

Guidance Document

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NEWFOUNDLAND AND LABRADOR CLIMATE CHANGE LENS PART 2:
ASSESSMENT AND INTEGRATION OF RESILIENCE AND MITIGATION MEASURES

What is the Newfoundland and Labrador Climate Lens?

- The Newfoundland and Labrador Climate Lens seeks to ensure the integration of climate change considerations into the planning, design, and development of all infrastructure projects that receive any financial support from the provincial government.
- The Newfoundland and Labrador Climate Lens is a two-step process:
 - **Step 1** - All entities seeking provincial funding for infrastructure (hereinafter referred to as 'applicants') confirm that they have integrated climate change considerations into the planning, design, and development of their project including their project budget and workplan; and
 - **Step 2** – Once their application has been approved, applicants demonstrate, using this guidance, how they intend to integrate measures to reduce greenhouse gas emissions and build resilience to climate change into the planning, design and development of the project, and subsequently report on how this affected the project from both a quantitative and qualitative perspective. While the applicant will be responsible for providing this information to the Department of Municipal Affairs and Environment, this information may be prepared by a lead consultant at the request of the applicant, providing the applicant approves the information submitted.

Why Implement a Climate Lens?

- The science is clear. Climate change is happening and the impacts are already been felt. The Government of Newfoundland and Labrador has committed to tackle climate change through (i) reducing greenhouse gas emissions and (ii) improving resilience to the impacts of climate change such as extreme precipitation, flooding, coastal erosion, and permafrost melt.
- Climate change is projected to bring warmer, wetter and stormier weather conditions across Newfoundland and Labrador. All regions will experience changes, ranging from an increase of up to 7.3°C in the winter and up to 3.8°C in the summer, with the most significant impacts expected for northern Labrador. Extreme precipitation and weather events are expected to increase in both frequency and intensity.
- These changes will impact infrastructure, and it is essential that all infrastructure investments take into account both projected climate change risks and impacts, and the need to reduce greenhouse gas emissions to help prevent further adverse impacts in future.
- The objective of this guidance document is to provide templates for applicants and consultants to help facilitate completion of the Newfoundland and Labrador Climate Lens by:
 - Quantifying changes in climate projections that could result in increased risks, impacts and vulnerabilities to a project; and
 - Quantifying climate change mitigation considerations associated with a project.
- If you have any questions, please contact: climatechange@gov.nl.ca

Resilience to Climate Change

- Available resources to facilitate completion of the climate change resilience section of the Newfoundland and Labrador Climate Lens are described in Table 1, focusing on temperature change, precipitation change, sea level rise and coastal erosion, and overland flooding. Tables 2 to 5 then provide more detailed templates for applicants to quantify how climate change can impact a project.
- This will assist applicants respond to questions 1.1 to 1.3 of the Newfoundland and Labrador Climate Lens and will better allow applicants to respond to questions 1.4 to 1.6 by identifying potential risks as required by the Newfoundland and Labrador Climate Lens.

Table 1: Overview of Guidance and Available Resources – Adaptation and Resilience

Table	Area of Focus	Available Data	Resource links
2	Temperature Change	Projections are available for 22 locations on the island of Newfoundland and 7 locations in Labrador. The projections compare change from the end of the last century to the mid- and late-21st century. Applicants can select locations closest to their project in completing the Lens.	https://www.exec.gov.nl.ca/exec/occ/climate-data/index.html (see Temperature Projections hyperlink)
3	Precipitation Change	General precipitation projections are available for 22 locations on the island of Newfoundland and 7 locations in Labrador. The projections compare change from the end of the last century to the mid- and late-21st century. Applicants can select locations closest to their project in completing the Lens.	https://www.exec.gov.nl.ca/exec/occ/climate-data/index.html (see Precipitation Projections hyperlink)
4	Extreme Precipitation	Projections for extreme precipitation events are available for 14 locations on the island of Newfoundland and 6 locations in Labrador. The projections compare change from the end of the last century to the mid- and late-21st century. Applicants can select locations closest to their project in completing the Lens.	https://www.exec.gov.nl.ca/exec/occ/climate-data/index.html (see list of hyperlink locations in table on webpage)
5	Sea level rise and coastal erosion	<p>Sea level rise and sea level allowance projections are available for three locations on the island of Newfoundland (St. John's, Argentia and Port aux Basques) and one location in Labrador (Nain). An additional regional sites that may be referred is Harrington Harbour, QC (north shore). Sea level allowance is a measure that allows a user to incorporate both sea level rise and increased sea surge in siting infrastructure. The projections compare change from the end of the last century by decade to the end of the 21st century. Applicants can select locations closest to their project in completing the Lens.</p> <p>Coastal erosion monitoring stations are available for approximately 120 locations, including 112 locations on the island of Newfoundland and 8 in Labrador. Applicants can select locations closest to their project in completing the Lens.</p>	<p>http://www.dfo-mpo.gc.ca/Library/353519.pdf (See Appendix B.2)</p> <p>https://geoatlas.gov.nl.ca/default.htm (See Coastal Monitoring section)</p>
No table provided	Flood risk mapping	Flood risk maps are available for approximately 40 locations on the island of Newfoundland. Climate change projections are included for 11 locations. The maps describe 20- and 100-year flood plains. Applicants located at these locations can utilize these maps in completing the Lens (no template is provided in the guidance for flood risk mapping).	https://www.mae.gov.nl.ca/waterres/flooding/frm.html

Table 2: Suggested Temperature Variables for mid- and late-century
(Applicants may include other variables based on their particular project)

Variable	Project examples	Adjacent location 1	Adjacent location 2	Other locations (one column per location)	Average (all identified locations)
Change in minimum daily temperature	Projects for which the freeze-thaw cycle is important				
Number of days with frost					
Change in heating degree days and cooling degree days	Building heating and cooling systems				

Table 3: Suggested Precipitation Variables for mid- and late-century
(Applicants may include other variables based on their particular project)

Variable	Project examples	Adjacent location 1	Adjacent location 2	Other locations (one column per location)	Average (all identified locations)
Change in maximum 3 day precipitation (mm)	Projects that include reservoirs (dams, water supply systems) or drainage systems				
Change in number of days with 10+ mm precipitation	As above, plus projects adjacent to the coastline and may be impacted by coastal erosion				
Change in 90th percentile of precipitation (mm)	As above				

Table 4: Suggested Extreme Precipitation Variables for mid- and late-century
(Applicants may include other durations (from 5 minutes to 12 hours) and return periods (ranging from 1-in-2 to 1-in-50 years) based on their particular project)

Variable	Project examples	Adjacent location 1	Adjacent location 2	Other locations (one column per location)	Average (all identified locations)
1-in-10 year storm, 24 hours (mm) Median expected change Maximum expected change	Projects with wood structures (e.g., walking trails)				
1-in-25 year storm, 24 hours (mm) Median expected change Maximum expected change	Buildings (e.g., roofing materials)				
1-in-100 year storm, 24 hours (mm) Median expected change Maximum expected change	Transportation projects (e.g., bridges)				

Table 5: Sea Level Rise and Sea Level Allowance Projections
(Applicants may include other years based on their particular project)

	Project Types	Projected Change in Sea Level	Projected Change in Sea Level Allowance
2030	Projects adjacent to the coastline (e.g., breakwaters, marinas, wastewater systems, walking trails, buildings, coastal roads)		
2050			
2070			
2090			
2099			

Climate Change Mitigation

- Table 6 provides an overview of project areas for which greenhouse gases may be quantified and outlines information requirements that applicants will need to provide. Tables 7 to 10 then provide calculation templates for applicants to quantify greenhouse gas emissions. Applicants should focus on areas that they control or own, and should exclude energy consumed by suppliers outside their control. Further details are provided in Tables 7 to 9.
- Completion of these tables will assist applicants respond to questions 2.1 to 2.3 of the Lens and will better allow applicants to respond to questions 2.4 to 2.6 by identifying areas of highest energy consumption. This will in turn allow applicants to identify mechanisms to reduce both energy use and greenhouse gas reductions, which is required by the Newfoundland and Labrador Climate Lens.

Table 6: Overview of Guidance and Information Requirements - Mitigation

Table	Project Phase	Areas of focus	Information Needed
7	Construction phase	Energy consumption and associated greenhouse gas emissions, excluding water treatment	Anticipated electricity consumption (KWh) Anticipated litres of fuel consumed by fuel type (gasoline, diesel fuel, etc.)
8	Operations phase Building replacements and upgrades	Energy consumption and associated greenhouse gas emissions, excluding water treatment	Existing and anticipated annualized electricity consumption (KWh) Existing and anticipated annualized litres of fuel consumed by fuel type (gas, diesel, etc.)
9	Operations phase New buildings	Energy consumption and associated greenhouse gas emissions, excluding water treatment	Anticipated annualized electricity consumption (KWh) Anticipated annualized litres of fuel consumed by fuel type (gas, diesel, etc.)
10	Water and wastewater (energy)	Energy consumption and associated greenhouse gas emissions related to water treatment	Existing and anticipated annualized water and wastewater use (m ³)
11	Wastewater treatment (non-energy)	Methane emissions associated with wastewater treatment	Number of residents serviced by type of wastewater treatment

Table 7: Construction phase**Energy-related GHGs (excluding water treatment)**

- GHG emissions from users that are not directly contracted or owned by the project owner, such as energy used to generate heat by asphalt providers, or transportation services provided by building suppliers and wholesalers, should be excluded.
- GHG emissions associated with water treatment, and GHG emissions associated with land use change (e.g., forest clearing) should also be excluded.

Fuel type (if available and relevant)	Examples	Unit	Annual KWh or litres from project-related sources consumed during project construction	GHG conversion factor (tonnes) (starting 2020)	Annual GHG emissions (tonnes)
			A	B	C (A x B)
Building electricity (island and Labrador on-grid)	Heating, appliances and lighting in temporary construction buildings	KWh		0.0	0.0
Building electricity (off-grid diesel generation)		KWh		0.0008	
Gasoline	Owned and contracted gas vehicles	Litres		0.0023	
Diesel	Owned and contracted diesel vehicles	Litres		0.0027	
Light fuel/heating oil	Heating and appliance use in temporary construction buildings	Litres		0.0027	
Propane	Heating and appliance use in temporary construction buildings Owned and contracted propane vehicles	Litres		0.0015	
Kerosene	Heating and appliance use in temporary construction buildings	Litres		0.0025	

On-grid electricity factor assumed to be 0.0 for the island of Newfoundland starting 2020.

Table 8: Operations Phase – Replacement or Upgrading of Existing Buildings
Energy-related GHGs (excluding water treatment)

- GHG emissions from users that are not directly contracted or owned by the project owner, such as from transportation services for couriers providing delivery services to a building, GHG emissions associated with water treatment, and GHG emissions from non-energy sources should be excluded.
- Water treatment is separately included below.

Water treatment is separately included below.								
Fuel type (if relevant)	Examples		Annual KWh or litres consumed from project-related sources		GHG conversion factor (tonnes) (starting 2020)	Annual GHG emissions (tonnes)		
		Unit	Prior to project	After the project		Prior to project	After the project	Net change
			A	B	C	D (A x C)	E (B x C)	F (D – E)
Electricity (island and Labrador on-grid)	Heating, appliances and lighting in buildings	KWh			0.0	0.0	0.0	0.0
Electricity (off-grid diesel generation)		KWh			0.0008			
Gasoline	Owned and contracted gas vehicles	Litres			0.0023			
Diesel	Owned and contracted diesel vehicles	Litres			0.0027			
Light fuel/heating oil	Heating and appliance use in buildings	Litres			0.0027			
Propane	Heating and appliance use in buildings Owned and contracted propane vehicles	Litres			0.0015			
Kerosene	Heating and appliance use in buildings	Litres			0.0025			

On-grid electricity factor assumed to be 0.0 for the island of Newfoundland starting 2020.

Table 9: Operations Phase – New Buildings
Energy-related GHGs (excluding water treatment)

- GHG emissions from users that are not directly contracted or owned by the project owner, such as from transportation services for couriers providing delivery services to a building, GHG emissions associated with water treatment, and GHG emissions from non-energy sources should be excluded.
- Water treatment is separately included below.

Fuel type (if relevant)	Examples	Unit	Annual KWh or litres from project-related sources after the project	GHG conversion factor (tonnes) (starting 2020)	Annual GHG emissions after project (tonnes)
			A	B	C (A x B)
Electricity (island and Labrador on-grid)	Heating, appliances and lighting in buildings	KWh		0.0	0.0
Electricity (off-grid diesel generation)		KWh		0.0008	
Gasoline	Owned and contracted gas vehicles	Litres		0.0023	
Diesel	Owned and contracted diesel vehicles	Litres		0.0027	
Light fuel/heating oil	Heating and appliance use in buildings	Litres		0.0027	
Propane	Heating and appliance use in buildings Owned and contracted propane vehicles	Litres		0.0015	
Kerosene	Heating and appliance use in buildings	Litres		0.0025	

On-grid electricity factor assumed to be 0.0 for the island of Newfoundland starting 2020.

**Table 10: Water treatment
Electricity GHGs**

		Unit	Annual m ³		GHG conversion factor (tonnes) (starting 2020)	Annual GHG emissions (tonnes)		
			Prior to project	After the project		Prior to project	After project	Net change
			A	B	C	D (A x C)	E (B x C)	F (D - E)
Electricity (island and Labrador on-grid)	Drinking water	m ³			0.0	0.0	0.0	0.0
Electricity (off-grid diesel generation)		m ³			0.008			
Electricity (island and Labrador on-grid)	Waste water treatment systems using electricity	m ³			0.0	0.0	0.0	0.0
Electricity (off-grid diesel generation)		m ³			0.000002			

On-grid electricity factor assumed to be 0.0 for the island of Newfoundland starting 2020.

**Table 11: Wastewater treatment
Non-energy (methane)**

Treatment type	Number of citizens using treatment type		GHG Emissions Factor	Annual GHG Emissions (tonnes)		
	Prior to project	After project		Prior to project	After project	Net change
	A	B	C	D (A x C)	E (B x C)	F (D - E)
Aerobic systems			0.0	0.0	0.0	0.0
Sequence batch reactor (sludge system)			0.010			
Wetland			0.034			
Facultative Lagoon (constructed ponds)			0.039			
Septic			0.099			
Anaerobic lagoon (constructed ponds not aerated, heated, or mixed)			0.158			
No treatment			0.020			

Estimated using the methodology for the federal National Inventory Report of GHG emissions, 2019.

CLIMATE CHANGE LENS PART 2

NEWFOUNDLAND AND LABRADOR CLIMATE CHANGE LENS PART 2: ASSESSMENT AND INTEGRATION OF RESILIENCE AND MITIGATION MEASURES

As part of its application to the Government of Newfoundland and Labrador for infrastructure funding, the applicant has confirmed that the Newfoundland and Labrador Climate Change Lens will be integrated into the planning, design and development phases of this project. The Newfoundland and Labrador Climate Change Lens includes:

- I. opportunities to minimize greenhouse gas emissions during the construction and operation of the project;
- II. using available information, tools and resources in decision-making processes to build resilience to climate impacts and reduce climate risk.

Part 1 of the Newfoundland and Labrador Climate Change Lens was completed by the applicant when applying for funding. It required the applicant to confirm that the climate change considerations would be fully integrated into the project, if the project was approved. Once projects are approved, applicants are required to complete Part 2 of the Newfoundland and Labrador Climate Change Lens. Part 2 must be completed and submitted to the Department of Municipal Affairs and Environment for review during the design stage, prior to construction beginning. Please complete the questions to demonstrate, in detail, how climate change considerations and appropriate measures have been fully assessed and appropriate action has been taken to integrate them into the project.

Please note that the Newfoundland and Labrador Climate Change Lens is distinct from the Federal Government's Climate Change Lens, which may also apply.

Instructions

- This form must be completed and submitted to the Department of Municipal Affairs and Environment as part of the design phase, before construction begins.
- Please ensure that all project information requested is provided and that questions are completed for both the Climate Risk and Mitigation Assessments.
- This form must be signed and submitted by an authorized representative of the applicant. It can be completed by the lead consultant at the request of the applicant, but the applicant must approve the completed Lens prior to its submission to the Department.
- If the form is not submitted, complete, or the content is considered unsatisfactory, the conditions on which funding was approved will be considered incomplete, and approved funds will not be released.

Provincial Climate Change Resources

- [Provincial Climate Change Temperature and Precipitation Projections](#)
- [Climate Change Intensity-Duration-Frequency Curves](#)
- [Climate Change Flood Risk Maps](#)
- [Coastal Erosion Monitoring data](#)
- [Sea-Level Change Data](#)

Project Information

Project Title: _____

Applicant Name: _____

Municipality/Organization: _____

Project Number (if applicable): _____

Project description (100-200 words)**1.0 Climate Resilience Assessment**

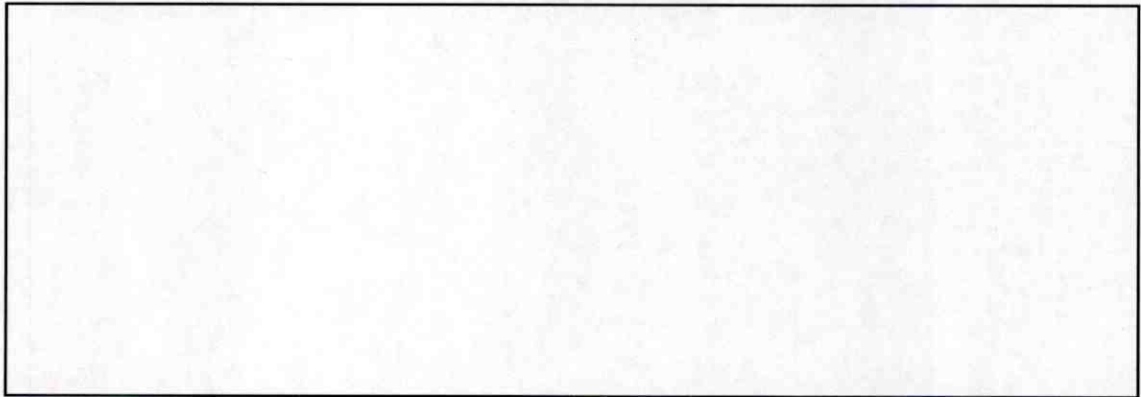
Climate resilience is defined as the actions taken to adapt to the current risks resulting from climate change. Climate change is projected to bring warmer, wetter and stormier weather conditions across Newfoundland and Labrador. This will impact our province in a variety of ways, including more flooding, coastal erosion, sea-level rise, and permafrost melt. These impacts will affect infrastructure and it is essential that any new investments fully take into account projected climate change throughout the project lifecycle.

Possible Climate Risks and Hazards:

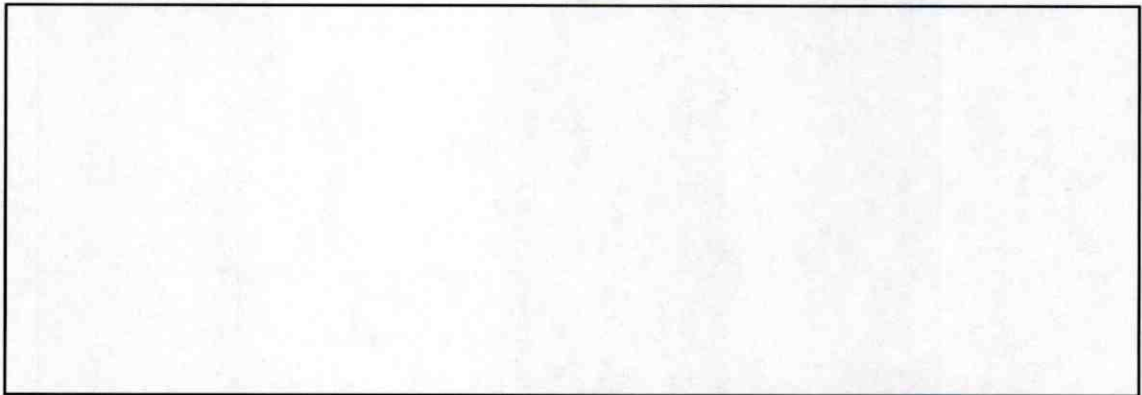
1.1 Please indicate which resources you have consulted:

- a. The provincial climate change resources (listed below) in your assessment, and if so, which resources.

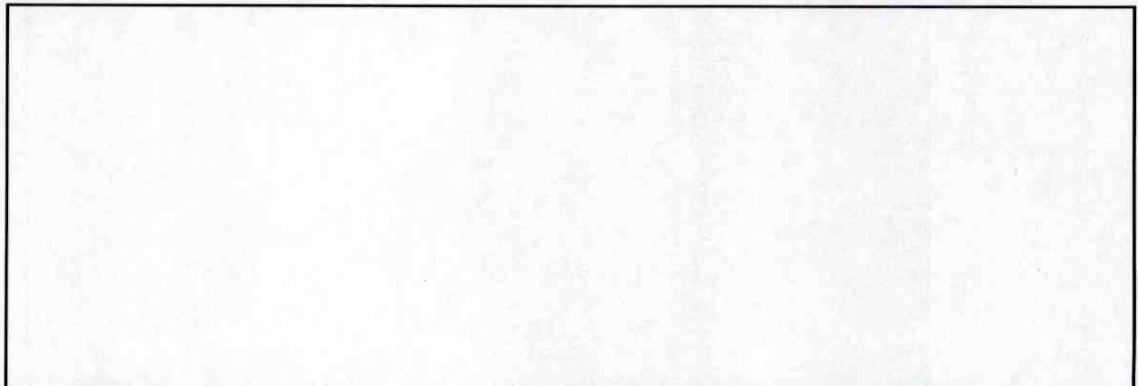
- b. Any additional resources in conducting your assessment (please describe)?

A large, empty rectangular box with a black border, intended for the respondent to describe any additional resources used in the assessment.

- 1.2 Drawing on the provincial climate change resources listed above, as well as any other relevant resources identified above, please describe any potential climate risks to the proposed infrastructure project for the full lifespan of the asset.

A large, empty rectangular box with a black border, intended for the respondent to describe any potential climate risks to the proposed infrastructure project.

- 1.3 Please describe the possible climate change hazards and risks that could affect this project. In completing this description, please identify whether the asset is in an area that has already been impacted by a notable natural hazard or other climate risk.

A large, empty rectangular box with a black border, intended for the respondent to describe possible climate change hazards and risks that could affect the project.

1.4 Please describe any potential impacts on the asset.

1.5 Please describe the potential consequences of these impacts.

Climate Resilience Measures:

1.6 In light of your responses to questions 1.1 to 1.5, please describe what resilience measures have been integrated into the project (e.g. location of asset, materials used, construction methods, etc.).

2.0 Climate Mitigation Assessment

Climate mitigation is defined as action to reduce the amount of greenhouse gas (GHG) emissions released into the atmosphere. A range of measures can be integrated into infrastructure projects to minimize GHG emissions in both the construction and operation phases of the project. For example, this may include measures to maximize fossil fuel efficiency and to recycle materials during construction and operation phases of the project, and measures to minimize wastewater emissions. This can be informed by life-cycle costing.

GHG Emissions

2.1 What are the estimated i) energy use and ii) GHG emissions for the construction phase of the proposed asset? This would include energy consumed by machinery and equipment during the construction phase of the project only, such as from contracted vehicles and equipment that will be used to construct the project. It would not include energy use and GHG emissions during the operations phase of the project, such as from space heating and cooling in a building. Please refer to the guidance sheet on calculations for assistance in determining these emissions. If you are not able to estimate the GHG emissions, please describe the key emission sources.

2.2 What are the estimated i) energy use and ii) GHG emissions related to the operations phase of the proposed asset after the project has been constructed? In cases where the new asset replaces an existing asset, what are the incremental changes in energy use and GHG emissions relative to the asset that has been replaced? This would include energy use and GHG emissions from fuel use and electricity purchases. Please refer to the guidance sheet on calculations for assistance in determining these emissions.

2.3 Please include any other information on GHG emissions that you would like considered. For example, non-energy GHG emissions (e.g. methane) for wastewater treatment projects. Please see the guidance document for additional details.

Climate Mitigation Measures

2.4 What measures, if any, will be implemented to reduce the GHG emissions during the construction phase of the proposed project? Please explain and, where possible, quantify. This could include, for example, procurement strategies to contract vehicles and equipment with a lower carbon footprint to reduce fuel consumption.

2.5 What measures, if any, will be implemented to reduce energy use and energy-related GHG emissions during the operations phase of the proposed project? Please explain and, where possible, quantify. This could include, for example, procurement strategies to purchase materials (e.g., insulation) and vehicles to reduce energy use and GHG emissions from fuel use and electricity purchases, and meeting the requirements of government's Build Better Buildings Policy by pursuing certification under LEED or BOMA BEST.

2.6 Please add any further information of relevance to this project. This could include information on non-GHG emissions (e.g. methane). For further information, please see the guidance document.

[To be completed by lead consultant]

I, the undersigned, understand and confirm that the statements in this document are true and accurate to the best of my knowledge, and that I am authorized and have the necessary knowledge and expertise to complete this document on behalf of my organization.

Signature: _____

Print Name: _____

Position Title: _____

Organization: _____

Date: _____

[To be completed by the Applicant – i.e. the Project Proponent]

I, the undersigned, understand and confirm the statements above are true and accurate to the best of my knowledge and that I am authorized to attest to this on behalf of my municipality/organization.

Signature: _____

Print Name: _____

Position Title: _____

Municipality/Organization: _____

Date: _____