NOVA SCOTIA

Environment

Guide to Considering Climate Change in Environmental Assessments in Nova Scotia

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1.0 INTRODUCTION

1.1 Climate Change and Environmental Assessment

Environmental Assessment (EA) is an important planning tool that is used to guide project developments to: minimize impacts on the environment; identify effects of the environment on the project; and increasingly to incorporate sustainability into project planning, development, operation, and decommissioning.

Through the EA, the environmental effects of a proposed project are predicted and evaluated, and a conclusion is made on the acceptability of the project from an environmental perspective. An EA also serves to promote sustainable development by identifying measures to protect and conserve the environment for future generations. By identifying and addressing environmental effects at the earliest stages of project development, the EA may also help proponents save time and money.

A key element of environmental sustainability will be how project proponents incorporate climate change considerations - greenhouse gas emissions reductions and climate change adaptation – into their respective projects.

The importance of an EA process as an effective tool for climate change mitigation and adaptation planning and management has been identified by the United Nations Framework Convention on Climate Change (UNFCCC) as well as by the World Bank, United Nations and other international development agencies. As such, climate change is increasingly becoming a key part of the EA process worldwide. This is because in the context of global climate change, it has been recognized that EAs should consider not only energy use/conservation and effects of emissions or sequestration of greenhouse gases, *i.e.* a project's contribution to climate change, but also the impacts of climate change on a project.

1.2 Why is Climate Change Important to a Project?

To reduce project risks associated with compliance with existing and future GHG reduction targets and legislation both in Canada and elsewhere, such as carbon cap-and-trade or carbon tax systems, certain projects will need to consider their "carbon footprint". This includes accounting for GHG emissions through all phases of the project lifecycle including: design, construction, operation and eventual abandonment of the project. In addition, existing carbon sinks such as forests may be lost if these are not considered in the design of a project.

One of the most compelling reasons for considering climate change in EAs is that climate data play a key role in the planning and design of infrastructure. Under climate change, the use of historic data alone may no longer be appropriate. Conventional uses of historic data such as the exclusive use of climatic normals could

render infrastructure vulnerable by leading to designs with insufficient load and adaptive capacity, or by leading to planning decisions that situate projects in environments that become unsafe or difficult to maintain over time. There is a potential that design professionals, infrastructure owners and operators may be held civilly liable for property damage or injury for not taking climate change effects into account (Gherbaz, 2008).

Many projects that trigger Project Registration and an associated EA in Nova Scotia can have relatively long life spans ranging from twenty to over one hundred years. Highway infrastructure, mine tailings facilities, and energy infrastructure are just a few such examples. It is important to consider how changing climate will influence the project over its expected lifetime, and how this will affect the environment and the on-going physical (direct impacts such as sea-level rise) and financial (costs such as insurance premiums and maintenance) viability of the project. Considering climate change at the time of Project Registration, in the EA, and early in the decision making process may avoid future costs to the project and related impacts on the environment.

1.3 Is this Guide Applicable to Your Project?

The intent of this Guide is to support the more detailed *Guide to Considering Climate Change in Project Development in Nova Scotia* and to assist project proponents in determining if the consideration of climate change would be beneficial to their project and how and where to incorporate climate change in a project's EA. The use of both Guides is encouraged for projects requiring registration and an associated environmental assessment under the *Environment Act* (Appendix A).

This Guide is not intended to provide guidance on preparing a Registration Document or conducting EAs in Nova Scotia and the proponent/practitioner should consult NSE's Environmental Assessment Branch EA guidance publications or contact the Environmental Assessment Branch for further information (http://www.gov.ns.ca/nse/ea/pubs.asp).

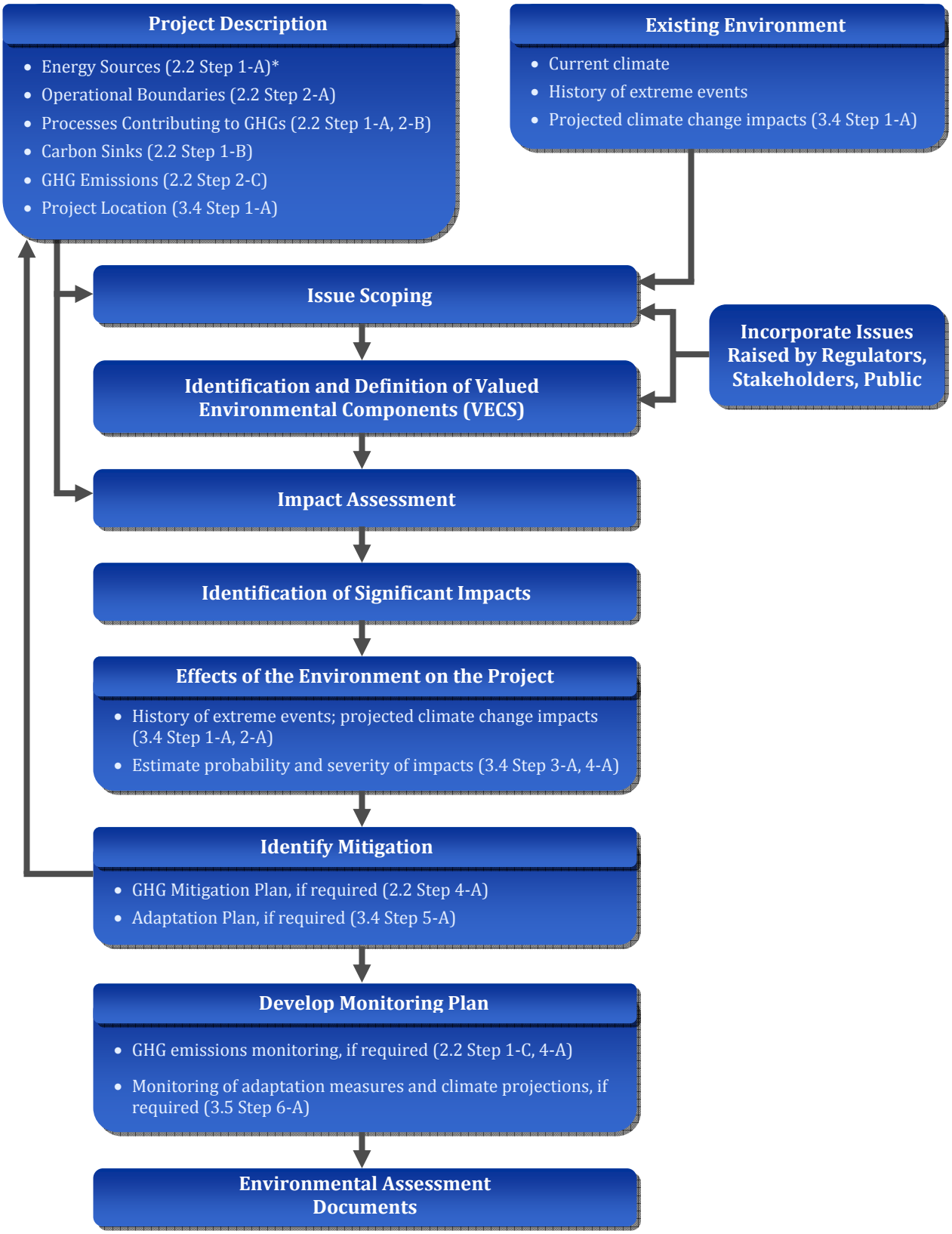
The extent to which climate change should be addressed will depend on project-specific factors including: project type; size; location; and project duration. In general, all projects should assess their carbon footprint; review possible options to reduce greenhouse gas emissions; and assess any impacts the project may have on carbon sinks. Similarly, all projects should, identify whether or not there are potential hazards from climate change that could affect the project. The intent of this Guide is to assist project proponents in making a decision if and to what extent climate change should be addressed in their EA. It is recommended that if a proponent and/or their consultant determine that climate change needs to be assessed that they review their approach with NSE's Environmental Assessment Branch and Climate Change Directorate as an initial step.

To the extent possible, proponents should avoid preparing a separate 'climate change' assessment document (with the exception of Appendices containing climate change specific data) and integrate climate change considerations into the project's registration document or environmental assessment report as described in the following sections.

1.4 Organization of the Guide

For ease of use by the project proponent and/or environmental assessment practitioner, this Guide has been organized along the primary steps of an environmental assessment. For each environmental assessment component, this Guide provides succinct advice on how to address climate change considerations. Where applicable, the advice for an EA component includes the link(s) [Section #, Step #] to the relevant steps described in the *Guide to Considering Climate Change in Project Development in Nova Scotia* (Figure 1-1). Appendix A provides the list of Class I and II undertakings requiring environmental assessment. Appendix B provides the list of Steps from the *Guide to Considering Climate Change in Project Development in Nova Scotia.*

Figure 1-1: Where to Include Climate Change Considerations in the Environmental Assessment Process



* Reference in brackets corresponds to applicable section and step in the "*Guide to Considering Climate Change in Project Development in Nova Scotia*".

2.0 INTEGRATION OF CLIMATE CHANGE IN ENVIRONMENTAL ASSESSMENT STEPS

2.1 Project Description

The Project Description provides an overview of the project through all phases of the project's life cycle. Typically, the Project Description will include information relevant to assessing the environmental impact of a project such as: site location; general layout; size; construction activities; operational processes and activities; anticipated emissions and discharges; and expected life span of the project. Climate change considerations can be readily incorporated into these elements for example:

- Operational processes and activities can include the project's energy sources and operational boundaries (*Guide to Considering Climate Change in Project Development in Nova Scotia* Section 2.2, Steps 1-A and 2-A);
- Anticipated emissions can include information on the processes contributing to GHGs (Section 2.2, Steps 1-A, 2-B) and estimated GHG emissions (Section 2.2, Step 2-C);
- General layout and size can describe the loss of carbon sinks through extent of forest removal (Section 2.2, Step 1-B); and
- The project's location or setting can be used in relation to a project's climate change vulnerability (Seciton 3.4, Step 1-A).

If climate change considerations have been incorporated into the project's design in advance of the environmental assessment, the measures included in the design should be described in the Project Description *e.g.* discussion of technologies selected to reduce GHGs; measures taken in project siting to address sea-level rise.

2.2 Existing Environment

The Existing Environment section of the EA will already include information on the local climate and meteorology in the vicinity of the project site. This discussion will often include a summary of extreme climate events and, if available, the trends in extreme events. In addition to historic climate data, the climate sub-section of the existing environment can also include a summary of climate change projections for the project location where available (*Guide to Considering Climate Change in Project Development in Nova Scotia* Section 3.4, Step 1-A). Alternatively, this information can be described in the Effects of the Environment on the Project section of the EA (see 2.7 below). In addition to climatic data, the proponent may highlight those environmental components relevant to the project that have documented sensitivity to climate change. These environmental components may include groundwater quality and quantity; and at-risk species.

Unlike other air quality parameters which are determined on a local or regional basis, GHG concentrations are determined on a global basis and as a result the existing environment as it relates to GHG concentrations is not pertinent to the EA.

2.3 Issue Scoping

Issue scoping involves identification of environmental concerns based on public and stakeholder opinion; applicable legislation and regulations; regulator input; scientific research; and professional judgment. Depending on the complexity of the project, scoping can range from an internal project team review of project characteristics and biophysical and socio-economic setting to open houses and public meetings. Regardless of the complexity of a project or the scoping process, specific consideration of climate change should be added to this step in the EA process (Bell et al, 2003). The scoping process should specifically consider whether or not climate change may impact the environmental concerns *e.g.* air quality, ecological concerns such as at risk species; or whether climate change may result in an environmental concern being added such as groundwater quality in areas susceptible to salt water intrusion due to sea-level rise or removed from consideration in the EA such as expatriation of a species due to climate change.

2.4 Identification of Valued Environmental Components

The Valued Environmental Component (VEC) list typically includes broad categories of VECs *e.g.* fish and fish habitat, or those species that are considered vulnerable or serve as indicator species, *e.g.* Atlantic Salmon. In most EAs, the VEC list will not be substantially affected by incorporating climate change, because most if not all VECs typically addressed in EAs in Nova Scotia have the potential of being effected by a project regardless of climate change. Climate change may result in some of VECs being more or less sensitive to impact but these potential impacts are more appropriately discussed in the Impact Assessment section of the EA.

2.5 Impact Assessment

Similar to the identification of VECs, climate change does not significantly alter the way in which a proponent will conduct the impact assessment. However, it is important to determine through the Issues Scoping step or the Existing Environment step what are the predicted impacts of climate change for the project area (follow *Guide to Considering Climate Change in Project Development in Nova Scotia* as described in Section 2.2 above or by consulting NSE's Climate Change Directorate http://climatechange.gov.ns.ca/).

The impact assessment process selected by the proponent/practitioner to determine impacts from the project on VECs remains the same with the caveat that if there are relevant VECs with a known positive or negative sensitivity to the projected climate change impacts, then this sensitivity should be taken into account when predicting impacts from the project. For example, if the project is likely to impact

groundwater quality and quantity and climate change projections indicate the potential for less groundwater recharge then the effect would be addressed in the impact assessment. For this step the proponent/practitioner may require additional VEC specific expertise to assist in assessment of the combination of project and climate change impacts and to assist in the determination of significance (Section 2.6 below).

One additional component of the impact assessment that has become increasingly common particularly in federal environmental assessments or joint federal/provincial environmental assessments is the impact of the project on carbon sinks such as forests and a project's net contribution to GHGs (*Guide to Considering Climate Change in Project Development in Nova Scotia* Section 2.2 Steps 1-B, 2-C). The results of these steps can be presented as a sub-section within the Air Quality section of the EA or if desired by the proponent/practitioner under a section dedicated to climate change considerations.

2.6 Identification of Significant Impacts

With the incorporation of climate change in EA, the determination of the significant impacts and how these are defined in terms of magnitude, duration and frequency, direct/indirect, geographic extent, reversibility, and level of adverse effects (Tables 2-1 and 2-2) does not change. However, if through the preceding steps of the EA, the project impacts in combination with climate change impacts on a VEC are evident then the proponent/practitioner should assess and discuss whether the significance of the combined impact increases or decreases the significance. For example, a project's impact on a sensitive VEC might be determined to be small in magnitude without climate change, but if climate change adds an additional stressor to the VEC, then the magnitude of the impact could increase to medium or major and would likely result in additional project impact mitigation.

Table 2-1 Criteria for Assessing Significance of Impacts from Project Activities

Nature of Impact	Adversity Category	Description
Magnitude	Negligible	Effect would not be detectable.
	Small	Small effect not likely detectable or to cause a statistically significant change.
	Medium	Measurable effect using well-planned sampling programs.
	Major	Effect that is readily measurable and involves large change, such as a doubling or halving of effects.
Duration and Frequency	Short-term	Effect would occur for a short duration and/or infrequently.
	Long-term	Effect would occur for a long duration and/or frequently.
Direct/Indirect	Direct	Resource would be directly affected.
	Indirect	Resource would be indirectly affected.
Geographic Extent	Site-specific	Restricted to a small area, such as the Project footprint,
	Local	Effects would be in the local area of the project.
	Regional	Effects would extend a broader regional or provincial wide area.
Reversibility	Reversible	Effects disappear when the impact is removed.
	Irreversible	Effects are permanent.

Table 2-2 Categories of Adverse Biophysical and Socio-economic Effects

Adversity Category	Biophysical	Socio-Economic
Negligible	Effect on the population or a specific group of individuals at a local Project area and/or over a short period in such as way as to be similar to small random changes in the population but having no measurable effect on the population as a whole.	Effect of either very short duration or affects a small group of people or which occurs in the local Project area in a manner similar to small random changes but having no measurable effect on the population as a whole.
Low	Effect on a specific group of individuals in a population in the Project area and/or over a short period (one generation or less), but not affecting other trophic levels or the integrity of the population itself.	Effect either of short-term duration or affects a specific group of people in the local Project area but not necessarily affecting the integrity of the entire group itself.

Adversity Category	Biophysical	Socio-Economic
Moderate	Effect on a portion of a population that results in a change in abundance and/or distribution over one or more generations of that portion of the population or any population dependent upon it, but does not change the integrity of any population as a whole. The effect may be localized.	Effect either of medium-term duration (which affects one or two generations and/or the portion of the population dependent upon it) or affects a moderate portion of the population without affecting the integrity of the population as a whole.
High	Effect on a whole stock or population of a species in sufficient magnitude to cause a decline in abundance and/or change in distribution beyond which natural recruitment would not return that population or species dependent upon it, to its former level within several generations.	Effect either of long duration (lasting several generations) or affecting an entire definable group of people in sufficient magnitude to cause severe change in economic, physical or psychological well-being or long established activity patterns that would not return to pre-Project levels or patterns within several generations.
Positive	Net improvement to the biophysical environment.	Net improvement to social well-being or the economy.

2.7 Effects of the Environment on the Project

This section of the EA is the most appropriate section for the assessment of climate change impacts on the project and to identify those components of the project that are vulnerable to climate change. As well, potential effects of the environment on the design of the project and how the proponent/practitioner will address the uncertainty of climate change predictions are the primary concerns that should be addressed in this section.

As noted in Section 2.2, historical extreme events, trends, and/or climate change projections can be described either in the Existing Environment section or in the Effects of the Environment on the Project section. It is highly recommended that as a minimum proponents complete the initial step in assessing climate change impacts on the project (Section 3.4.1, Step 1 – 'Setting the Context' from the *Guide to Considering Climate Change in Project Development in Nova Scotia*) to determine the initial risk category of the project. If a project is identified as Low/No Risk, *e.g.* no impacts from sea-level rise; project has back-up power; and in an existing industrial/commercial location with municipal services, then no further assessment is required. For Low/No Risk projects, the proponent/practitioner should include a brief rationale for the determination.

The proponent/practitioner may determine a project's risk is either Medium, *e.g.* projects that have some specific climate vulnerabilities such as sea-level rise related to a component or components of the project; or High Risk, *e.g.* projects that: are reliant on resources affected by climate (water resources); are located in hazard zones (coastal zones); or have long-term infrastructure potentially effected by climate change. In

either of these risk categories, proponents/practitioners are encouraged to describe the process taken and outcomes of the Steps 1 – 4 in Section 3.4.1 from the *Guide to Considering Climate Change in Project Development in Nova Scotia*.

2.8 Mitigation and Monitoring

The mitigation section of the EA focuses on measures to reduce or eliminate the potential remaining impacts of a project after standard design measures are applied, such as using Best Available Control Technology Economically Achievable (BACTEA); or selecting an appropriate project location to minimize environmental impacts.

In contrast to climate change assessments, in particular GHGs, mitigation in EA refers to both measures to be taken to reduce GHG emissions; and measures to be taken to make the project less vulnerable to climate change. In addition, the mitigation section of the EA should describe what measures the proponent will take to reduce the significance of the identified combined project climate change impacts on climate sensitive VECs. Where applicable, proponents/practitioners should provide the approach to climate change related mitigation in a sub-section (s) of the EA's mitigation section.

2.8.1 Greenhouse Gas Emissions

Nova Scotia, through its Environmental Goals and Sustainable Prosperity Act has set a target to reduce GHG emissions 10% below 1990 levels by 2020 and all proponents are encouraged to review and implement measures to reduce their GHG emissions.

For those projects that will exceed 10,000 tonnes[1] CO_2e emissions annually, proponents/practitioners should develop a GHG Management Plan (see *Guide to Considering Climate Change in Project Development in Nova Scotia* Section 2.2, Step 4 for recommended contents of the plan and consult with NSE's Environmental Assessment Branch and Climate Change Directorate). The plan should include the proponent's proposed monitoring methodology. The monitoring plan should be commensurate with the level of detail/emission sources/reduction measures described in the plan. This plan should be referenced in the mitigation section and can be appended to the Registration Document or the EA report.

2.8.2 Adaptation Plan

If a project is identified as a Medium or High Risk for climate change impacts (from Section 3.4.1, Step 1 of the *Guide to Considering Climate Change in Project Development in Nova Scotia*) and the results of the risk assessment approach (Section 3.4.1, Steps 2 – 4) indicate the project is vulnerable to climate change, then the

[1] Based on reporting requirements of British Columbia's Reporting Regulation (B.C. Reg. 272/2009) under the *Greenhouse Gas Reduction (Cap and Trade) Act.*

proponent/practitioner should develop an Adaptation Plan for the project (see *Guide to Considering Climate Change in Project Development in Nova Scotia* Section 3.4.1, Step 5). The Adaptation Plan can be referenced or the mitigation section or in the project description section of the EA and if necessary, the details of the plan appended to Registration Document or the EA report.

The knowledge base of climate change projections for Nova Scotia will increase over the life of a project, therefore, if a project has been noted as being sensitive to climate change, the Adaptation Plan should include how the performance of the measures will be monitored. Monitoring can include for example visual observations or surveying of physical adaptation measures and should include periodic review of climate change projections with staff of NSE's Climate Change Directorate to evaluate whether adaptation measures should be implemented or modified.

If no hazards are identified then the proponent/practitioner should document the risk assessment rationale in the Project Description or Effects of the Environment on the Project sections of the EA.

3.0 REFERENCES

Bell, A.V., N. Collins, and R.Young, 2003. Practitioner's Guide to Incorporating Climate Change into the Environmental Assessment Process.

Gherbaz, S., 2008. Liability for Failing to Adapt Infrastructure to Climate Change Events. Transcript – Torys' Video Podcast Series: Climate Change
(http://www.torys.com/VideoCenter/Archives/Pages/LiabilityforFailingtoAdaptInfrastructuretoClimateChangeEvents.aspx)

Nova Scotia Environment Environmental Assessment Branch (Environmental Assessment | Environmental Assessment | Nova Scotia Environment)

Appendix A
Projects Requiring Environmental Assessment in Nova Scotia

Class I Undertakings

The following are designated as Class I undertakings under the Act:

A. Industrial facilities

1. A storage facility that has a total storage capacity of over 5000 m^3 and is intended to hold liquid or gaseous substances, such as hydrocarbons or chemicals other than water.

2. A facility for manufacturing wood products that are pressure treated with chemical products.

3. A facility that produces fish meal.

4. A rendering plant.

5. An onshore pipeline that is 5 km or longer, other than a pipeline that carries any of the following:

   (a) natural gas, if the pipeline has a maximum operating pressure below 3450 kPa (500 psig);

   (b) water;

   (c) steam;

   (d) domestic wastewater.

6. A natural gas processing plant.

7. A paper product manufacturing plant.

8. An oil refinery that

   (a) produces no more than 15,000 L of hydrocarbon products per day; and

   (b) uses a feedstock that meets all of the following criteria:

(i) it contains no more than 1% sulphur or sulphur compounds by weight;

(ii) it does not contain halogenated compounds.

B. Mining

1. A facility that extracts or processes any of the following:

(a) metallic or non-metallic minerals;
(b) coal;
(c) peat;
(d) peat moss;
(e) gypsum;
(f) limestone;
(g) bituminous shale;
(h) oil shale.

2. A pit or quarry, other than a pit or quarry exempted under Section 4 of the regulations for the Department of Transportation and Infrastructure Renewal, that is larger than 4 ha in area for extracting one of the following:

(a) ordinary stone;
(b) building or construction stone;
(c) sand;
(d) gravel;
(e) ordinary soil.

C. Transportation

1. The construction of a new paved highway that is longer than 2 km and is designed for 4 or more lanes of traffic.

2. The construction of a new paved highway that is longer than 10 km and is designed for 2 or more lanes of traffic.

D. Energy

1. A corridor for 1 or more electric power transmission lines that have a cumulative voltage rating equal to or greater than 345 kVA.

2. An energy generating facility, other than an emergency generator, that meets any one of the following:

(a) it has a production rating of at least 2 MW derived from wind, tides or waves;

(b) it has a production rating of at least 2 MW and no more than 25 MW derived from hydroelectricity, other than run-of-the-river facilities under 10 MW;

(c) it has a daily fuel input rating of at least 11 000 GJ and no more than 31 000 GJ derived from natural gas;

(d) it has a daily fuel input rating of at least 250 GJ and no more than 2500 GJ derived from fossil fuels other than natural gas;

(e) it has a daily fuel input rating of at least 4000 GJ and no more than 10 000 GJ derived from fuels other than fossil fuels, but excluding solar power.

E. Waste management

1. A facility for storing, processing, treating or disposing of waste dangerous goods that were not produced at that facility, other than facilities operated by, or on behalf of, a municipality or Provincial agency for waste dangerous goods collected only from residential premises.

2. A facility for treating, processing or disposing of contaminated materials that is located at a site other than where the contaminated materials originated.

F. Other

1. An undertaking that involves transferring water between drainage basins, if the drainage area containing the water to be diverted is larger than 1 km^2.

2. An undertaking that disrupts a total of 2 ha or more of any wetland.

Class II Undertakings

The following are designated as Class II undertakings under the Act:

A. Industrial facilities

1. A facility for manufacturing, processing or reprocessing radioactive materials.
2. A heavy water plant.
3. A pulp mill.
4. A petrochemical manufacturing plant.
5. A cement plant.
6. An oil refinery other than an oil refinery listed as a Class 1 undertaking.
7. A non-ferrous or ferrous metal smelter.
8. A lead acid battery plant.
9. A ferro-alloy plant.

B. Energy

1. An energy generating facility, other than an emergency generator, that meets any one of the following:

(a) it has a production rating of more than 25 MW derived from hydroelectricity;
(b) it has a daily fuel input rating of more than 31 000 GJ derived from natural gas;
(c) it has a daily fuel input rating of more than 2500 GJ derived from fossil fuels other than natural gas;
(d) it has a daily fuel input rating of more than 10 000 GJ from fuels other than fossil fuels, but excluding solar power.

2. A water reservoir that has a storage capacity of 10 000 000 m^3 or more than the mean volume of the natural water body source for which it is a reservoir.

C Waste Management

1. A facility for incinerating municipal solid waste.

Appendix B
Summary of Steps from
Guide to Considering Climate Change in Project Development in Nova Scotia

Greenhouse Gas Emissions and Mitigation
Section 2.2 Guidance

Step 1 - Scoping

A. Using available project information on process, equipment, and energy sources, identify the potential GHG emission sources associated with the project.

B. Calculate area of forest loss associated with the project.

C. Is the project subject to federal, provincial legislation and regulations, or municipal by-laws or ordinances? If so, these should be described. If there are specific monitoring and reporting requirements, the proponent should ensure that the required methodologies or protocols are taken into account in the estimation of GHG emissions (Step 2C below).

Step 2 – Develop a GHG Inventory

A. What are the operational boundaries of the project? Identify the physical and process boundaries of the project. .

B. Identify and describe the operations within the project boundary that will contribute GHG emissions.

C. Estimate GHG emissions in CO_2e/year from the project based on projected construction, operations, and, if feasible, decommissioning activities using available data and references. NSE recognizes that depending on the level of design available early in the project, there may be uncertainty or unknowns with respect to emission rates, and in some cases, emission sources.

Step 3 – Identify GHG Emission Reduction Opportunities

A. Review major sources of emissions and determine if there are feasible reduction strategies available for the project.

Step 4 – Develop a GHG Mitigation Plan

A. Prepare a GHG Mitigation Plan that summarizes the findings of the previous steps and identifies the actions the proponent proposes to take to reduce GHG emissions over the life time of the project. The plan should also include the proposed monitoring and continual improvement procedures to be implemented as well as a commitment to update the plan as regulatory requirements evolve.

Adaptation
Section 3.4.1 Risk Management Approach

Step 1 – Setting the Context

A. The context for the risk management framework will come from a description of the project; and the existing environment where the project will be located Based on a general review of the above information, proponents should identify whether their projects are considered high, medium, or low/no risk. No further assessment is required for low/no risk projects.

Step 2 - Analysing the Hazard

A. Detail known climate change hazards, frequency, and how the hazards may impact the project.

Step 3 – Estimating the Probability and Severity of Climate Change Hazards

A. Evaluate the probability and severity of the climate change hazards identified in Step 2.

Step 4 – Evaluating the Risk

A. Using the probability and severity of climate change impacts or hazards, determine the risk of the impacts to the project to identify which impacts present the highest risks to the project and to assist in the determination of priorities for implementing adaptation measures where required.

Step 5 - Adaptation Planning

A. Where a project has been identified with medium to high integrated risks from climate change impacts, a proponent should develop an Adaptation Plan.

Step 6 – Implementation and Monitoring

A. If an Adaptation Plan is identified in Step 5, then a monitoring program should be carried out to assess the performance of the adaptation measures over the lifetime of the project as well as keeping current on climate change projections relevant to the project.