthic invertebrate community study, fish population study, and dioxin and furan levels in fish as applicable.

