



NORTHERN PULP NOVA SCOTIA

Impacts and Mitigation

Focus Report – Replacement Effluent Treatment Facility

Appendix Focus Report Item 0: Impact Evaluation/Effects Assessment

0.1 Impact Evaluation/Effects Assessment

The following provides an update, by Valued Environmental Component (VEC), of the impact evaluation/effects assessment for the replacement Effluent Treatment Facility (ETF) Project, which has been updated as a result of the revised project as described in the Project Overview of the Focus Report.

In general, the impact evaluation/effects assessment that was undertaken for, and presented in the Environmental Assessment Registration Document (EARD; Northern Pulp Nova Scotia – NPNS 2019) remains applicable to many of the VECs, and the mitigation, residual effects, and overall conclusions for these VECs remain unchanged from those presented in the EARD. For those VECs for which the effects assessment presented in the EARD remains unchanged, a brief summary is provided. However, for those VECs that have been affected by the revised project description, an updated impact evaluation/effects assessment is presented below. It is noted that for these VECs, only the impact evaluation/effects assessment is updated below; the scope of the VEC, boundaries, and significance criteria for these VECs remain the same as were presented in the EARD. In cases where the existing environment has changed for these VECs (e.g., due to new emissions or wastes information, or because of a change in alignment/footprint), the updated existing environment for those VECs is presented in other appendices to this Focus Report.

Summary of Key Project Changes Since the Completion of the EARD: Key changes to the project since the publication of the 2019 EARD include:

- A re-assessment of air emissions from the existing and proposed operations has adjusted some of the parameters, added emissions estimates for new parameters, and replicated the dispersion modelling for all parameters;
- The re-alignment of the land-based portion of the treated effluent pipeline from the Highway 106 road shoulder to the west, to the eastern edge of the right-of-way (ROW) for Highway 106;
- The preferred technology for watercourse and wetland crossings has now been identified as trenching, rather than trenchless technology, boring methods, or other methods previously preferred in the EARD;
- Minor adjustments to the marine pipeline and outfall location have been made based on field data collected in 2019;
- Re-assessment of the Receiving Water Study (RWS) based on new field data collection has adjusted modelled plume predictions and comparison to the current outfall.

As a result of these changes, impact evaluations/effects assessments for some of the VECs have been updated in the following sections.

Although minor adjustments have been made to the location of the spill basin to increase the buffer zone from the potential presence of undiscovered archaeological resources, the effects assessment for

all VECs with respect to the replacement ETF location at Abercrombie Point, on the mill property, remains unchanged from that outlined in the EARD.

The Atmospheric Environment VEC effects assessment has been adjusted to reflect the re-assessment of air emissions arising from the inclusion of a greater number of potential contaminants in the emissions inventory and updated dispersion modelling, compared to the focus on criteria air contaminants (CACs) that was presented in the EARD.

It is noted that the design for watercourse and wetland crossings along the land-based portion of the re-aligned treated effluent pipeline route has not been completed at the time of writing the Focus Report. However, it is known that the proposed re-aligned treated effluent pipeline will now be located adjacent to Highway 106, outside of the road shoulder, within the current Nova Scotia Transportation and Infrastructure Renewal (NSTIR) ROW on the east side of the highway (in the EARD, the treated effluent pipeline was to be in the road shoulder of Highway 106, on the west side, but the alignment has since been modified at NSTIR's request). VECs potentially affected by this change include: surface water, freshwater fish and fish habitat, and wetlands, for which the impact evaluation/effects assessment has been updated below.

In addition, the anticipated crossing methodology for both wetlands and watercourses will likely be based on trenched technology (in the EARD, consideration was given to using trenched and trenchless technology, boring techniques (e.g., horizontal directional drilling), for both for wetland and watercourse crossings); however, site-specific crossing design will be required as part of the subsequent watercourse and wetlands approval process.

For the purposes of this impact evaluation/effects assessment, it has been conservatively assumed that the footprint of the re-aligned treated effluent pipeline (Figure 2.1 in Focus Report Section 2.1) will encompass the existing NSTIR ROW (east of the roadside ditch), with the footprint of the pipeline estimated at 15 m wide (See Section 2.1). This estimate is conservative because the pipeline footprint (anticipated to be less than 10 m wide, including temporary workspace and material laydown areas) is subject to design and not finalized, and in addition, the location of access and laydown areas are not known (but are assumed to be located between Highway 106 and the proposed pipeline)—thus a 15 m-wide footprint for the re-aligned treated effluent pipeline has been assumed to account for these uncertainties. The following sections provide a revised environmental effects assessment for surface water, wetlands, and freshwater fish and fish habitat along the revised proposed treated effluent pipeline route, based on the assumed use of trenched crossing methodology options (see Focus Report Section 2.1).

Additional VECs for which the assessment has been updated based on information presented in the Focus Report include atmospheric environment, and marine water quality and marine fish.

Other VECs remain as presented in the EARD and require no modification despite the re-alignment of the treated effluent pipeline.

The construction schedule may vary depending on the timing of approvals, but the approximate time to construct the various project components is expected to be similar to that identified in the EARD, and environmental construction windows/constraints will be followed. It is noted that, in the Project Overview, one of the options for marine pipeline construction may involve a significantly longer timeframe than originally proposed in the EARD; however, with appropriate mitigation, this change does not materially affect the effects assessment.

Revised Environmental Effects Assessment: The revised environmental effects assessment is based on the existing environment as documented in the EARD (updated as necessary in the main Appendices to the Focus Report, where applicable) and in consideration of the revised project description (Project Overview of the Focus Report) and mitigation as required to minimize environmental effects from the development and operation of the project. Below, the assessment is described only if it differs from that presented in the EARD. Additional information on the existing environment in relation to the revised project description (where applicable) is provided in summary form in the Focus Report and with details provided in the Appendices to the Focus Report; in cases where the existing environment or components thereof remain the same as that presented in the EARD, that description of existing conditions is not repeated below, for brevity. For each of these effects, proposed mitigation, and predicted residual effects are determined. The predicted residual effect assumes that each of the recommended mitigation measures is implemented. The significance of the residual effect is based upon an evaluation of the effect's magnitude, geographic extent, duration/frequency, reversibility and ecological context, as defined for each VEC in the EARD.

Potential accidents or malfunctions which may affect these VECs, and their related environmental effects assessments, remain consistent with those considered in Section 10 of the EARD. Two potential areas of increased risk are identified:

- Trenching activities through wetlands is likely to increase the risk of release of hazardous materials (particularly petroleum hydrocarbons related to risk of spills) 'directly' into wetlands. In the EARD, it is noted that wetlands may be impacted 'indirectly' through their connectivity to other features and from migration, since activities were not previously planned to occur in wetlands; and
- There is greater potential for discovery of previously undiscovered heritage resources (particularly archaeological resources) with the re-aligned treated effluent pipeline route compared to that presented in the EARD. In the EARD, it is specifically noted that due to the disturbed nature (highway road shoulder) of the majority of the pipe installation corridor, potential for discovery is quite low. However, with the change in alignment to the edge of the Highway 106 ROW, ground disturbance of previously undisturbed ground may uncover archaeological resources if they are present there.

These levels of increased risk associated with the revised Project Description are of low likelihood of occurrence and overall resulting effects assessment for them remains largely as presented in the EARD (and updated as necessary below), but will be highlighted in contingency planning as part of the project.

0.1.1 Atmospheric Environment

The updated environmental effects assessment of the project on the atmospheric environment is provided in this section. An update to the environmental effects assessment for the atmospheric environment is required because a more comprehensive emissions inventory and revised dispersion modelling were developed for the project to include a greater number of contaminants that could be released from the mill following the Project as compared to the focus on criteria air contaminants (CACs) that was presented in the EARD.

The scope of the atmospheric environment VEC, boundaries, significance thresholds, and existing environment remain the same as presented in Section 8.1 of the EARD. Revised emissions information, dispersion modelling, and ambient air quality monitoring plan for the project are described in summary form in Section 6.0 of the Focus Report, with more detailed information on these topics provided in Appendices 6.1, 6.2, and 6.3 of the Focus Report.

0.1.1.1 Potential Environmental Effects

This section supersedes Section 8.1.3.1 of the EARD. Without mitigation, the project could interact with the atmospheric environment in the following ways:

- Emissions of combustion gases and fugitive dust from construction activities associated with the replacement ETF, re-aligned pipeline, and marine outfall/diffuser, and related transport of materials during construction, could result in air contaminants that could disperse in the atmosphere to off-site receptors; and
- Emissions of combustion gases, particulate matter, and possibly odour from the replacement ETF during operation and maintenance could result in air contaminants that could disperse in the atmosphere to off-site receptors.

Additionally, since the project will include the combustion of sludge generated in the replacement ETF for energy recovery and odour control, emissions from the combustion of such sludge in the power boiler during operation and maintenance could disperse from mill stacks to off-site receptors.

0.1.1.2 Mitigation

This section supersedes Section 8.1.3.2 of the EARD. The following mitigation measures will be implemented to reduce environmental effects on the atmospheric environment:

- Application of dust suppressants via water truck during dry periods when appropriate;
- Instituting and following a non-idling policy;
- Vehicles and equipment will be maintained in proper working order;
- Operation of the facility will follow regulatory requirements;
- Continuous solids removal from clarifiers to mitigate odour potential by preventing sludge from turning septic;
- Subsurface air injection in the activated sludge to mitigate odour potential;
- Indirect effluent cooling (heat exchangers) to mitigate odour potential; and
- Combustion of sludge in the power boiler may reduce CO₂eq emissions through displacement of other fuels.

0.1.1.3 Characterization of Residual Environmental Effects

This section supersedes Section 8.1.3.3 of the EARD. Residual environmental effects (after the application of mitigation) of the project on the atmospheric environment are re-assessed in this section.

Construction Phase

During the construction phase, emissions are expected to be primarily related to fugitive dust and the operation of heavy equipment, trucking, and related construction activities. Construction activities have the potential to result in changes in the local air quality, primarily related to fugitive dust and particulate matter from material movement as well as emissions from combustion associated with construction equipment.

The construction phase emissions will consist of combustion gas emissions and fugitive dust from the equipment and material movement during the construction of the replacement ETF and from the digging, laying of pipe, and material fill during the installation of the new effluent pipeline. These emissions will be of low magnitude, temporary, highly localized (largely remaining either on the project site or within the NSTIR ROW) and transient along the ROW as construction activities progress, and are not expected to be distinguishable from current ambient air quality most of the time.

During the construction of the replacement ETF, emissions are expected to be primarily related to operation of heavy equipment and related construction activities. Construction related activities have the potential to result in changes in local air quality, primarily related to dust and particulate matter from material movement and emissions from the combustion of fossil fuels in construction equipment. Emissions related to construction activities are expected to be fairly localized, transient, short-term, and reversible.

Given that the replacement ETF will be constructed on an operating pulp mill facility, and in light of the project site's relative distance to the nearest residential receptor, the potential for construction-related emissions from the ETF area to adversely affect nearby receptors is expected to be minimal. Similarly, emissions of construction equipment and fugitive dust associated with the new effluent pipeline will be highly localized, temporary, and transient and are not expected to adversely affect nearby receptors. Given that construction emissions are not likely to be substantive and remain largely within the PFA, they are therefore not assessed further.

Total GHG emissions during construction are expected to be immaterial in the context of Nova Scotia's last reported total of 15.6 Mt CO₂eq. Given the relatively low magnitude of emissions, no further action is taken in the analysis as per the guidance provided in the document *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners* (CEAA 2003).

Operation and Maintenance Phase

Releases of the contaminants listed in the Nova Scotia *Air Quality Regulations* from the NPNS mill have previously been modelled. Because sludge from the replacement ETF will be combusted in the power boiler as part of the project, the assessment of environmental effects of the project on the atmospheric

environment needs to consider a comparison between overall emissions from the pulp mill currently versus those that will occur once the replacement ETF is operational. Therefore, emissions at the existing BHETF are considered for the baseline scenario, and emissions estimated for the proposed replacement ETF are considered for the future operation scenario. The co-combustion of sludge with hog fuel in the power boiler is also considered in the future operation scenario.

During the operation phase, emissions are primarily related to existing emission sources at the facility and fugitive emissions from the replacement ETF. These activities have the potential to result in some limited changes in the local air quality. Once in the operation and maintenance phase, there are no features of the effluent pipeline on land or in the marine environment that would be expected to affect air quality, and as such the effluent pipeline during operation and maintenance is not discussed further.

The United States Environmental Protection Agency, USEPA, in its rulemaking process related to the "Identification of Non-Hazardous Secondary Materials That Are Solid Waste" under the *Resource Conservation and Recovery Act (RCRA)*, has made a technical determination in relation to dewatered pulp and paper sludges that are not discarded and are generated and combusted on-site by pulp and paper mills that burn a significant portion of such materials. In its ruling, the USEPA determined that where such dewatered residuals are managed in a manner that preserves the meaningful heating value of the materials, they can be considered a standard fuel, with combustion-related emissions that are no different than other forest-based solid fuels such as bark (Reference: 40 CFR 241, final rule dated February 7, 2013).

Estimates of emissions of criteria air contaminants (i.e., contaminants with limits specified in the *Nova Scotia Air Quality Regulations*) associated with the existing operation of the NPNS mill (which will continue during construction of the project, but are unrelated to the project itself) are summarized in Table 0.1.1-1. These emissions from existing operations are unchanged from those presented in Section 8.1.3.3 of the EARD.

Table 0.1.1-1: Emissions Inventory – Existing Operations (Baseline Conditions during Construction)

| Source | Carbon Monoxide (g/s) | Nitrogen Oxide (g/s) | Sulphur Dioxide (g/s) | TSP (g/s) | PM _{2.5} (g/s) | Hydrogen Sulphide (g/s) |
|---------------------------------------|-----------------------|----------------------|-----------------------|-----------|-------------------------|-------------------------|
| Power Boiler | 11.4 | 3.40 | - | 3.87 | 1.14 | - |
| Other Mill Point Sources ¹ | 76.9 | 8.72 | 1.73 | 5.61 | 0.79 | 1.60 |
| ETF – Settling Pond | - | - | - | - | - | 0.0202 |
| ETF – Cell 1 | - | - | - | - | - | 0.00008 |
| ETF – Cell 2 | - | - | - | - | - | 0.00006 |
| ETF – Cell 3 | - | - | - | - | - | 0.0001 |
| ETF – Cell 4 | - | - | - | - | - | 0.0001 |

"-" air contaminant is not released in a substantial amount from this source

¹ Each "Other Mill Point Source" was modelled individually and the total emission rate is shown in the total above
Reference: Stantec (2019)

Revised estimates of emissions of criteria air contaminants associated with the operation phase of the project, updated from the information presented in Section 8.1.3.3 of the EARD, are summarized in Table 0.1.1-2.

Table 0.1.1-2: Emissions Inventory – Future Operation and Maintenance

| Source | Carbon Monoxide (g/s) | Nitrogen Oxide (g/s) | Sulphur Dioxide (g/s) | TSP (g/s) | PM _{2.5} (g/s) | Hydrogen Sulphide (g/s) |
|---------------------------------------|-----------------------|----------------------|-----------------------|-----------|-------------------------|-------------------------|
| Power Boiler | 3.26 | 7.42 | 0.358 | 2.77 | 0.595 | - |
| Other Mill Point Sources ¹ | 76.9 | 8.72 | 1.73 | 5.61 | 0.79 | 1.60 |
| Primary Clarifier | - | - | - | - | - | 0.0227 |
| Aeration Basin | - | - | - | - | - | 0.0352 |
| Secondary Clarifier 1 | - | - | - | - | - | 0.011 |
| Secondary Clarifier 2 | - | - | - | - | - | 0.011 |

"-" air contaminant is not released in a substantial amount from this source

"bold" indicates sources/emissions rates that have changed from existing operations

¹ Each "Other Mill Point Source" was modelled individually and the total emission rate is shown in the table above

Reference: Stantec (2019)

In addition to the regulated contaminants presented above, an expanded emissions inventory was developed that considered all potential significant contaminants that could be emitted from the Project. These included metals, polyaromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), and select other contaminants. The potential effects of facility emissions on ambient air quality for the existing baseline and future operation phases of the project were predicted by conducting a dispersion modelling study. The facility emissions calculations and dispersion modelling assessment were conducted by Stantec Consulting Ltd. in their report entitled "Expanded Air Dispersion Modelling Study – Replacement Effluent Treatment Facility", prepared for NPNS (Stantec 2019) and provided in Appendix 6.1 (updated emissions inventory) and Appendix 6.2 (updated dispersion modelling) of the Focus Report.

Ground-level concentrations (GLCs) of air contaminants were predicted for two modelling scenarios, as follows:

1. Existing Operations – emissions consist of existing facility point sources and fugitive emissions from the existing ETF; and
2. Future Operations – emissions consist of existing facility point sources (with the power boiler co-combusting sludge and hog fuel) and fugitive emissions from the new replacement ETF.

Modelling was conducted for a 30 km by 30 km study area with varying receptor grid spacing as presented in Figure 5.3 of the Stantec report. Additionally, ten discrete receptor locations were identified representing the nearest sensitive receptors (residential locations). The locations of these receptors relative to the project are presented in Figure 5.4 of the Stantec report (Stantec 2019).

Based on the modelling results, the predicted ground-level concentrations of the criteria air contaminants of concern (i.e., CO, NO₂, SO₂, TSP, PM_{2.5} and H₂S) from the operation of the existing mill and the future mill (with replacement ETF) are both expected to be in compliance with the reference criteria at the representative off-property discrete receptors (Stantec 2019). The EARD had indicated an exceedance of the maximum permissible ground-level concentrations for H₂S, but based on the revised emissions inventory, the H₂S limits are no longer being exceeded.

With respect to the expanded emissions inventory modelled, emissions were compared to Ontario Reg. 419/50 criteria for context, as none of these contaminants have permissible ground-level concentration limits under Nova Scotia's *Air Quality Regulations*. The Ontario criteria are provided for information and to provide context for the resulting ground-level concentrations of contaminants from the mill, but have no force of law in Nova Scotia. Of these, ammonia, chloroform, total reduced sulphur (TRS), and hexavalent chromium were predicted to have infrequent ground-level concentrations above their respective criteria. At key discrete receptor locations, hexavalent chromium was not predicted to exceed the criteria, and the frequency of exceedance for the other contaminants was less than 0.5%. In addition, in all cases, the report (Stantec 2019) discusses the conservatism and limitations in the emissions estimates and that the model predictions are accordingly conservatively high and likely overestimated.

The diversion of sludge for combustion in the power boiler may displace the use of fossil fuel, depending on the dryness, thereby reducing the overall GHG emissions from the pulp mill. Given some potential GHG reduction and considering the change in total GHG emissions during future operation are expected to be immaterial in the context of Nova Scotia's last reported total of 15.6 Mt CO₂eq, no further action is required in the analysis as per the guidance provided in the document *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners* (CEAA 2003).

0.1.1.4 Summary

In summary, the residual environmental effects of the project on the atmospheric environment are summarized in Table 0.1.1-3 below.

Table 0.1.1-3: Summary of Residual Environmental Effects Related to the Atmospheric Environment VEC

| VEC | Activities | Potential Effects | Mitigative Measure | Residual Effect | Significance of Residual Effect |
|-----------------------------------|---|---|--|--|---------------------------------|
| Site Preparation and Construction | | | | | |
| Atmospheric - Air Quality (dust) | <ul style="list-style-type: none"> · Vegetation removal · Restoration following pipe installation · Site preparation | Dust and airborne particulate generation and deposition | <ul style="list-style-type: none"> Application of dust suppressants where appropriate Institute anti-idling policy Maintain equipment | Negligible with standard mitigation applied. Indirect, Reversible Magnitude - negligible Duration – short-term Geographic extent – local to construction area, transient Context – existing and proposed buffers from receptors | Not Significant -Adverse |
| Atmospheric – | Emissions from | Contribution to | Institute anti-idling policy | Negligible with standard | Not Significant |

| VEC | Activities | Potential Effects | Mitigative Measure | Residual Effect | Significance of Residual Effect |
|---|--|--|---|---|---------------------------------|
| Air Quality Combustion gases (NO _x , SO _x , CO, H ₂ S) | construction equipment | degradation of air quality | Maintain equipment | mitigation applied. Indirect, Reversible Magnitude - negligible Duration – short-term Geographic extent – local to construction area, transient Context – existing and proposed buffers from receptors | -Adverse |
| Atmospheric - Climate (GHG Emissions by vehicles) | Operation of construction machinery in all activities and transport vehicles | Contribution to degradation of air quality | Institute anti-idling policy Maintain equipment | Negligible. Indirect, Irreversible Magnitude - negligible Duration – short-term Geographic extent - regional Context - global atmosphere | Not Significant -Adverse |
| Operation and Maintenance | | | | | |
| Atmospheric – Air Quality Combustion gases (NO _x , SO _x , CO, H ₂ S) | Emissions from transport vehicles | Contribution to degradation of air quality | Institute anti-idling policy Maintain equipment | Negligible with standard mitigation applied. Indirect, Reversible Magnitude - negligible Duration – short-term Geographic extent – local to construction area Context – existing and proposed buffers from receptors | Not Significant -Adverse |
| Atmospheric - Air Quality Point and Fugitive Emissions (H ₂ S/odour) | Fugitive emissions from ETF and power boiler | Nuisance effect Potential for perception by nearby receptors at times | Continuous solids removal from clarifiers Subsurface air injection Indirect effluent cooling | Negligible with standard mitigation applied. Indirect, Reversible Magnitude - negligible Duration – short-term Geographic extent - site- specific Context – infrequent, nuisance effect | Not Significant - Adverse |
| Atmospheric – Climate (GHG Emissions by vehicles) | Operation of facilities in all activities and transport vehicles | Contribution to degradation of air quality | Institute anti-idling policy Maintain equipment | Negligible. Indirect, Irreversible Magnitude - negligible Duration – long-term Geographic extent - regional Context - global atmosphere | Not Significant -Adverse |

During construction, the effects of the project on ambient air quality due to fugitive dust and emissions from equipment are expected to be very localized and minimal using standard and site specific mitigation as identified. Appropriate mitigative measures will be taken when required to ensure nuisance dust levels are controlled. It is unlikely that emissions will exceed Nova Scotia or federal ambient air quality objectives.

During operation and maintenance, GHGs for the future operating scenario are not anticipated to be materially different from the existing facility emissions, with the overall change being immaterial in the context of regional emissions. Emissions of the regulated air contaminants are predicted to be below the provincially-regulated maximum permissible ground-level concentrations (Stantec 2019).

In consideration of the above, and in light of the proposed mitigation, the residual environmental effects of the project on the atmospheric environment during all phase of the project are rated not significant, with a high level of confidence.

0.1.1.5 Follow-up and Monitoring

Follow up and monitoring using the mill's current regulated source emission testing program will verify the environmental effects predictions and the effectiveness of mitigation. The facility currently undergoes a source emissions testing program, which will continue as per the Industrial Approval. Pulp and paper mill sludges are considered, in most jurisdictions, a standard fuel with no requirements for additional monitoring outside of the source emissions testing program.

The existing ambient air monitoring program is expected to continue during future operation and will collect data on the concentration of the various air contaminants over time for comparison of the model predictions conducted for the project to the Nova Scotia *Air Quality Regulations*. The ambient air quality monitoring program will be reviewed and updated as appropriate to confirm the predictions and assumptions of the modelling assessment and its conclusions, as required. See Section 6.3 of the Focus Report.

0.1.2 Acoustic Environment

With respect to potential noise receptors, the proposed location of the re-aligned treated effluent pipeline is generally similar (i.e., typically within 20 m farther or closer to a given receptor) to the original pipeline route as presented in the EARD. Additionally, the proposed re-aligned treated effluent pipeline construction methodology has a similar noise profile to the original pipeline construction methodology. As a result, despite the change in alignment, the noise modelling predictions during construction of the treated effluent pipeline remain the same as presented in Section 8.2 of the EARD. Additional modelling was also conducted to determine the potential effects of noise from horizontal directional drilling (HDD) along the pipeline route in response to a question from regulatory authorities that arose in the course of their review of the EARD, but since a trenching methodology is now being considered as the primary methodology for the watercourse and wetland crossings, this information does not need to be updated in the effects assessment for the acoustic environment.

Overall, the scope of the acoustic environment VEC, existing conditions, mitigation, and regulatory requirements remain the same as presented in Section 8.2 of the EARD, and the overall residual effects significance of the project on the acoustic environment remains not significant, as with the EARD. No further effects assessment is therefore believed to be required with respect to the acoustic environment.

0.1.3 Soils and Geology

Despite the re-alignment of the treated effluent pipeline route, no change in the predicted potential environmental effects with respect to soils and geology is anticipated beyond those described in the EARD. The assessment within the EARD reflected desktop information on the soils and geology in the area of the proposed re-aligned treated effluent pipeline. The re-aligned location of the treated effluent pipeline has not changed the understanding of the existing environment and potential effects with respect to soils and geology as was presented in Section 8.3 of the EARD. With implementation of identified mitigative measures and contingency plans, it is not anticipated that the project will result in significant adverse residual environmental effects to soils and geology. No further effects assessment is therefore believed to be required with respect to soils and geology.

0.1.4 Surface Water

The environmental effects assessment relative to surface water and the replacement ETF footprint presented in Section 8.4 of the EARD is applicable to the current project and remains unchanged; thus the focus of the updated assessment below is on the potential effects of the re-aligned treated effluent pipeline on surface water. An update to the environmental effects of the pipeline on surface water is required because the treated effluent pipeline will be constructed in a different route than was presented in the EARD (i.e., now located adjacent to Highway 106, outside of the road shoulder, within the NSTIR ROW on the east side of the highway, whereas in the EARD, the treated effluent pipeline was to be in the road shoulder of Highway 106, on the west side—the alignment has since been modified at NSTIR's request).

The scope of the surface water VEC, boundaries, significance thresholds, and existing environment remain the same as presented in Section 8.4 of the EARD.

Surface water is considered from the perspective of freshwater water quality and quantity in relation to other VECs. No potable surface water supplies were identified in relation to the project. Marine waters are discussed in Focus Report Section 7.3.

A revised environmental effects assessment for surface water is presented below. The scope of the VEC and existing conditions is presented in the EARD (Section 8.4) with additional watercourse assessment provided in Focus Report Section 7.1.

0.1.4.1 Potential Environmental Effects

This section supersedes Section 8.4.3.1 of the EARD with respect to the re-aligned treated effluent pipeline route; however, the information presented in Section 8.4.3.1 of the EARD for the replacement ETF footprint remains the same as presented in that section.

Key interactions between the re-aligned treated effluent pipeline and surface water with the potential to result in both direct and indirect adverse effects to surface water during construction of the project include:

- Potential for sediment or other contaminant, if encountered, to enter watercourses, wetlands and/or drainage ditches during construction activities such as: vegetation clearing, grubbing and potentially grading; and watercourse and wetland crossings; and,
- Surface drainage patterns may be altered during the construction of the project and potential changes to surface water hydrology may result in indirect changes to water quantity or quality.

Integrity testing of the pipeline will utilize a water source currently used (Middle River) and following testing, it will discharge to the marine environment. Therefore, direct effects of the pipeline on surface water are not anticipated from this activity. Once in operation and following soil stabilization of watercourse crossing areas, there are no effects anticipated from the presence, operation, or maintenance of the pipeline on surface water; thus, the discussion that follows will focus on potential effects that could arise during the construction phase.

0.1.4.2 Mitigation

This section supersedes Section 8.4.3.2 of the EARD with respect to the re-aligned treated effluent pipeline route; however, the information presented in Section 8.4.321 of the EARD for the replacement ETF footprint remains the same as presented in that section.

Key mitigation to be implemented to minimize effects of the re-aligned treated effluent pipeline on surface water includes:

- Environmental management and planning as identified in the Environmental Planning and Mitigation (See Section 0.2 below), including the requirement for a contractor generated Erosion and Sedimentation Control Plan, petroleum/oils/lubricants management, and Environmental Protection Plan (EPP).
- Environmental contingency planning to include “Stop-work” contingency if a contaminant that may potentially impact surface water quality is encountered.
- Prohibition on fording of watercourses and prioritization of access from Highway 106 or existing roads.
- If required, temporary clear span bridges or temporary culvert meeting Nova Scotia Environment/Fisheries and Oceans Canada (NSE/DFO) requirements, construction windows and restoration requirements, may be used.
- Watercourse and wetland crossings to be conducted under applicable provincial (NSE) and/or federal approvals (DFO and/or Transport Canada).
- Determination of the appropriate crossing method for each watercourse crossing based on sensitivity of that watercourse (e.g., considering factors such as: co-location with a wetland, particularly with highly organic bottom substrate; presence, seasonality and characteristic/life stage of fish habitat; suitability of restoration options; susceptibility to erosion and sediment generation; stability of banks and bottom and substrate type; and requirement for and ease of dewatering).
- Development of alternative crossing design options and contingency plans and materials to be on-site in the event of a failure.

- Construction using “in the dry” / isolation techniques (e.g., dam and pump, flume, coffer dam) to occur at times when high flows are not anticipated and within NSE’s low flow construction window.
- Isolation techniques will be designed based on accommodation of potential high flow periods during the construction period and to prevent erosion and release of sediments.
- For watercourses crossed using methods such as dam and pump or flume; restoration of watercourses should be:
 - To original configuration (i.e., bed and bank width, depth, contour, and gradient) to the extent possible to maintain existing hydrology, and habitat character and passage if applicable. If the original gradient cannot be restored, a stable gradient that does not obstruct fish passage (as applicable) should be established.
 - To original substrate type. In some cases, the existing substrate may be changed from organic based to gravel/rock in order to maintain stable cover over the trench.
 - Undertaken at the time the isolation is still in place.
 - Restoration of flow is to be conducted in a manner that gradually equalizes flow and allows suspended material to be removed prior to completion.
- Material removed from trenches within the channel will be segregated with the top 10-50 cm of substrate stored separately to be replaced to the channel during backfilling, where practical.
- Use of appropriately sized clean stone/rock for channel bed and bank restoration if existing channel material is not suitable or for erosion and sediment control and coffer dams.
- Use of granular material for coffer dams may require poly-plastic on the outside face to prevent inflow. Material for infill (temporary or permanent) will not be obtained from an existing water body but from a clean approved land-based source.
- De-watering of trenches or establishment of isolated crossings to be conducted in a manner that minimizes potential for erosion and sedimentation including use of adjacent vegetated areas or filtration systems.
- If pumping of flow is conducted from fish habitat, the pump must be installed to prevent entrainment/impingement of fish such as use of a screen which is regularly inspected and cleaned.
- If a trenchless method (e.g. Horizontal Directional Drilling (HDD)) is used to cross watercourses or wetlands, additional geotechnical information will be required and additional mitigation identified consistent with Canadian Association of Petroleum Producers (CAPP 2018; *Pipeline Associated Watercourse Crossing Fish and Fish Habitat Impact Assessment Tool*) guidance.
- Temporary diversion of surface runoff from open trenches will be redirected to the same watershed with appropriate erosion and sedimentation controls.
- Standard pipeline construction activities are designed to avoid circumstances that result in permanent diversion and/or unnatural retention of water along the construction footprint by following recommendations from various industry and provincial guidelines.

0.1.4.3 Characterization of Residual Environmental Effects

This section supersedes Section 8.4.3.3 of the EARD with respect to the re-aligned treated effluent pipeline route; however, the information presented in Section 8.4.331 of the EARD for the replacement

ETF footprint remains the same as presented in that section. A summary of residual environmental effects of the re-aligned treated effluent pipeline on surface water are discussed below.

Construction Phase

Direct watercourse interaction will occur in relation to construction of crossings of watercourses and wetlands along the re-aligned treated effluent pipeline route. Additionally, some crossings of undefined drainage channels and ditches may also occur, and work may occur within 30 m of a watercourse. Stormwater drainage will be relocated where required, following the NSE watercourse alteration approval process as applicable. Watercourses (as defined by NSE) and wetlands, crossed along the re-aligned pipeline route will be further evaluated to determine appropriate crossing methods and associated mitigative techniques. Appropriate crossing design will be required prior to the applicable approval application and once approved, approval requirements will be followed.

Potential changes in water quality due to erosion and/or sediment generation will be mitigated by standard erosion and sediment control measures, and a construction monitoring program.

0.1.4.4 Summary

Table 0.1.4-1 summarizes the effects analysis for surface water including a summary of the potential, associated mitigation measures, and the determination of residual effect.

Table 0.1.4-1: Residual Environmental Effects on Surface Water

| Activities | Potential Effects | Mitigative Factors and Measures | Residual Effects | Significance of Residual Effects |
|---|---|--|--|----------------------------------|
| Construction | | | | |
| Site preparation vegetation clearing, grubbing and grading; and access road maintenance | Degradation of water quality Alteration of natural surface water flow patterns | Mitigation as noted in Section 0.1.4.2 including key items: Environmental management planning and standard mitigation as outlined in Section 0.2. Comply with NSE conditions of approval for clearing within 30 m of watercourses. Implementation of EPP, which shall include erosion and sediment control, buffer zones, stormwater management plan, and spill prevention and emergency response plan. Project Environmental Inspector will monitor the implementation of the EPP mitigation during all critical phases of construction and repair, if warranted. Maintain drainage across the construction ROW during all phases of construction; and not cause ponding of water or | Localized alteration of natural surface drainage patterns until trench settlement is complete Negligible with standard mitigation applied. Direct and Indirect, Reversible Magnitude - negligible Duration – one to two years for construction Frequency – daily until complete for construction; Geographic extent – within 500 m of watercourse crossings or where pipeline is within 30 m of a watercourse or drainage Context – footprint generally within areas previously disturbed | Not Significant - Adverse |

| Activities | Potential Effects | Mitigative Factors and Measures | Residual Effects | Significance of Residual Effects |
|--|---|--|--|----------------------------------|
| | | unintentional channelization of surface water flows. Restrict the removal of riparian plants to appropriate setbacks from surface waters. | | |
| Construction and installation of effluent pipeline (pipeline trenching, backfilling, watercourse and wetland crossings (trenching assumed), pipe testing and pipeline commissioning) | Reduction in surface water quality Changes to stormwater runoff and potential impact to water quantity to nearby watercourse/ wetlands | Mitigation as noted in Section 0.1.4.2 including key items: Ensure all necessary approvals, licenses and permits required for a particular activity are obtained prior to the commencement of the activity. Environmental management planning and mitigation as outlined in Section 0.2. Implementation of EPP. An erosion and sediment control plan for the project to be developed and erosion and sediment control measures to be implemented including those in Section 0.2. Evaluate crossing method in relation to watercourse sensitivity and conduct instream crossing of NSE defined watercourses following NSE/DFO approval process, as applicable. | Negligible with standard mitigation applied. Indirect, Reversible Magnitude - negligible Duration – long term (project duration) Frequency – daily until complete Geographic extent - site-specific Context - footprint partially within areas previously disturbed (historic highway construction and existing culverts or stormwater drainage) | Not Significant - Adverse |

As identified in the table above, watercourse crossing disturbance will occur during a temporary construction period and watercourse restoration will be implemented limiting the potential of occurrences of long or extended-term residual environmental effects on surface water quality of high magnitude. Watercourse crossing construction methodology and associated mitigation is well established. With the implementation of the identified mitigation measures, the residual environmental effects of the project on surface water quality and quantity during all phases of the project are rated not significant, with a moderate to high level of confidence.

0.1.4.5 Follow-up and Monitoring

Implementation of sediment and erosion control is a well-established and effective mitigation. Temporary effects are anticipated for trenched watercourse crossings. The magnitude and duration of effects will be minimized through implementation of appropriate mitigation including restoration, and by follow-up and monitoring. Compliance monitoring is proposed to confirm appropriate implementation of sediment and erosion control measures and of mitigation associated with crossings.

Follow-up will be implemented to determine and adjust restoration for watercourse crossings, if required.

The NPNS surface water monitoring program will be adjusted for the project and maintained over the life of the project in accordance with requirements stipulated by NSE. Baseline surface water monitoring along the re-aligned pipeline route will be completed prior to project commencement.

During construction, additional monitoring required to achieve environmental compliance will be outlined in the EPP. The Construction Monitoring Program will be developed in consultation with NSE and will include monitoring of surface water (pH and Total Suspended Solids - TSS) during storm events. Watercourse monitoring will be conducted as part of the visual inspection of the construction of the project by a specialist. The banks and approach slopes of watercourses within 10 m of the footprint will be monitored for bank stability, morphology, soil erosion, invasive species, soil productivity, revegetation, and the effectiveness of erosion control measures. All watercourses crossed will be revisited as necessary following construction to ensure that they are stabilized and restoration goals met. Restoration surveys for watercourses will also include an evaluation of the success of bed, bank and riparian erosion control and vegetation re-establishment.

0.1.5 Groundwater

No change in the predicted potential environmental effects of the project on groundwater is anticipated, beyond those described in Section 8.5 of the EARD. The assessment within the EARD reflected desktop information on the groundwater resources in the general area of the treated effluent pipeline. The re-aligned location of the treated effluent pipeline has not changed the understanding of the existing environment, and potential effects identified in the EARD centre around impacts resulting from a potential accident or malfunction. See Focus Report Section 5.2 for discussion of monitoring of pipeline leaks or spills.

The scope of the groundwater VEC, existing conditions, mitigation, and regulatory requirements remain the same as presented in Section 8.5 of the EARD, and the overall residual effects significance of the project on groundwater remains not significant, consistent with the EARD. No further effects assessment is therefore believed to be required with respect to groundwater.

0.1.6 Freshwater Fish and Fish Habitat

This section addresses watercourses with identified freshwater fish habitat. The ETF footprint in relation to freshwater fish and fish habitat effects has not changed from the EARD assessment; thus the focus below is on the re-aligned treated effluent pipeline and its potential effects on freshwater fish and fish habitat. The assessment of fish habitat assumes effects and mitigation as identified for surface water quality and quantity considerations have been applied.

A revised environmental effects assessment relating to potential effects of the re-aligned treated effluent pipeline on freshwater fish and fish habitat is presented below. An update to the environmental effects of the pipeline on freshwater fish and fish habitat is required because the treated effluent pipeline will be constructed in a different route than was presented in the EARD (i.e., now located adjacent to Highway 106, outside of the road shoulder, within the NSTIR ROW on the east side

of the highway, whereas in the EARD, the treated effluent pipeline was to be in the road shoulder of Highway 106, on the west side—the alignment has since been modified at NSTIR's request).

The scope of the freshwater fish and fish habitat VEC, boundaries, significance thresholds, and existing environment for the ETF footprint remain the same as presented in Section 8.6 of the EARD. The updated existing environment in relation to freshwater fish and fish habitat is presented in Focus Report Section 7.1.

0.1.6.1 Potential Environmental Effects

This section supersedes Section 8.6.3.1 of the EARD with respect to the re-aligned treated effluent pipeline route; however, the information presented in Section 8.6.3.1 of the EARD for the replacement ETF footprint remains the same as presented in that section.

Potential interactions of the re-aligned treated effluent pipeline with freshwater fish and fish habitat include:

- Construction activities have the potential to result in the direct permanent or temporary loss of fish habitat in areas where the project footprint encroaches on fish habitat;
- Construction could also result in the indirect loss of fish habitat in areas where the presence of project-related facilities cause a change in surface water availability (e.g., a local change in drainage pattern or hydrology) or changes to components of habitat (e.g., watercourse structure/cover, riparian cover, food supply, water temperature and dissolved oxygen);
- Watercourse (and associated wetland) crossings could restrict fish passage; and
- Construction in the areas of wetlands and watercourses (including within the 30 m buffer) could increase erosion rates in proximity to aquatic receptors and affect water quality (sediment generation as noted for surface water section above).

Once construction is complete, watercourses are restored with hydrology maintained, and offset (if required) has been implemented; as such, there are no anticipated environmental effects to freshwater fish and fish habitat during operation and maintenance of the project.

0.1.6.2 Mitigation

This section supersedes Section 8.6.3.2 of the EARD with respect to the re-aligned treated effluent pipeline route; however, the information presented in Section 8.6.3.2 of the EARD for the replacement ETF footprint remains the same as presented in that section.

Mitigation measures for the proposed re-aligned treated effluent pipeline in relation to freshwater fish and fish habitat include the following:

- Environmental management and planning as identified in the Environmental Planning and Mitigation section in Section 0.2 below, including the requirement for a contractor generated Erosion and Sedimentation Control Plan, petroleum/oils/lubricants management, and Environmental Protection Plan (EPP).

- Mitigation as identified for surface water and wetlands protection, including following NSE approvals processes.
- Determination of appropriate crossing method for watercourses with fish habitat will follow the CAPP (2018) assessment methodology.
- Where required (i.e., where watercourse disturbance is necessary), obtaining an authorization under Section 35(2) of the *Fisheries Act* for any project activities that would result in the loss of fish habitat or other activities that result in a harmful alteration, disruption or destruction of fish habitat (as determined by DFO), with appropriate offsetting.
- Construction and operation activities will comply with the conditions of watercourse alteration approvals and *Fisheries Act* authorizations (as applicable).
- In fish bearing watercourses, a fish rescue program will be implemented for crossings undertaken using isolation techniques or infill, prior to undertaking in-stream construction activities. Fish impounded in these reaches will be removed and relocated under DFO permit and as per DFO guidance and consultation.
- Project team and contractors will be educated on recognizing potential aquatic species at risk (SAR) that may occur within the proposed watercourse crossings.

0.1.6.3 Characterization of Residual Environmental Effects

This section supersedes Section 8.6.3.3 of the EARD with respect to the re-aligned treated effluent pipeline route; however, the information presented in Section 8.6.3.3 of the EARD for the replacement ETF footprint remains the same as presented in that section.

Construction Phase

Construction related activities have potential to result in changes in water quality due to erosion and/or sediment generation which can be transported into surface waters. Any impacts to on-site surface waters, including wetlands and streams, will most likely be a result of erosion, sediment transport or chemical contamination from stormwater runoff.

Direct freshwater fish habitat loss is estimated conservatively based on average width of the watercourse (see Focus Report Figure 7.1-1) within the potential project area and the length of the pipeline route crossed:

- WC02 – 1,000 m²
- WC08 – 70 m²
- WC09 - 500 m²
- WC10 - 200 m²
- WC11 – 3,500 m²
- WC12 - 600 m²
- WC13 – 1,000, m²
- WC17 - 70 m²

The very conservative estimate of potential loss of freshwater fish habitat totals approximately 7,000 m². On completion of watercourse crossing design, an application for authorization under Section 35(2) of the *Fisheries Act*, reflecting actual proposed alteration footprint and associated mitigation and proposed offsetting measures, will be made. Construction will proceed on approval of NSE’s watercourse alteration process and authorization under the federal *Fisheries Act* (with appropriate offsetting), as required by NSE and DFO.

Operation and Maintenance Phase

Once the project is operational, no impacts are anticipated to freshwater fish and fish habitat during the operation and maintenance phase of the re-aligned treated effluent pipeline. Operation and maintenance activities at the proposed ETF facility will be similar to existing NPNS activities. Operation and maintenance activities along the proposed re-aligned treated effluent pipeline route will not include maintenance of access roads, and no significant interaction is anticipated with the project.

0.1.6.4 Summary

Table 0.1.6-1, provides a summary of the residual environmental effects of the project on freshwater fish and fish habitat. With the implementation of the identified mitigation measures, significant adverse residual effects to the surface water quality component of fish habitat are not likely to occur.

Table 0.1.6-1: Summary of Residual Environmental Effects on Freshwater Fish and Fish Habitat

| Phase and Activities | Potential Effects | Mitigative Factors and Measures | Residual Effects | Significance of Residual Effects |
|---|---|---|---|----------------------------------|
| Construction | | | | |
| Site preparation vegetation clearing, grubbing and grading | Indirect loss of fish habitat - suspended sediment generation and other water quality effects; and, | Mitigation as noted in Section 0.1.6.2 including key items: | Negligible with standard mitigation applied. | Not Significant -Adverse |
| Construction of effluent treatment facility | | Implement mitigation measures as outlined in Section 0.2 including erosion and sediment control | Indirect, Reversible Magnitude - negligible Duration – construction season plus 3-5 years Frequency - low Geographic extent - site-specific | |
| Construction and installation of effluent pipeline | Indirect effects in relation to hydrological changes | Comply with NSE conditions of approval for clearing within 30 m of watercourses | Context – existing Highway 106 ROW and existing NPNS industrial site | |
| Pipeline trench backfilling, watercourse and wetland crossings (trenching assumed), pipe testing and pipeline commissioning | | | | |

| Phase and Activities | Potential Effects | Mitigative Factors and Measures | Residual Effects | Significance of Residual Effects |
|----------------------|-----------------------------|---|--|----------------------------------|
| | Direct Loss of Fish Habitat | <p>Mitigation as noted in Section 0.1.6.2 including key items:</p> <p>Comply with NSE watercourse alteration conditions of approval for activities within 30 m of watercourses</p> <p>Conduct fish rescue under DFO permit for areas of direct habitat loss</p> <p>Comply with DFO Authorization conditions of approval for work in fish bearing watercourses including approved offset and effects monitoring</p> <p>Project team and contractors will be educated to recognize potential SAR that may occur within the project area</p> | <p>Negligible with standard mitigation applied.</p> <p>Direct, Irreversible</p> <p>Magnitude - negligible</p> <p>Duration – long term (duration of construction phase)</p> <p>Frequency - low</p> <p>Geographic extent - site-specific</p> <p>Context - existing Highway 106 ROW and existing NPNS industrial site</p> | Not Significant –Adverse |

In light of the above, and with authorization and offsetting measures (as required) for direct loss of fish habitat, the relocation of fish prior to crossing construction, and the implementation of other mitigation measures aimed at reducing or minimizing environmental effects on fish and fish habitat, the residual environmental effects of the project on freshwater fish and fish habitat during all phases of the project are rated not significant, with a moderate level of confidence. The implementation of water management features, water quality monitoring, groundwater level monitoring, and other follow-up measures to monitor changes to water quality or water levels arising from the project, with adaptive management measures implemented as necessary to address those changes, will improve the confidence of this prediction.

0.1.6.5 Follow-up and Monitoring

The following monitoring and follow-up efforts in relation to freshwater fish and fish habitat (in addition to those identified for surface water) will be implemented as a part of the project:

- On development of crossing design, field verification of fish habitat within watercourses in the vicinity of the project footprint will be undertaken as part of the approval application;
- Baseline, compliance and effects monitoring of surface water quality as described for the surface water VEC;
- Compliance monitoring as required to meet regulatory approvals; and
- Follow-up effects monitoring of fish habitat offset, if required, to meet DFO requirements.

0.1.7 Wetlands

This section addresses potential environmental effects of the project on wetlands, with particular focus on the re-aligned treated effluent pipeline route. The environmental effects assessment for the replacement ETF footprint is unchanged from that presented in Section 8.7 of the EARD; thus the focus below is on the re-aligned treated effluent pipeline and its potential effects on wetlands.

A revised assessment of the environmental effects assessment of the re-aligned treated effluent pipeline on wetlands is presented below. An update to the environmental effects of the pipeline on wetlands is required because the treated effluent pipeline will be constructed in a different route than was presented in the EARD (i.e., now located adjacent to Highway 106, outside of the road shoulder, within the NSTIR ROW on the east side of the highway, whereas in the EARD, the treated effluent pipeline was to be in the road shoulder of Highway 106, on the west side—the alignment has since been modified at NSTIR's request).

The scope of the wetlands VEC, boundaries, significance thresholds, and existing environment for the ETF footprint remain the same as presented in Section 8.7 of the EARD. The revised existing environment is presented in Focus Report Section 5.1.

0.1.7.1 Potential Environmental Effects

This section supersedes Section 8.7.3.1 of the EARD with respect to the re-aligned treated effluent pipeline route; however, the information presented in Section 8.7.3.1 of the EARD for the replacement ETF footprint remains the same as presented in that section.

The project is expected to interact directly with wetlands along the land-based portion of the re-aligned treated effluent pipeline route throughout the construction phase of the project. The primary impacts to wetlands will include the direct loss of wetland area and/or function as a result of the construction of the pipeline. Wetlands within the construction footprint will be subjected to project activities such as site clearing, grubbing and the construction of infrastructure, including potential loss of function related to trenching. Additionally, wetlands adjacent to the re-aligned pipeline footprint are anticipated to be subject only to indirect effects due to impairment of wetland function during the construction, which are likely to improve over time. For these wetlands located outside, but adjacent to the pipeline construction area, anticipated potential indirect impacts are related to surface water quality, potentially impairing wetland function. These include sediment deposition, potential contaminant spills, potential nutrient loading (e.g., from hydroseeding), or changes to natural wetland pH. The installation of the pipeline trench is also expected to involve dewatering particularly in the vicinity of wetlands, deep peat and high water table areas.

More specifically, the project may interact with wetlands in the following ways:

- The construction phase of the project will potentially result in the direct loss of approximately 1 ha of shrub swamp wetland and approximately 1 ha of other wetland types (predominately marshes). This is based on the assumption of total loss of wetland area located within the NSTIR ROW portion east of Highway 106 and additional loss within the footprint crossing the Pictou roundabout area. This is

expected to be a conservative estimate as the actual pipeline footprint is expected to be considerably smaller in area than the extent of the NSTIR ROW.

- The construction phase of the project may result in indirect (through surface water and groundwater pathways) effects to wetlands that are located adjacent to the pipeline footprint.
- Construction activities (e.g., excavation, dewatering and infilling) that may occur up-gradient of wetlands have the potential to alter natural drainage patterns, increase erosion rates, or change hydrology, potentially affecting wetland function.
- Vegetation removal has potential to affect adjacent wetlands and wetland function through habitat loss, the introduction of exotic or invasive species, soil compaction, increased erosion rates, and sedimentation.
- Re-vegetation and hydroseeding of disturbed project areas may impact wetlands during site reclamation following construction through the introduction of exotic or invasive species and the potential for nutrient loading.

No interaction is anticipated between the project and wetlands during the operation and maintenance phases, as no further ground disturbance is anticipated and no new indirect effects beyond those that arose during the construction phase are expected.

0.1.7.2 Mitigation

This section supersedes Section 8.7.3.2 of the EARD with respect to the re-aligned treated effluent pipeline route; however, the information presented in Section 8.7.3.2 of the EARD for the replacement ETF footprint remains the same as presented in that section.

The following measures will be implemented in relation to wetlands along the land based portion of the re-aligned treated effluent pipeline route:

- Meeting the Nova Scotia Wetland Conservation Policy (Government of Nova Scotia 2011).
- Environmental management and planning as identified in the Environmental Planning and Mitigation Section 0.2 below, including the requirement and compliance with a contractor-generated Erosion and Sedimentation Control Plan, petroleum/oils/lubricants management, and Environmental Protection Plan (EPP).
- Mitigation as identified for surface water and fish habitat protection, including following NSE approvals processes and compliance with approval conditions and EPP.
- Where required, wetland alteration approvals will include appropriate compensation for net loss of wetland function, developed in consultation with NSE.
- Minimization of the footprint where possible within and adjacent to wetlands.
- Establish wetland and watercourse buffers, preserving natural vegetation, with clearly defined and flagged boundaries prior to construction activities.
- Wetlands will not be used as temporary workspaces, unless required for site-specific purposes and prior approval obtained from Nova Scotia Environment (NSE).
- Where practical, conduct ground level cutting using manually operated chainsaws and hand tools, mowing and mulching of wetland vegetation instead of grubbing or use of mechanical harvesters.

- Use of granular material for cofferdams may require poly-plastic on the outside face to prevent inflow. Material for infill (temporary or permanent) must be obtained from a clean, approved land based source, and not from an existing waterbody.
- De-watering of trenches or establishment of isolated crossings to be conducted in a manner that minimizes potential for erosion and sedimentation, including use of adjacent vegetated areas or filtration systems.
- Ditch plugs or similar water control structures will be used in the trench at either end of wetland crossings where there is the potential of water migration along the trench.
- Grubbing will include the removal of the upper layer, approximately 30 cm, of vegetated topsoil from wetland areas within the trench width to be set aside for re-use during restoration.
- Soils will be stored in such a way as to avoid the mixing of topsoil with subsurface soils.
- Wetland topsoil and sub-surface soils stored for re-use must be routinely wetted to ensure they are 'live' when re-used for restoration purposes.
- Replace trench material as soon as practicable, and re-establish pre-construction contours within wetland boundary to re-establish drainage patterns.
- To the extent possible, backfilling will be done using the sub-surface soil material that had been previously excavated from the wetland areas being backfilled.
- To the extent possible, the stored vegetated topsoil layer is to be reapplied as the top layer of wetland soil covering the now backfilled trench.
- Progressive rehabilitation practices will focus on restoring topography, hydrology and vegetation in disturbed wetland areas where practicable, to reduce permanent loss. Natural re-vegetation for wetlands will be employed.
- Cleaning of equipment between wetlands and monitoring for invasive species and appropriate control if required.
- Minimizing hydroseeding in wetland buffers and not applying in wetlands.
- Maintain existing hydrologic conditions in wetlands and watercourses and conduct preventive maintenance as required to limit potential hydrological impacts.

0.1.7.3 Characterization of Residual Environmental Effects

This section supersedes Section 8.7.3.3 of the EARD with respect to the re-aligned treated effluent pipeline route; however, the information presented in Section 8.7.3.3 of the EARD for the replacement ETF footprint remains the same as presented in that section.

The following is a characterization of the residual environmental effects of the project on wetlands as they pertain to the project phases.

Construction Phase

Unavoidable permanent direct wetland loss (area and associated functions) is anticipated for those wetlands located within the ETF footprint area (i.e., Wetlands WL-1 and WL-2). For the wetlands crossed by the pipeline trench, a conservative estimate of direct wetland loss has been identified based on the potential to affect the wetland within the 15 m work space, and for the portion of the pipeline adjacent

to Highway 106. The remaining wetland area within the NSTIR ROW (east of the highway) is assumed to be potentially affected. It is noted that under the Nova Scotia Wetland Conservation Policy, approval is not required for linear developments that are less than 10 m wide and less than 600 square metres (0.06 ha) in total area (such as forest access roads, secondary roads, and driveways) through shrub or wooded swamps that are not classified as “Wetlands of Special Significance”.

An estimate of potential wetland loss associated with the project is:

- WL-1 (wet meadow) – 0.036 ha
- WL-2 (shrub swamp) – 0.12 ha
- WL-5A (shrub swamp/wet meadow) – 0.46 ha
- WL-7 (riparian floodplain) -0.01 ha
- WL8-2019 (shrub swamp) -0.071 ha
- WL9A&B (shrub swamp) – 0.035 ha
- WL10 (shrub swamp/marsh) – 0.179 ha
- WL19 (shrub swamp/marsh) – 0.007 ha
- WL20 (shrub swamp) – 0.008 ha
- WL11-2019 (shrub swamp) – 0.249 ha
- WL13 (fen/marsh) – 0.56 ha
- WL13B (shrub swamp) – 0.026 ha
- WL16 (treed swamp) – 0.107 ha

The direct wetland impact is an unavoidable loss of less than 2 ha to accomplish the project, which will occur during construction and may persist through the life of the project. The project has been designed and developed to first avoid wetlands, and where avoidance is not possible, to minimize the area of disturbance to that which is required to meet the Project objectives and to minimize the net loss of wetland area and/or function. Furthermore, restoration activities will be undertaken at wetland crossings in a manner that aims to maintain wetland hydrology in adjacent areas of the wetland, restore naturally occurring wetland vegetation, and to the extent possible, return any lost wetland function to the trenched area. Wetland alteration will be undertaken within the context of NSE approval requirements and fulfillment of compensation obligations for “no net loss” of wetland function. The wetland compensation plan will be developed prior to disturbance following Nova Scotia Wetland Conservation Policy and in consultation with NSE. As many of the wetlands are associated with watercourses and fish habitat, alterations may also require NSE watercourse alteration approval, and/or *Fisheries Act* authorizations, as noted in Section 1.6.

With the proper implementation of proposed mitigation measures, permitting and compensation, impacts to wetlands as a result of construction of the project are not anticipated to be significant.

Operation and Maintenance Phase

The operation and maintenance of the replacement ETF and pipeline, including their presence and periodic maintenance activities is not expected to interact significantly with the wetland VEC beyond

existing interactions related to Highway 106 and operations at the existing NPNS facility. It is acknowledged that construction related effects may extend beyond the construction period, however no further ground disturbance is anticipated during that phase and no new indirect effects beyond those that arose during the construction phase are expected.

With the proper implementation of proposed mitigation measures, impacts to wetlands as a result of operation and maintenance of the project are not anticipated to be significant.

0.1.7.4 Summary

Table 0.1.7-1, provides a summary of the residual environmental effects of the project on the wetlands VEC.

Table 0.1.7-1: Summary of Residual Environmental Effects Related to the Wetlands VEC

| Phase and Activities | Potential Effects | Mitigative Factors and Measures | Residual Effects | Significance of Residual Effects |
|---|---|--|---|----------------------------------|
| Construction | | | | |
| Clearing (and grubbing), and construction of the ETF and pipeline footprint area. | Direct loss of wetland area / function; and, Indirect loss of wetland function via reduced surface water quality | Mitigation as noted in Section 0.1.7.2 including key items: Wetland alteration approval and compensation plan to achieve 'no net loss of wetland area/function developed in conjunction with NSE. Implement mitigation as outlined in Section 0.2 including best management practices related to erosion and sediment control. | Negligible with correct mitigation applied. Direct and Indirect, Irreversible to reversible Magnitude – low Duration – permanent or long term Frequency - once Geographic extent – small to moderate (project footprint and connected wetland area) Context – existing development | Not Significant - Adverse |
| Dewatering | Indirect effects to wetland hydrology | Minimize time spent 'De-watered' Plan for use of alternative crossing construction method (infill, pipe weighting), if required | Negligible with correct mitigation applied. Indirect, Reversible Magnitude – low to moderate Duration – temporary Frequency - once Geographic extent – small to moderate (related to wetland connection) Context – NSTIR ROW or NPNS site | Not Significant - Adverse |
| Site reclamation (re-vegetation and hydroseeding) | Nutrient loading affecting wetland vegetation communities and potentially introducing invasive species | Mitigation as noted in Section 0.1.7.2 including key items: Implement mitigation as outlined in Section 0.2. Following the contractors' EPP and applicable guidelines and regulations and use the NS | Negligible with standard mitigation applied. Indirect, Reversible Magnitude - low Duration – long term if invasive species introduced Frequency – daily Geographic extent – | Not Significant - Adverse |

| Phase and Activities | Potential Effects | Mitigative Factors and Measures | Residual Effects | Significance of Residual Effects |
|----------------------|-------------------|--|---|----------------------------------|
| | | Highway Seed Mix, unless otherwise approved. | wetland specific Context – probably existing introduced species prevalent in disturbed portions of pipeline footprint | |

Based on the above, with planned mitigation, authorization (with compensation, as required), and environmental protection measures, the residual environmental effects of the project on wetlands during all phases of the project are rated not significant, with a moderate level of confidence.

The implementation of regulatory requirements, additional delineation of wetland features and evaluation of wetland function adjacent to the pipeline footprint area during follow-up, water management, water quality monitoring, wetland function monitoring, and other follow-up and monitoring measures to be implemented to monitor changes to wetland function arising from the project, with adaptive management measures implemented as necessary to address those changes, will improve the confidence of this prediction.

0.1.7.5 Follow-up and Monitoring

Follow-up will be conducted to assess the success of wetland compensation for the proposed wetland alterations. In addition, the degree of disturbance in wetlands adjacent to the proposed pipeline will be assessed prior to and subsequent to construction activities. The condition of the disturbed portions of wetlands will be compared to the conditions of any undisturbed portions of the same wetlands located adjacent to the pipeline footprint. Criteria assessed will be a comparison of grade, substrate composition, surface water presences/absence, water quality and hydrophytic vegetation re-establishment to those observed on adjacent undisturbed wetland portions. The results of this comparison will be used to measure the effectiveness and efficiency of mitigation measures and to assist in the determination and maintenance of wetland function.

0.1.8 Flora/Floral Priority Species

The environmental effects assessment for the replacement ETF footprint is unchanged from that presented in the EARD.

While the re-aligned treated effluent pipeline now follows a different route as that presented in the EARD and vegetation species in the re-aligned route are slightly different than that presented in the EARD, based on the 2019 plant surveys and proposed mitigation, significant impacts to priority plant species are not anticipated for the re-aligned pipeline. The priority non-vascular plants identified in 2019 include those identified in Section 8.8 of the EARD, plus additional similar species. Typically priority plants are lichens and mosses of eroding coastal areas. With the exception that most of the work is now being proposed to be conducted within a currently treed area instead of the routinely mowed and

maintained road shoulder, and a pre-construction plant survey having now been completed, the mitigation and residual effects identified in Section 8.8 of the EARD remain valid. No significant adverse residual effect is predicted with the implementation of the identified mitigation and follow-up.

0.1.9 Terrestrial Wildlife/Priority Species

The environmental effects assessment for the replacement ETF footprint is unchanged from that presented in Section 8.9 of the EARD.

Based on the 2019 surveys and proposed mitigation, significant impacts to priority wildlife species are not anticipated for the re-aligned pipeline. The primary priority species wildlife habitat identified in both the EARD and 2019 field programs, related to turtles. With the exception that most of the work is now being proposed to be conducted within a currently treed area instead of the routinely mowed and maintained road shoulder, and a pre-construction herptile habitat survey having now been completed, the mitigation and residual effects identified in Section 8.9 of the EARD remain valid. No significant adverse residual effects are predicted with the implementation of the identified mitigation and follow-up.

0.1.10 Migratory Birds and Priority Bird Species/Habitat

The environmental effects assessment for the replacement ETF footprint is unchanged from that presented in Section 8.10 of the EARD.

In general, based on the 2019 bird surveys and proposed mitigation, impacts to migratory and priority bird species are not anticipated for the re-aligned pipeline route.

With the exception that most of the terrestrial work now being proposed is to be conducted within a currently treed area instead of the routinely mowed and maintained road shoulder, the mitigation and residual effects identified in the EARD remain valid. The key mitigation of clearing of existing vegetation within the footprint being conducted outside the breeding season is unchanged. Additional mitigation with respect to the cormorant colony includes limiting the marine components of pipeline staging and construction to be outside the typical active breeding period for the nearby colony of double-crested cormorants, or to have suitable and appropriate mitigation developed in consultation with Environment Canada and the Canadian Wildlife Service. No significant adverse residual effects are predicted with the implementation of the identified mitigation and follow-up.

0.1.11 Harbour Physical Environment, Water Quality, and Sediment Quality

Section 7.3 of the Focus Report provides a marine impact assessment addressing potential effect of marine portions of the project including to water and sediment quality. This assessment supersedes that provided in Section 8.11 of the EARD.

Based on the updated receiving water study and with identified mitigation, no significant residual adverse environmental effects were identified. In addition, based on Stantec review of the existing discharge from Boat Harbour, the receiving water study at the existing Boat Harbour dam discharge into the Northumberland Strait undertaken to assess environmental impacts has concluded that existing dilution factors are low and insufficient for effluent mixing with the ambient water. This assessment confirms that the replacement facilities re-aligned outfall; a diffused outfall at the CH-B outfall near Caribou, is considered to have much less potential effluent impact on the receiving environment than the existing condition.

0.1.12 Marine Fish and Fish Habitat

Section 7.3 of the Focus Report provides a marine impact assessment addressing potential effect of marine portions of the project including to marine fish and fish habitat. This assessment supersedes that provided in Section 8.12 of the EARD. With identified mitigation and meeting of *Fisheries Act* authorization requirements, no significant residual adverse environmental effects were identified.

0.1.13 Marine Mammals, Sea Turtles and Marine Birds

The study area identified within the EARD covered the Northumberland Strait. The proposed project area is within the area assessed previously and the mitigation measures and characterization of residual effects identified in Section 8.13 of the EARD remain applicable to the marine mammals, sea turtles and marine birds VEC in relation to the current project. With identified mitigation and follow-up, no significant residual adverse environmental effects were identified.

0.1.14 Socio-Economic Environment

No change in potential effects are anticipated beyond those identified in Section 8.14 of the EARD with the exceptions of:

- Traffic impacts during construction along Highway 106 may be less than what was identified in the EARD. By moving the route from the road shoulder to the edge of the right-of-way, traffic disruptions may be reduced as a large portion of construction activity will take place away from the road surface.
- Since the *Canadian Navigation Protection Act* is now in force, Navigable Waters Approvals will have to be obtained for watercourses crossed by the pipeline route and for the marine portion of the pipeline/outfall and a review of approval requirements is anticipated for freshwater crossings.

The rating of not significant for residual environmental effects of the project on the socio-economic environment with implementation of the identified mitigation, including communication, scheduling considerations and compensation as applicable, remains valid.

0.1.15 Indigenous Peoples Use of Land and Resources

Completion of the MEKS in July 2019 confirmed the impact evaluation of Section 8.15 of the EARD submitted in January 2019. MEKS studies included both the ETF site and the re-aligned pipeline. Moving the pipeline alignment from the road shoulder to the edge of the right-of-way does not alter the assessment of this VEC as the current alignment and the alignment proposed in the EARD are within the boundary of the MEKS project site. No significant adverse effects were predicted.

0.1.16 Marine Archaeological Resources

Completion of a marine archaeological resource impact assessment (ARIA) was one of the recommendations of the Marine Archaeological Resources Assessment conducted as part of the EARD. Section 8.16 of the EARD indicated that archaeological resources could be found in the Caribou and Pictou Harbour areas of the project. The Marine ARIA identified areas of potential archaeological resources based on sediment cores, and magnetic and sonar scans, and provided recommended mitigation measures. These same mitigation measures were recommended in the assessment conducted for the EARD. The Marine ARIA narrowed the areas of potential resources and identified specific areas of avoidance. There is no change in the environmental effects beyond those described in Section 8.16 of the EARD, which determined that with the implementation of mitigation measures, significant adverse residual environmental effects on marine archaeological resources are not anticipated.

0.1.17 Terrestrial Heritage Resources

Shovel testing conducted at the NPNS facility in June 2019 and subsequent review of the proposed pipeline route along the NSTIR ROW confirmed that the proposed project is unlikely to result in significant adverse impacts to terrestrial heritage resources as potential resources are avoided by the re-aligned pipeline route. The mitigation and residual environmental effects of the project on terrestrial heritage resources, as outlined in Section 8.17 of the EARD, remain valid and the residual effects remain not significant.

0.2 Environmental Planning and Mitigation Measures

The following summarizes environmental planning and mitigation identified for the project.

0.2.1 Environmental Planning and Management

Environmental protection is a key feature throughout project planning. In particular, the new ETF, pipeline route and outfall have been sited to be adjacent and/or parallel to existing facilities and linear rights-of-ways. The pipeline has been designed to comply with all current codes and standards reflecting the most current knowledge about pipeline safety and integrity.

NPNS is committed to developing the project in an environmentally responsible manner consistent with good environmental management and sustainability principles. To this end, Northern Pulp Nova Scotia

(NPNS) will develop and carry out the project in a manner that avoids or minimizes the adverse environmental effects of the project, and enhances positive ones, in a manner that complies with applicable laws and regulations.

Several environmental protection and management measures will be implemented to guide the construction, operation and maintenance, and decommissioning of the project, as follows:

- Employing good planning, design, and management practices to comply with regulated and/or industry design and management standards to satisfactorily deal with environmental risks such as seismicity, unusual weather events, flooding, and erosion;
- Siting facilities to avoid sensitive areas such as species at risk habitat, where possible, and maintaining as much of a mature tree buffer as possible surrounding these features;
- Siting the land-based portion of the effluent transmission pipeline within an existing corridor (i.e., the edge of the current Highway 106 ROW, NPNS property);
- Minimizing the footprint of project facilities and activities to consequently reduce the amount of disturbed land, wetlands, and water resources;
- Employing good planning, design and management practices to comply with standards and objectives for air contaminant emissions, noise, vibration, and surface runoff;
- Developing a modern ETF using BAS™ technology as the best available technology currently for treating effluent from Kraft pulping processes;
- Implementing progressive environmental protection, mitigation, and management strategies that avoid or minimize adverse environmental effects, and maintain or enhance positive effects;
- Preparing and implementing an Environmental Management Plan (EMP), which will contain mitigation measures to avoid and reduce potential adverse environmental effects that might otherwise occur from routine project activities, including emergency response and contingency procedures. The EMP will include procedures related to, but not limited to, the following:
 - management of emissions and noise;
 - management of surface water runoff;
 - heritage resources (including procedures for chance encounters of heritage resources during construction);
 - erosion and sediment control;
 - spill prevention and management;
 - transportation;
 - personnel training and awareness;
 - Preparing and implementing project-specific emergency response and contingency procedures as part of the EMP to advise project personnel on how to implement specific actions to respond to accidents, malfunctions, or unplanned events; and
 - Completing Indigenous engagement, and public/stakeholder consultation, as described in Focus Report Section 1.2, such that, wherever possible, concerns about the project have been accommodated to the extent possible in its design, construction, operation, and decommissioning.

0.2.1.1 Environmental Management Plan

Project facilities have been designed to comply with all current codes and standards reflecting the most current knowledge about ETFs, pipelines, and marine protection and safety. A project-specific EMP will be prepared prior to project initiation to provide the required procedures to adhere to regulatory obligations and other environmental commitments.

The purpose of the EMP is to:

- Guide the company's commitments to reduce environmental effects in general, and ensure specific regulatory commitments will be met;
- Provide concise and clear instructions regarding procedures for protecting the environment, and reducing potential environmental effects;
- Document environmental concerns and appropriate protection measures associated with project operations;
- Provide a reference document for planning and/or conducting specific activities which may have an effect on the environment; and
- Function as a training document/guide for environmental education and orientation; and communicate changes in the program through the revision process.

Environmental management is considered an integral element in the way daily operations are performed and NPNS is committed to upholding this position while complying with applicable laws, regulations, and internal standards. NPNS will develop an EMP in order to communicate this commitment as well as detailed project requirements for environmental management to staff, contractors, regulatory agencies, and the public. By first ensuring that working conditions promote an atmosphere of health and safety for all employees, employees will then incorporate the environmental management practices into their daily work routine. Specific environmental requirements and mitigation practices are identified in this assessment and will be refined in subsequent environmental regulatory permitting processes, and are applicable through the construction phase of the project. The EMP will continue to evolve through the life of the project as new requirements emerge from various permitting and other processes.

A sample table of contents for an EMP for this type of project is presented below:

- Introduction and Scope
- Environmental Policy
- Project Description and Purpose
- Environmental Requirements
 - Federal, provincial, municipal legislation
 - Required environmental approvals
 - Management of environmental commitments
 - Reporting procedures

Resources, Roles, Responsibility and Authority (including contractors)

Competence, Training and Awareness

Communication

- Key Contacts List
- Environmental Protection Plan
- Purpose, structure, compliance, mitigation measures
- Emergency Response and Contingency Plans
- Fuel and hazardous material response
- Discovery of archaeological or heritage resources
- Erosion control failure
- Ground or surface water contamination
- Others

Monitoring and Measuring

- Terms of reference
- Terrestrial environment
- Public health and safety
- Erosion control
- Fish and fish habitat
- Current use of land and resources for traditional purposes by Indigenous persons
- Archaeological heritage resources

Incident Reporting

Control of Records

0.2.2 Mitigation Measures

Mitigation measures will be employed, as applicable, to reduce or eliminate adverse effects associated with project activities. Mitigation measures as identified for the project are outlined in this below. This list is intended as an overview and additional measures may be added as appropriate.

0.2.2.1 General Construction

- All components will be constructed according to applicable regulations, safety codes, and standards.
- Safety exclusion zones will be required to manage access to construction sites.
- All necessary approvals, licences and permits required for a particular activity or construction site are obtained prior to the commencement of the applicable activity or construction at that site.
- Existing infrastructure and previously disturbed areas (e.g., existing roads, ROWs) will be used where feasible to reduce additional site clearing and the need for new materials.
- A project Environmental Protection Plan (EPP) will be developed and project Environmental Inspector designated to monitor the implementation of the EPP during all critical phases (i.e., clearing/mowing, topsoil salvage, replacement, grading drainage and watercourse/wetland crossings and clean-up) of construction.

- Construction activities will be restricted to the approved project area including the surveyed ETF site, pipeline corridor, outfall location, approved temporary workspaces and existing roads.
- Natural vegetation will be preserved where feasible.
- All equipment will arrive at the site clean and free of soil, vegetative debris, invasive/noxious species or fluid leaks. Equipment will be inspected by the project Environmental Inspector(s), or designate.
- Material will be sourced from existing, approved pits or quarries, if required to establish grades at the ETF and along the effluent pipeline corridor.
- A tight construction spread (i.e., interval between front-end activities such as brushing and grading, and back-end activities such as clean-up) will be maintained to reduce the duration of activities and effects of the project on land use and wildlife.
- All deliveries to the project area and transportation of construction and waste materials will be managed within the legal loading requirements and according to spring weight restrictions.
- Notice of construction activity will be appropriately communicated to potentially affected businesses and residents.
- Roads frequently traveled will be repaired as necessary.
- All construction materials will be removed from site upon completion of pipeline installation.

0.2.2.2 Subsurface and Pipe Installation Activities

- The amount of open trench or excavation at any one time will be minimized.
- Trenches and excavations will be backfilled as soon as practical, following pipeline lowering-in, to minimize hazards to wildlife, workers and the public.
- Topsoil and subsoil removed during trenching will be stored in separate spoil piles to avoid mixing.
- Spoil piles will be managed to minimize spoil spread outside of the designed project area.
- Where feasible, the ETF and pipeline footprint will be graded to divert surface water away from the open trenches and excavations.
- Where the open pipeline trench has the potential to draw down groundwater or contribute to surface water flow isolation and other methods will be used to prevent the flow of water into/along the trench. Methods will comply with the project erosion and sediment control plan.
- If the pipeline trench or other excavations require dewatering, water will be filtered through vegetated upland areas or other appropriate sediment filtering devices.
- Dewatering will be completed in a manner that does not cause erosion or allow sediment to enter a watercourse.
- If a surface or groundwater withdrawal exceeds 23,000 litres per day, the Project will require a water withdrawal approval from NSE.
- Trench and excavation water will not be allowed to flow directly into any watercourse.

0.2.2.3 Erosion and Sedimentation Control

- The area of exposed soil will be limited, and the length of time soil is exposed without mitigation (e.g., mulching, seeding, rock cover) will be reduced through scheduled work progression.
- Reduction of the width of grading in order to limit the potential for erosion and subsoil compaction.

- Erosion and sedimentation control structures will be used and maintained throughout construction activities.
- Erosion and sedimentation control structures will be inspected regularly, especially before and after heavy rain events.
- Erosion and sedimentation control structures will remain in place until the disturbed area is stabilized or natural revegetation occurs.
- Dewatering of excavated areas will control the release of sediment-laden water (e.g., filtration through upland vegetation or engineered erosion control devices).
- Overburden storage piles and exposed topsoil will be covered, or seeded and revegetated, as soon as practicable.
- Engineered surface water drainage and diversion channels will be constructed to direct flow around the construction site and away from watercourses and wetlands.
- Construction material (e.g., gravel) placed in or next to watercourses, where approved, will be free of debris, fine silt and sand, and chemical contaminants.
- All watercourse crossings will be conducted according to the terms of provincial water approvals including site-specific erosion and sediment control plans.
- The following is a brief summary of the erosion and sediment control measures that may be used:
 - Buffer Zones: Buffer zones are areas that will not be grubbed until just prior to construction. Buffer zones will extend 10 m each side of the crest of the slope of a watercourse or wetland, and wider if HDD is employed.
 - Sediment Control Fence: Sediment control fencing is a sheet of geosynthetic fabric imbedded into the ground parallel to the contours. Sediment control fencing is used to filter sheet runoff. It will be used to delineate buffer zones as well as at the edges of the rights-of-way and near water courses. It can also be used around spoil piles, on toe of slopes and at intermediate locations to control siltation.
 - Diversion Ditches: A diversion ditch is normally constructed up slope of the work to divert clean water prior to it entering the work area. Diversion ditching established in undeveloped areas up gradient of active working locations to reduce the amount of incoming surface runoff. Stabilized diversion ditches will be used to minimize the amount of off-site water entering disturbed areas.
 - Geotextile Filter Bags: Sediment laden water is pumped into geotextile filter bags such that the water filters out and the sediment remains in the bag. These may be used where small volumes of sediment laden water require filtering.
 - Sediment Pond/Trap: A sediment pond or sediment trap is designed to contain flow for a period of time in order to facilitate the settling out of sediments.
 - Stabilization Methods: Stabilization methods will be used to minimize the potential for erosion. These include hydroseeding, application of tackified straw mulch, erosion control blankets, and gravel (including clear stone, surge rock or riprap).
 - Sediment and Erosion Control measures will be installed and maintained according to provincial standards and will be inspected regularly (including pre/post predicted heavy rainfall events) to ensure proper operation.

- Exposed soil surfaces will be stabilized and revegetated to limit erosion. Seeding the disturbed areas of the construction ROW will be conducted as soon as practical after final clean-up and as weather and soil conditions permit. The goal is to reclaim all disturbed lands within one growing season following construction.

0.2.2.4 Vegetation Clearing and Disposal and Restoration

- Along the current NSTIR ROW project area, where limited clearing is required, trees will be felled towards the project, wherever possible. Trees that inadvertently fall into adjacent undisturbed vegetation will be recovered.
- On the NPNS property, where clearing is required, trees will be felled towards disturbed areas, wherever possible. Trees that inadvertently fall into adjacent undisturbed vegetation will be recovered.
- Environmentally sensitive features will be avoided during clearing as identified by appropriate signage and fencing.
- The boundaries of the construction, staging, stockpile areas and temporary workspace will be staked prior to work. Brushing or grading beyond the stakes will not be allowed unless temporary workspace rights have been obtained.
- Salvageable timber will not be bulldozed.
- Subject to regulatory approval, wooden mats or equivalent in areas of wet soils will be installed to reduce terrain disturbance and soil structure damage through compaction. These materials will be removed during clean-up.
- Clearing/grubbing or earth moving activities will be scheduled to avoid periods of heavy precipitation and high winds.
- In areas with native vegetation, allow for natural regeneration, or seed as directed by the appropriate Land Administrator on Crown lands. Natural recovery is the preferred method of reclamation on level terrain where erosion is not expected. Where appropriate, natural regeneration may be supplemented with seed or live grubblings harvested from the area, as well as through the salvage and transplantation of sod and whole plants.
- Clearing/grubbing or earth moving activities shall be minimized to the extent possible, will be limited to areas where soil removal is necessary (e.g., trench lines, areas to be graded), and shall not extend beyond the limits of the project without additional assessment of potential sensitivities and development of appropriate mitigation.
- In consultation with landowner(s) or appropriate regulatory agency, potential grubblings and/or wood debris stockpile locations will be determined.
- Grubblings and wood debris stockpiles will be placed in a manner that does not create or enhance a fire hazard.
- Timber material not salvaged for merchantability will be disposed of through mechanical chipping, where possible.
- No vegetation burning will occur.

0.2.2.5 Topsoil Management

- Soil storage areas will be located in the approved areas of the project, including temporary workspaces.
- Following the salvage of the topsoil, if warranted, topsoil windrows and stockpiles will be stabilized.
- Wetland organic layer and live grubblings will be salvaged and stored separately from upland topsoil for possible re-use as backfill within wetlands.

0.2.2.6 Watercourse and Wetland Crossings (Freshwater)

- Reduce physical disturbance to wetlands and watercourses through detailed routing during detailed engineering.
- All watercourse crossings will be conducted according to the terms of provincial water approvals including site-specific erosion and sediment control and as applicable work during regulated timing (low flow) windows.
- Wetlands will not be used as temporary workspaces, unless required for site-specific purposes and prior approval obtained from Nova Scotia Environment (NSE).
- Construction work within 30 m up gradient of wetlands and watercourses will be conducted during the low flow construction season (June 1 to September 30) when possible.
- Natural vegetation (especially adjacent to the watercourse) will be preserved as much as possible.
- Conduct ground level cutting, mowing and mulching of wetland vegetation instead of grubbing, wherever practical.
- Restrict the general application of herbicide near wetlands and watercourses. Spot spraying, wicking, mowing, or hand-picking are acceptable measures for integrated vegetation management in these areas.
- Minimize grading in native vegetation communities.
- Where possible, machinery will be operated from land, avoiding watercourse/wetland banks or beds.
- When working on saturated soils during non-frozen ground conditions to reduce compaction and admixing, use equipment and techniques that distribute ground pressure (e.g., swamp mats, geofabric and padding, corduroy).
- Regular visual monitoring of surface water conditions and operational observations will be undertaken to ensure that sediment and erosion control measures are working effectively.
- Root grubbing and brushing will be restricted near watercourses and wetlands. Grubbing will not occur within riparian buffers adjacent to watercourses and wetlands.
- Trees will be felled away from watercourses and wetlands.
- Grading will be directed away from waterbodies and wetlands. Grading will be minimized within wetlands and adjacent watercourses, wherever possible.
- Excavate a pit or construct berms of packed earth or staked straw bales, if the spoil is likely to be highly saturated, to prevent spoil or silty water from flowing back into the watercourse.
- Temporary berms will be installed on approaches slopes to watercourses and wetlands (where required), and silt fence or an equivalent temporary erosion/sediment control device (e.g., hay bales, coir logs) will be erected near the base of approach slope.

- Ditch plugs or similar water control structures will be used in the trench at either end of wetland crossings where there is the potential of water migration along the trench.
- Replace trench material as soon as practicable, and re-establish preconstruction contours within wetland boundary to re-establish drainage patterns.
- Install cross ditches and berms on moderately steep and steep slopes in non-agricultural areas to prevent runoff along the ROW and subsequent erosion.
- Progressive rehabilitation practices will focus on restoring topography, hydrology and vegetation in disturbed wetland areas where practicable, including the re-use of live grubblings, to reduce permanent loss. Natural re-vegetation for wetlands will be employed.
- Minimizing hydroseeding in wetland buffers and no hydroseeding within wetlands.
- Disturbed riparian buffer areas will be seeded with appropriate seed mix if no woody material is to be installed within the riparian area.
- Bio-stabilization measures will be used, such as willow staking and erosion control blankets to reclaim riparian areas, as appropriate.
- Where practical, stumps will be left in place, particularly on stream banks, to provide surface stability.
- If wetland disturbance cannot be avoided, it will be undertaken under the relevant provincial requirements, including meeting the Nova Scotia Wetland Conservation Policy.
- Prohibition on fording of watercourses. Prioritization on access from Highway 106 or existing roads.
- If required, temporary clear span bridges or temporary culvert meeting NSE/DFO requirements, construction windows and restoration requirements, may be used.
- Watercourse and wetland crossings to be conducted under applicable provincial (NSE) and/or federal approvals (DFO).
- Determination of the appropriate crossing method for each watercourse crossing based on sensitivity of that watercourse (considering factors such as: co-location with a wetland, particularly with highly organic bottom substrate; presence, seasonality and characteristic/life stage of fish habitat; suitability of restoration options; susceptibility to erosion and sediment generation; stability of banks and bottom and substrate type; and requirement for and ease of dewatering).
- Development of alternative crossing design options and contingency plans and materials to be on-site in the event of a failure.
- Construction using “in the dry” / isolation techniques (e.g. dam and pump, flume, coffer dam) to occur at times when high flows are not anticipated and within NSE's low flow construction window.
- Isolation techniques will be designed based on accommodation of potential high flow during the construction period and to prevent erosion and release of sediments.
- For watercourses crossed using methods such as dam and pump or flume; restoration of watercourses should be:
 - To original configuration (bed and bank width, depth, contour and gradient) to the extent possible to maintain existing hydrology, and habitat character and passage if applicable. If the original gradient cannot be restored, a stable gradient that does not obstruct fish passage (as applicable) should be established.
 - To original substrate type. In some cases, the existing substrate may be changed from organic based to gravel/rock in order to maintain stable cover over the trench.

- Undertaken at the time the isolation is still in place.
- Restoration of flow is to be conducted in a manner that gradually equalizes flow and allows suspended material to be removed prior to completion.
- Material removed from trenches within the channel will be segregated with the top 10-50 cm of substrate stored separately to be replaced to the channel during backfilling, where practical.
- Use of appropriately sized clean stone/rock for channel bed and bank restoration if existing channel material is not suitable or for erosion and sediment control and coffer dams.
- Use of granular material for cofferdams may require poly-plastic on the outside face to prevent inflow. Material for infill (temporary or permanent) will not be obtained from an existing water body, but rather from a clean approved land-based source.
- De-watering of trenches or establishment of isolated crossings to be conducted in a manner that minimizes potential for erosion and sedimentation including the use of adjacent upland vegetated areas or appropriate filtration systems.
- If pumping of flow is conducted from fish habitat, the pump must be installed such to prevent entrainment/impingement of fish such as use of a screen which is regularly inspected and cleaned.
- If a trenchless method (e.g. Horizontal Directional Drilling (HDD)) is used to cross watercourses or wetlands, additional geotechnical information will be required. In this event, additional mitigation consistent with Canadian Association of Petroleum Producers (CAPP 2018; Pipeline Associated Watercourse Crossing Fish and Fish Habitat Impact Assessment Tool) guidance will be identified.
- Temporary diversion of surface runoff from open trenches will be redirected to the same watershed with appropriate erosion and sedimentation controls.
- Standard pipeline construction activities are designed to avoid circumstances that result in permanent diversion and/or unnatural retention of water along the construction footprint by following recommendations from various industry and provincial guidelines (CAPP et al. 2015).
- Maintain existing hydrologic conditions in wetlands and watercourses and conduct preventive maintenance as required to limit potential hydrological impacts.
- A new drainage ditch at the proposed ETF spill basin site will be constructed to replace the one currently located within the footprint of the project.

0.2.2.7 Fish Habitat

- Determination of appropriate crossing method for watercourses with fish habitat will follow the CAPP 2018 assessment methodology.
- Where required (i.e., where watercourse disturbance is necessary), obtaining an authorization under Section 35(2) of the *Fisheries Act* for any project activities that would result in the loss of fish habitat or other activities that result in serious harm to fish (as determined by DFO), with appropriate offsetting.
- Construction and operation activities will comply with the conditions of watercourse alteration approvals and *Fisheries Act* authorizations, including offsetting (as applicable).
- In fish bearing watercourses, a fish rescue program will be implemented prior to undertaking in-stream construction activities, and fish will be removed and relocated under DFO permit and as per DFO guidance and consultation.

- In both marine and freshwater environments - Work will be staged and on consultation with DFO will incorporate fisheries timing windows, to the extent possible, to avoid sensitive life stages (i.e. spawning - e.g., Atlantic herring are known to spawn in the eastern Northumberland Strait in the fall, migratory periods, when plentiful in harvest areas).
- Blasting, if required, will be conducted in accordance with DFO Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky 1998).

0.2.2.8 Trenching in Wetlands

- A pump will be installed as required to dewater open trenches in a manner that maintains existing drainage patterns.
- Trench water will be pumped onto a stable sediment filtering device or management areas and will not be permitted to flow directly into a watercourse or wetland.
- Where appropriate, sediment control fences will be installed and maintained along the edges of exposed soil within wetlands.
- Grubbing in wetlands will be delayed until necessary for construction access, and limited to the trench width.
- Grubbing will include the removal of the upper layer, approximately 30 cm, of vegetated topsoil from wetland areas within the trench width to be set aside for re-use during restoration.
- Soils will be stored in such a way as to avoid the mixing of topsoil with sub-surface soils.
- Subsurface materials excavated during trenching in wetlands will be stored outside of the wetland where possible.
- Backfilling will be done as soon as possible following pipeline installation.
- To the extent possible, backfilling will be done using the sub-surface soil material excavated that had been previously excavated from the wetland areas being backfilled.
- Trench material and vegetated topsoil will be replaced in a way that reduces the mixing or loss of materials.
- All temporary drainage devices will be removed after construction to restore hydrology.
- Vegetated topsoil material will be replaced in the same wetland where it was removed.
- Temporary access through wetlands will be removed or altered after construction to allow wetland functionality and protection and restoration/monitoring initiated as applicable to maintain wetland function.

0.2.2.9 Wildlife, Priority Species and Migratory Birds

- Contingency plans will be developed to address unexpected encounters with priority species as noted in Section 0.3 below. If a SAR is encountered, contact will be made to a SAR Biologist at NSLF for an appropriate protocol, and/or federal authority for federal species.
- The project team and contractors will be educated to recognize potential priority species that may occur within the project area with an emphasis on the *Nova Scotia Wildlife Act* prohibition on nest, egg or young destruction including turtle nests and on the *Migratory Birds Convention Act* prohibition on the destruction of the nest, eggs or young of migratory birds. In all cases, if nests are identified, work must stop to avoid nest destruction.

- Suspend ROW preparation in the event that an active nest (bird or turtle) or priority species habitat is discovered during ROW preparations. Sign, fence or flag off appropriate buffer area and contact the assigned project Environmental Inspector (or equivalent role), initiate contingency plan, and contact with the appropriate regulatory authority (e.g. NSLF, Canadian Wildlife Service).
- Clearing and grubbing activities will take place outside of the nesting periods for turtles (avoiding the May – late July period) and breeding birds (avoiding mid-April to late August)(Regional nesting Zone C3 – Environment Canada guidance - <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html#toc0>), or if this is not possible, a trained biologist will conduct a pre-commencement turtle nesting survey or bird nesting survey to confirm no nesting is present in the project area and/or develop mitigation in discussion with NSLF.
- Do not harass or feed wildlife. Harassment of wildlife is not permitted within NPNS property.
- Establish construction traffic speed limits and general public speed limits during construction to reduce the risk of collisions with wildlife.
- Nuisance or aggressive wildlife encountered will be reported to the local office of NSLF, and if required a licensed wildlife nuisance contractor employed.
- Re-introduction of milkweed to areas adjacent to the existing ETF footprint area is proposed to mitigate loss of potential monarch habitat at the ETF site.
- The majority of the ETF will be constructed (e.g. wall heights, steepness) to minimize wildlife entry.
- Monitor topsoil windrows for weed growth during the course of construction during non-frozen soil conditions and direct the contractor to implement corrective measures (i.e., hand pulling, mowing, non-persistent herbicides).
- Use of an appropriate seed mix for non-native seed mixes and, where possible, obtaining seed from a local source.
- Should monitoring indicate that further management measures are warranted to prevent the spread of invasive weed species further action to address the issues will be undertaken in a timely manner.

0.2.2.10 Archaeological/Heritage Resources

- Planned avoidance of areas of elevated potential for encountering heritage resources to the extent practical.
- Avoid the area of the stone boundary wall identified west of Caribou.
- Conduct archaeological monitoring during construction.
- If the layout of land-based project elements changes from what is proposed, additional archaeological assessments will be carried out to evaluate archaeological potential.

0.2.2.11 Marine Environment

- All marine-based work will be undertaken by Canadian-registered vessels which will comply with the requirements of the *Canada Shipping Act*.
- In recognition that the discharge of ballast water from ships is viewed as a principle vector for the introduction and spread of harmful aquatic organisms and pathogens, all ballast water management

activities will comply with the Ballast Water Control and Management Regulations (updated Oct 31, 2012), under the *Canada Shipping Act*.

- Routine effluents and operational discharges produced by Project vessels will be managed in accordance with *International Convention for the Prevention of Pollution from Ships* (MARPOL) and International Maritime Organization (IMO) guidelines, of which Canada has incorporated provisions under various sections of the *Canada Shipping Act*. No waste or garbage will be dumped overboard.
- All marine-based work undertaken by foreign vessels must be undertaken pursuant to a Coasting Trade Permit issued under the *Coasting Trade Act*, and will comply with applicable regulations under the International Maritime Organization Conventions including the International Convention for the Prevention of Pollution from Ships (MARPOL).
- All marine project activities will be conducted in accordance with the requirements of the Canadian Coast Guard Marine Communication and Traffic Services (CCG-MCTS).
- The pipeline will be placed in a trench with appropriate cover to prevent damage to the pipeline from ice scour. Ice scour is the possibility of damage to the pipeline by floating ice, both by direct tearing of the pipeline or by deformation of the pipeline by applied pressure to the soil/sediment around it.
- Environmental controls (e.g., silt curtains) will be employed as necessary to reduce sediment resuspension during construction in the intertidal/nearshore zone and marine outfall construction.
- Scheduling of project activities will be coordinated through consultation with local fish harvesters, Northumberland Ferries and other stakeholders and best-efforts will be made to schedule activities to minimize interference.
- Vessel maintenance, inspection and certifications will be required prior to mobilization.
- Shipboard personnel will be qualified, trained and competent prior to mobilization.
- All marine equipment used during construction will be examined and cleaned to prevent and control marine biofouling. All anti-fouling activities will comply with the Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals (2012), under the *Canada Shipping Act*, as well as requirements set out by Health Canada and the Pest Management Regulatory Agency regarding approved anti-fouling substances.
- For marine construction - Work during the construction phase will be scheduled to the extent practical to avoid periods of adverse weather or spring tides to reduce turbidity and sedimentation.
- Duration of in-water work will be managed to the shortest time that is practical.
- Displaced substrate will be recovered to bury portions of the pipeline, wherever practical.
- Visual inspection in the area of Caribou Harbour to confirm that increases in turbidity are limited. If excessive changes in turbidity occur that differ from the existing conditions of the surrounding waterbody (i.e., distinct colour difference) as a result of construction activities, an investigation will be performed to determine root cause and additional mitigation measures will be applied as needed.
- The barge-mounted excavator and/or crane will operate at slow maneuvering speeds while engaged in pipeline trenching and installation and project vessels will have a maximum speed of 10 knots during transit to reduce the risk of lethal strikes to marine wildlife (Laist et al. 2001). No high-speed maneuvers will be conducted by vessels engaged in project activities.

- If required, Marine Mammal Observers (MMOs) equipped with 7x35-power binoculars will monitor and report on marine mammal and sea turtle sightings during project construction activities. This is typically only required during marine blasting operations.
- Project vessels will adhere to the general guidelines for vessels operating near marine mammals that are specified in section A2 of the annual edition of Notices to Mariners (DFO 2018c). Adherence to these guidelines includes, but is not limited to, the following measures:
 - Project vessels will approach areas of known or suspected marine wildlife activity with extreme caution.
 - Project vessels will reduce their speeds to less than 7 knots when within 400 m of the nearest marine mammal and avoid abrupt changes of course.
 - Project vessels will not approach any marine mammals and will maintain a distance of at least 100 m from the nearest marine mammal.
 - Project vessels will maintain a distance of at least 300 m from islands or pack ice where seals are actively whelping or breeding.
- The risk of marine mammal or sea turtle entanglement in anchor lines will be reduced by (U.S. Maritime Administration and Coast Guard 2009):
 - only deploying anchor lines as necessary to complete the task and then promptly removing them,
 - keeping anchor lines as taut as possible during use (although some slack is necessary to account for currents, tides, and other factors), and
 - taking in the slack or removing the line as quickly as possible or in the unlikely event that entanglement appears likely.
- The operator will notify the Maritime Animal Rescue Society (MARS) immediately (by phone at 1-866-567-6277, by email at marineanimalresponse@gmail.com, and/or by radio on VHF Channel 16) in the unlikely event that a marine mammal or sea turtle becomes entangled.
- Lighting is required for navigational and safety purposes; however, deck lighting on project vessels will be reduced whenever it is safe and practical to do so, and the use of unnecessary lighting will be avoided. If possible, waste lighting will be further reduced using directional overhead lighting focused on work areas, rather than floodlights.
- Avoid marine blasting within 500 m of a marine mammal or sea turtle.
- Comply with MARPOL and IMO guidelines.
- Project vessels will adhere to ECCC guidelines for avoiding disturbance to seabird and waterbird colonies (Government of Canada 2017b). Adherence to these guidelines includes, but is not limited to, the following measures:
 - Blasting on land (if required) will be avoided within 1 km of active bird colonies;
 - All other project construction activities will be avoided where possible within 300 m of active bird colonies. Project vessels will maintain a distance of at least 300 m from active breeding islands where possible;
 - Project vessels will travel at steady speeds near active bird colonies, moving parallel to the shore rather than approaching the colony directly;

- Project vessels will avoid making sharp or loud noises (e.g., blowing horns or whistles) and will maintain constant engine noise levels near active bird colonies; and.
- Bird deterrent devices will be used prior to blasting (if blasting is required in the marine environment or on land).
- Given the seasonal presence of a colony of Double-crested Cormorants adjacent to the Pictou Causeway and the potential for other migratory birds to be nesting in the area (including SAR), no blasting (if required) or other intrusive construction activities related to the Pictou Causeway crossing will be carried out during the nesting period for migratory birds (April 1st to August 31st), or as agreed to by the Canadian Wildlife Service (CWS).
- A permit to handle storm-petrels will be obtained from CWS and held onboard project vessels to cover personnel involved in bird collision and stranding incidents. These designated crew members will conduct routine checks of project vessels for stranded seabirds. If any Leach's Storm-petrel becomes stranded on a project vessel, it will be handled and released in accordance with the procedures outlined in *The Leach's Storm-Petrel: General Information and Handling Instructions* (Williams and Chardine n.d.).
- A project-specific EPP will be developed prior to the commencement of construction activities and will include measures to control sediment resuspension associated with seabed disturbance.

0.2.2.12 Horizontal Directional Drilling (HDD)

- If HDD method is required, the rig layout will include containment facilities designed to contain a release of drilling fluid from the mud circulation system.
- Noise abatement measures will be installed if deemed necessary in consideration of Health Canada guidelines for day and night noise limits (Health Canada 2010) and provincial and local noise limits.
- An emergency response plan will be developed as part of the Environmental Management Plan (EMP) and will include emergency spill response procedures for potential release of diesel fuel, hydraulic oil and all other types of synthetic oil, drill muds.

0.2.2.13 Blasting and Noise Control

- Utilization of construction scheduling restrictions, where possible (or alternative mitigation implemented), to ensure construction activities with elevated noise emissions occur during the day.
- Vehicles and equipment shall be maintained in good working order with quality mufflers to maintain noise suppression.
- Requirements will be in tender clauses that assure minimization of noise.
- Regular discussions will be conducted with workers and contractors on noise minimization practices.
- Timing windows, as identified relative to migratory bird sensitivities will be respected.
- NPNS will ensure drivers know the designated vehicle routes, parking locations, idling policy, normal delivery hours and use of engine brakes policy.
- Idling of vehicles will be limited. Vehicles and equipment will be turned off when not in use, unless required for effective or safe operation.
- Use of current NPNS communication procedures, via telephone or email, to communicate with local residents who have questions or concerns related to project noise.

Mitigation measures for minimizing noise during the operation of the replacement ETF will include following manufacturer's specifications and operating instructions during operation and maintenance. Following the operating instructions will minimize nuisance noise issues.

Blasting activities are not anticipated as part of this project. However, if required based on final project design:

- Blasting will be limited to daytime hours.
- Pre-blast surveys will be completed to evaluate the potential for ground vibration and identify potentially affected structures (e.g., wells and foundations).
- Blasting will be conducted according to provincial legislation, and will be subject to terms and conditions of applicable permits.
- Blasting near watercourses will follow the requirements of the *Fisheries Act* and the Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky 1998).
- Nearby residents will be given a construction schedule for key noise-generating activities including blasting (if applicable), and provided with contact information in case of complaints.
- Marine blasting will be completed in accordance with applicable regulations.

0.2.2.14 Dust and Air Emissions Control

- Idling of vehicles will be limited. A non-idling policy will be implemented. Vehicles and equipment will be turned off when not in use, unless required for effective or safe operation.
- Burning of brush or slash will not be permitted.
- Permanently cleared areas will be stabilized with native plantings or seed mix as used by NSTIR to minimize dust.
- Natural vegetation will be preserved where possible.
- When dust is a concern, dust suppressants (e.g., water) will be applied to exposed surfaces.
- Petroleum products will not be applied as a dust suppressant.
- Vehicles and equipment will be maintained in proper working order.

Operational mitigation will include the above as well as:

- Operation of the facility will follow regulatory requirements.
- Continuous solids removal from clarifiers to mitigate odour potential by preventing sludge from turning septic.
- Subsurface air injection in the activated sludge to mitigate odour potential.
- Indirect effluent cooling (heat exchangers) to mitigate odour potential.
- Combustion of sludge in the power boiler may reduce CO₂eq emissions through displacement of other fuels.

0.2.2.15 Traffic Management and Roadway Infrastructure

- Project-related traffic will be managed in accordance with the Nova Scotia Temporary Traffic Control Manual (e.g., traffic control persons, signage, and temporary markings) (NSTIR 2018).

- Advance notice will be provided to any property owners and residents of any temporary interruption or temporary alteration to access to their property.
- During construction activities, advance public and governmental department notice will be given for any necessary detours or road closures. Plans will be developed in conjunction with affected stakeholders.
- Planning for required traffic delays will avoid peak traffic times when possible, and will consider other traffic disruptions in the area.
- Vehicles will yield to wildlife and will be operated at appropriate speeds.
- Establish construction traffic speed limits and general public speed limits during construction to reduce the risk of collisions with birds.
- Flag persons, detours, safety barricades, fences, signs and/or flashers will be used as required.
- Pre and post roadway surveys will be completed.

0.2.2.16 Waste Management

Construction related materials such as survey staking, pallets, construction signage and erosion and sediment control structures will be removed on completion. Waste storage will be minimized by prompt removal of waste following equipment servicing, and project sites will be kept free of loose waste material and debris. However, if liquid waste storage is required, the storage areas will be located following regulatory requirements for fuel and lubrication storage and will not be located within 30 m of a watercourse or wetland. Portable toilet rentals will be used for construction sites; these will be serviced by the company and disposal in accordance with regulations. Solid waste produced will include materials such as strapping, temporary fencing, bridge material, signs, containers and welding rods.

Construction specifications will also include requirements for litter control and management of construction wastes. Non-hazardous solid waste will be collected and disposed of at an approved facility by a licensed contractor. Food and food waste will be stored and disposed of properly to avoid attracting wildlife.

0.2.2.17 Dangerous Goods Management

- Basic petroleum spill clean-up equipment must be on-site and all spills or leaks must be promptly contained, cleaned up and reported to the 24-hour environmental emergencies reporting system: 1-800-565-1633.
- All fuels and lubricants used during construction will be stored in designated areas. Storage areas will be located at least 100 m from watercourses, wetlands and water supply areas (including known private wells), where possible, except where secondary containment is provided.
- Equipment used will be well-maintained and free of fluid leaks (checks to be conducted). Equipment to be used in or adjacent to a watercourse, wetland or marine environment will be clean or otherwise free of external grease, oil or other fluids, mud, soil and vegetation, prior to entering the waterbody.
- Refuelling of machinery will not occur within 30 m of watercourses, wetlands and water supply areas (including private wells) and where possible will be done on an impermeable surface.
- Storage of all dangerous goods will comply with the Workplace Hazardous Materials Information System (WHMIS) requirements and applicable federal and provincial regulations.

- Transportation of dangerous goods will comply with TC's Transportation of Dangerous Goods Act.
- Emergency response procedures will be in place for spill response, with trained personnel present onsite at all times.

0.2.2.18 Fire Prevention

- Proper disposal methods for welding rods, cigarette butts and other hot or burning material will be used.
- Smoking will only occur in designated areas.
- Appropriate fire-fighting equipment will be kept on site.
- Burning of slash (fine or coarse wood debris) will not be permitted.

0.2.3 Emergency Response and Contingency Plan (ERCP)

A project-specific ERCP for unplanned events will be prepared. This will include spill management and response procedures to prevent and respond to spills. Emergency response planning will include accidental spills, emergencies, incidents or storm events will be completed and detailed in conjunction with the EPP. The contractor will be required to provide spill response training to construction personnel.

0.2.3.1 Contingency Planning

Contingencies with respect to construction planning will include evaluation of:

Acid Rock Drainage (ARD) Potential - In Nova Scotia, ARD is most commonly associated with slate from the Halifax Formation of the Meguma Group and coal-bearing shales. As noted above, the bedrock underlying the project site contains minor coal amounts compared with the nearby Stellarton formation. Yeo (1988) describes the coal formations in Pictou County as having low sulphur content. Although bedrock with acid producing potential is not anticipated, if encountered NPNS would follow the guidance provided by ECCC and NSE with respect to acid rock, which is to avoid where possible, and if not possible, to cap the exposed acid rock with clay and/or bury/encapsulate ripped material.

Potential for fine materials susceptible to erosion - The predominant soil unit (Pugwash Association) is a sandy loam soil, which is less likely to be subject to erosion than silty clay soils due to its drainage properties.

Effects from sedimentation from soils and surficial material will be prevented or will be mitigated in accordance with the appropriate guidelines documented in the EPP and Erosion and Sediment Control Plan developed for the project.

Potential for Karst – Based on the local geology, there is low potential for karst topography. The Malagash Formation located north of the Highway 106 roundabout has potential for limestone. However, the proposed project pipeline in this area will be installed within the existing gravel fill roadbed material (i.e., no excavation of bedrock anticipated). Subsidence along Highway 106 has not been identified.

Potential for Contaminants – NPNS has a contingency plan for its operations. As part of construction planning a contingency plan will be developed specific to the proposed project including contingency for encountering contaminants. This is to include “stop-work” orders to determine appropriate response in consultation with regulatory authorities, if contaminants are encountered.

The ETF site will be located in an undeveloped area on the NPNS facility property. The former Canso Chemicals plant is located on the adjacent property south of the NPNS facility industrial site. This adjacent operation was discontinued in the 1990s, but continues to serve as a distribution facility for NaOH. Soil from the excavation area at the ETF site will be tested and either used as fill at the facility or disposed of within an approved facility. During construction, localized temporary lowering of the local water table may be required to construct portions of the ETF (e.g., the clarifiers) that will be constructed below the water table. To mitigate the potential impact on groundwater, dewatering will be limited to the immediate area and duration in order to safely excavate and complete construction of components that will be placed below the water table. Pumped groundwater will be tested and then released appropriately.

Encountering Sensitive Wildlife or Priority Species/Habitat – A Wildlife Management Plan will be developed to address any potential encounter of priority species, bird or turtle nests, or other sensitive habitat. It will be prepared prior to commencement and will reflect a biologist’s assessment of potential for flora/fauna VECs prior to construction, as well as direction provided in recovery plans and provincially identified Best Management Practices such as for wood turtles (MacGregor and Elderkin 2003) and the NS Lands and Forestry (NSLF) Special Management Practices (2012). A component of this contingency will be to educate the project team and all contractors on recognizing potential aquatic and terrestrial Species at Risk that may occur within the proposed footprint. This may be done through targeted workshops/Lunch’n’learn style sessions, through the creation of a project-specific SAR Identification guide to be distributed to project personnel, or both.

Encountering Archaeological Resources – In the unlikely event that an archaeological, paleontological, or cultural resource or artifact is discovered during the construction or operation and maintenance phases of the project, the following procedure will be followed, to be updated as part of the development of the EPP:

- If cultural resources are encountered, work will be immediately stopped, and the area will be marked to prevent further disturbance. An exclusion zone of 100 m surrounding the find will be established.
- The Site Manager will immediately contact the Special Places Branch of the Nova Scotia Department of Communities, Culture and Heritage to notify them of the discovery and establish a mitigation plan.
- No new ground disturbance work will be permitted at the site until approval has been received from the appropriate regulatory agency to resume the work.
- If bones or human remains are found, work in the area must cease, and the Royal Canadian Mounted Police (RCMP) shall be immediately notified.
- No one shall disturb, move or rebury any uncovered human remains.

If the resources are related to Indigenous culture, the Office of Aboriginal Affairs and Special Places Branch will be contacted to determine how best to proceed with respect to repatriation of the resources.

0.2.3.2 Emergency Response

NPNS maintains an emergency response team that is available to respond to incidents during the construction of the project. Consistent with current NPNS operations, the emergency response team will be available 24-hours/day, 7 days/week to support the project. The capacity of local fire and ambulance services to respond to incidents will also be evaluated during preparation of the ERCP. NPNS will continue to work closely with related agencies on the issue of public safety during all phases of the project.

In the case of an accidental release of materials, reporting and clean-up procedures will follow provincial emergency spill regulations as required. Lubricants and other petroleum products will be stored and waste oils will be disposed of in accordance with provincial regulations. Small spills will be contained by onsite personnel using spill kits kept at the site.

It is anticipated that elements of the ERCP will include:

- Purpose and scope of plan coverage;
- General etf identification information (e.g., name, owner, address, key contacts, phone number);
- Etf and associated infrastructure (i.e., pipeline) locality information (e.g., maps, drawings, description, layout);
- Discovery/initial response;
- Termination and follow-up actions/prevention of recurrence;
- Notification protocols (internal, external, and agencies);
- Response management system (e.g., incident commander, safety, liaison, evacuation plan);
- Assessment/monitoring, discharge or release control;
- Containment, recovery, and decontamination;
- Logistics – medical needs, site security, communications, transportation, personnel support, equipment maintenance and support, emergency response equipment (e.g., personal protective equipment (ppe), respiratory, fire extinguishers, first aid);
- Incident documentation (accident investigation and history);
- A description of biological and human-use resources that could be impacted;
- An inventory of oil and chemical products and associated storage locations for both construction and operation phases;
- The identification of spill response equipment that will be onsite or available in case of emergency events;
- Procedures for responding to operational spills and releases;
- An incident reporting system, including notification and alerting procedures;
- A list of responsible organizations and clarification of the roles of each organization;
- Clean-up and disposal procedures;

- Training and exercises/drills;
- Plan review and modification;
- Prevention; and
- Regulatory compliance.

The ERCP will also reference relevant and appropriate standards to supplement code requirements as applicable. NPNS commits to submitting the ERCP to appropriate regulatory agencies for review.