

# Climate Change Operations Plan

2020–2030 | VERSION 3 (UPDATED IN 2022)



IE

# Acknowledgements

acknowledgements are a way to show appreciation for the people and organizations that have supported you throughout your journey. They are an important part of any project or presentation, and they can help you to build relationships and gain support for your work. Acknowledgements can be as simple as a thank-you note or as formal as a speech. They can be written in a variety of styles, and they can be as long or as short as you need. The most important thing is to be sincere and to express your gratitude for the help you have received.

## Land Acknowledgment

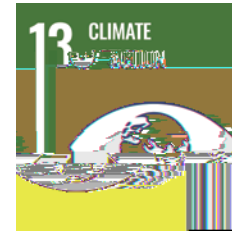
Land acknowledgment is a way to recognize the Indigenous peoples who have lived on the land for thousands of years. It is a way to show respect for their history and culture, and to acknowledge their ongoing presence in the community. Land acknowledgment can be as simple as a statement of gratitude or as formal as a ceremony. It can be written in a variety of styles, and it can be as long or as short as you need. The most important thing is to be sincere and to express your appreciation for the land and the people who have lived on it.



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Environmental Impact Assessment (EIA) is a process that identifies, predicts, and evaluates the potential environmental impacts of a proposed project or development. It is a key tool for decision-making and for ensuring that the environmental consequences of development are taken into account.



# Summary

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## Current Context

### ■ Climate Change and Its Projected Impacts

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### Climate Change Adaptation and Mitigation

Climate change adaptation and mitigation strategies are essential for reducing the risks and impacts of climate change. Adaptation involves adjusting to the current and expected changes in climate, while mitigation focuses on reducing greenhouse gas emissions to limit the extent of climate change. Both are critical for a sustainable future.

### Climate Change Planning for Halifax and Colchester County

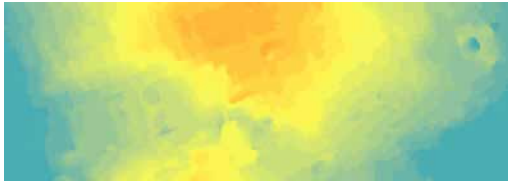
#### Halifax

The Halifax region is highly vulnerable to the impacts of climate change, particularly coastal erosion and sea level rise. The region's infrastructure, including roads, bridges, and buildings, is at risk of damage and displacement. Climate change planning for Halifax and Colchester County must focus on identifying and addressing these vulnerabilities. Key areas of concern include the protection of critical infrastructure, the development of resilient communities, and the implementation of nature-based solutions to reduce coastal erosion. The region's unique geography and climate make it particularly susceptible to these risks, and proactive planning is essential to ensure a sustainable future for all residents.

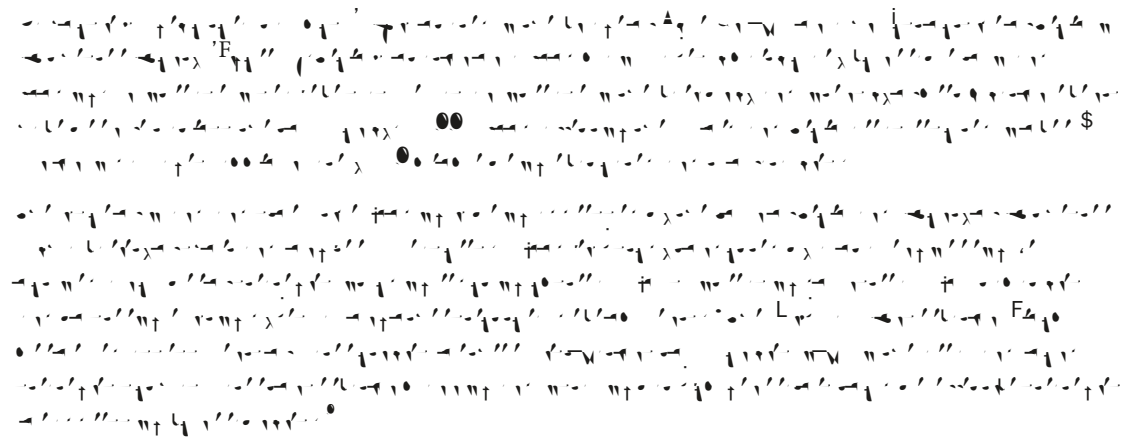
Coastal erosion on McNab's Island Halifax Harbour. Rochelle Owen, 2018.



Figure 3. Studley Campus Elevation Map.  
Yvonne Ritchie, 2018.



**Colchester**









## 👁️ Vision, Principles, and Scope

👁️ Vision  
The vision of the organization is the primary reason for its existence. It is a statement of the organization's purpose and its long-term goals. It is a statement of the organization's values and its commitment to its stakeholders. It is a statement of the organization's identity and its role in the world.

👁️ Principles

👁️

# Benchmarking

## GHG Inventory

The GHG inventory for Dalhousie's Halifax and AC campuses for 2009-2010 is presented in Figure 9. The total emissions are 1,000 tonnes of CO2e. The inventory is broken down into three scopes: Scope 1 (Direct GHG emissions and removals), Scope 2 (Energy indirect GHG emissions), and Scope 3 (Other indirect GHG emissions).

### Scope 1: Direct GHG emissions and removals

Scope 1 emissions include direct emissions from the combustion of fossil fuels in owned or controlled boilers, engines, turbines, and other combustion equipment. For Dalhousie, this includes emissions from the AC campus boiler.

### Scope 2: Energy indirect GHG emissions

Scope 2 emissions are indirect emissions from the generation of purchased electricity, steam, heating, and cooling. For Dalhousie, this includes emissions from the AC campus.

### Scope 3: Other indirect GHG emissions

Scope 3 emissions include all other indirect emissions that are not covered in Scopes 1 or 2. For Dalhousie, this includes emissions from the Halifax campus.

Figure 9. Quantitative summary of Dalhousie's GHG emissions for 2009–2010 baseline for Halifax and AC campuses.

EMISSIONS SUMMARY TONNES	TONNES OF CO2e
Scope 1: Direct GHG emissions and removals	100
Scope 2: Energy indirect GHG emissions	800
Scope 3: Other indirect GHG emissions	100

## Climate Modelling for Halifax and Agricultural Campuses

Climate modelling for the Halifax and Agricultural Campuses (AC) was conducted to assess the impact of various scenarios on future emissions. The modelling considers different energy efficiency measures and renewable energy sources.

The results of the climate modelling show that implementing energy efficiency measures can significantly reduce emissions. Additionally, transitioning to renewable energy sources can further reduce the carbon footprint of the campuses.

<p>Table 1. Results of climate modelling data without any global action</p>
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All Campuses (Halifax and Agricultural)

Key Themes

- Increased energy consumption
- Increased greenhouse gas emissions
- Increased water consumption
- Increased waste generation
- Increased air pollution
- Increased noise pollution
- Increased soil erosion
- Increased water pollution
- Increased air quality degradation
- Increased noise levels
- Increased soil degradation
- Increased water quality degradation

Implications

- Increased energy costs
- Increased greenhouse gas emissions
- Increased water costs
- Increased waste management costs
- Increased air pollution costs
- Increased noise pollution costs
- Increased soil erosion costs
- Increased water pollution costs
- Increased air quality degradation costs
- Increased noise levels costs
- Increased soil degradation costs
- Increased water quality degradation costs

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Table 3. Key Climate Vulnerabilities and Impacts

Highest to Lowest Priority Vulnerabilities for the University	Vulnerabilities	Impacts
<b>High</b>	<ul style="list-style-type: none"> <li>Increased precipitation</li> <li>Increased wind</li> <li>Increased snow/ice</li> <li>Increased flooding</li> <li>Increased temperature extremes</li> </ul>	<ul style="list-style-type: none"> <li>Temperature extremes</li> <li>Increased precipitation</li> <li>Increased wind</li> <li>Increased snow/ice</li> <li>Increased flooding</li> </ul>
<b>Medium</b>	<ul style="list-style-type: none"> <li>Increased precipitation</li> <li>Increased wind</li> <li>Increased snow/ice</li> <li>Increased flooding</li> <li>Increased temperature extremes</li> </ul>	<ul style="list-style-type: none"> <li>Temperature extremes</li> <li>Increased precipitation</li> <li>Increased wind</li> <li>Increased snow/ice</li> <li>Increased flooding</li> </ul>
<b>Low</b>	<ul style="list-style-type: none"> <li>Increased precipitation</li> <li>Increased wind</li> <li>Increased snow/ice</li> <li>Increased flooding</li> <li>Increased temperature extremes</li> </ul>	<ul style="list-style-type: none"> <li>Temperature extremes</li> <li>Increased precipitation</li> <li>Increased wind</li> <li>Increased snow/ice</li> <li>Increased flooding</li> </ul>

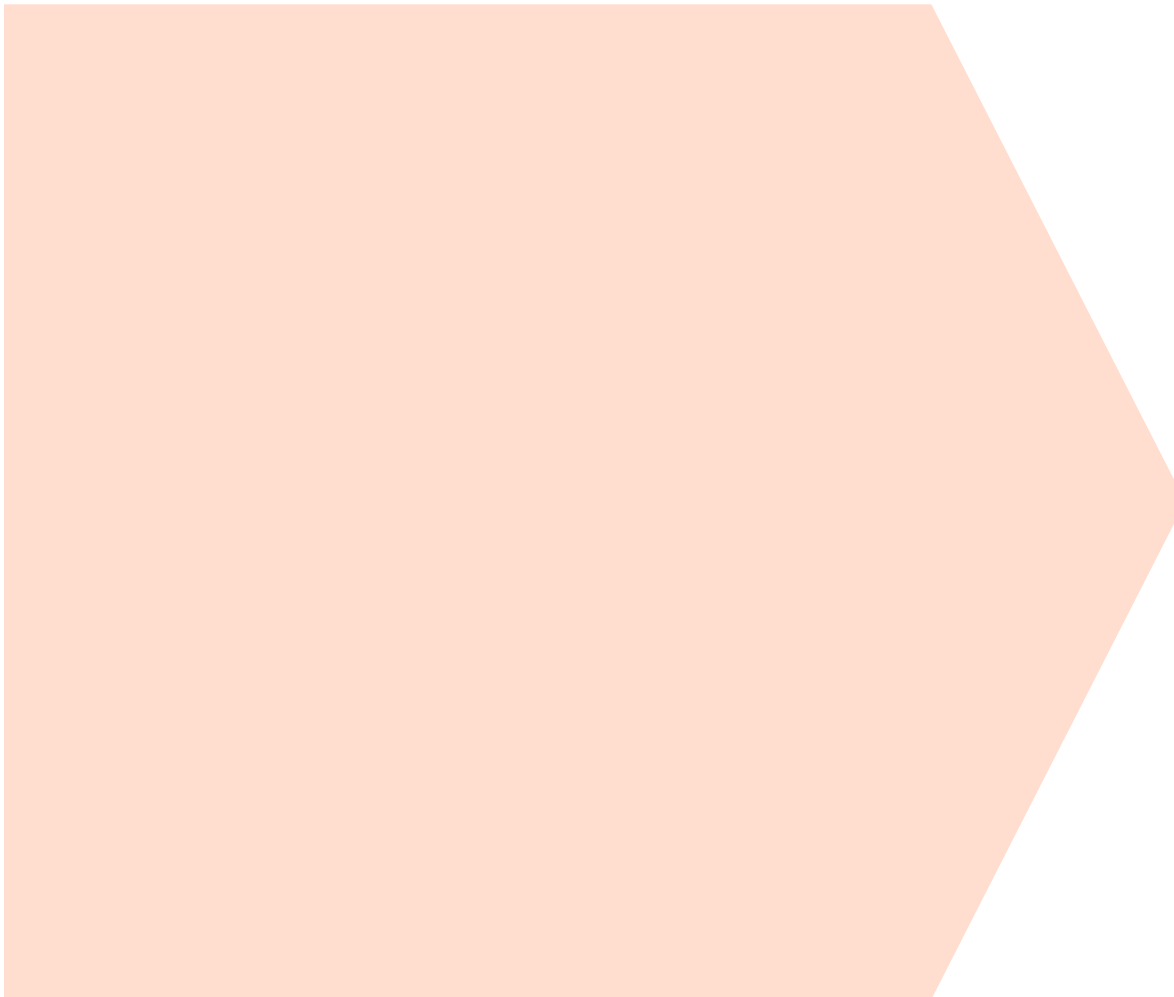
Increased precipitation, increased wind, increased snow/ice, increased flooding, increased temperature extremes

Table 4. University Specific Climate Change Vulnerabilities and Risks

VULNERABILITY	RISK (Probability and Impact)
<b>Energy</b>	
Downed transmission lines (most likely from severe wind events)	High
Changes in laboratory environments that threaten research animal health, interrupt research, disrupt hazardous material handling	High
Hypothermia if students/staff/faculty on campus without heat	Low
<b>Built Environment</b>	
Flooding of Data Centre Services below grade	High
Collapse or damage to vulnerable roofs from ice/snow	High
Flooding on or around campus	High
Freezing pipes causing flooding and water damage	Medium
More weather impacts (precipitation, wind, freeze/thaw, ice, heat) on the building envelope and outdoor surfaces	Medium
Impacts on the tunnels that supply buildings with electricity, heating, cooling	Low
<b>Natural Environment</b>	
Damage to foliage, weakened trees (from pests and winds)	High
Erosion	Medium
Damage to agricultural lands	Medium
Seasonal water shortages impacting campus lands and usage	Low
<b>Transportation</b>	
Impaired transportation systems through flooded roads and lands from increase precipitation and tree fall	Medium
Roads damaged in winter through increased freeze and thaw cycles	Medium
<b>Other</b>	
Respiratory distress or heat stroke (people and animals)	Medium
Falls as a result of snow/ice, with financial liability	Medium
Housing impacts in surrounding community and/on campus (ex. more severe storms causing impacts to housing)	Medium-Low

## **Goals, Actions and Targets**

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# Green Buildings

## Actions

### Recommissioning

At least one major building system (HVAC, lighting, controls, etc.) is recommissioned annually. This process involves a systematic approach to optimize building systems for energy efficiency and indoor air quality. It includes tasks such as calibrating sensors, adjusting setpoints, and testing control sequences. Regular recommissioning can lead to significant energy savings and improved occupant comfort.

### Major and Minor Buildings Retrofits

Major retrofits include high-impact measures such as envelope improvements (insulation, windows), HVAC system upgrades, and renewable energy integration. Minor retrofits focus on smaller-scale improvements like LED lighting, low-flow fixtures, and smart thermostats. A combination of both types of retrofits is essential for achieving significant energy performance goals.

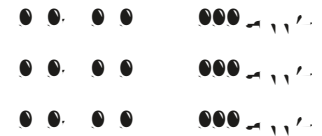
### New Construction

New construction projects are designed to meet high green building standards from the ground up. This includes specifying high-performance materials, energy-efficient systems, and sustainable construction practices. Integrating green building principles into the design and construction phases ensures long-term sustainability and cost-effectiveness.

Rain water cistern in IDEA building

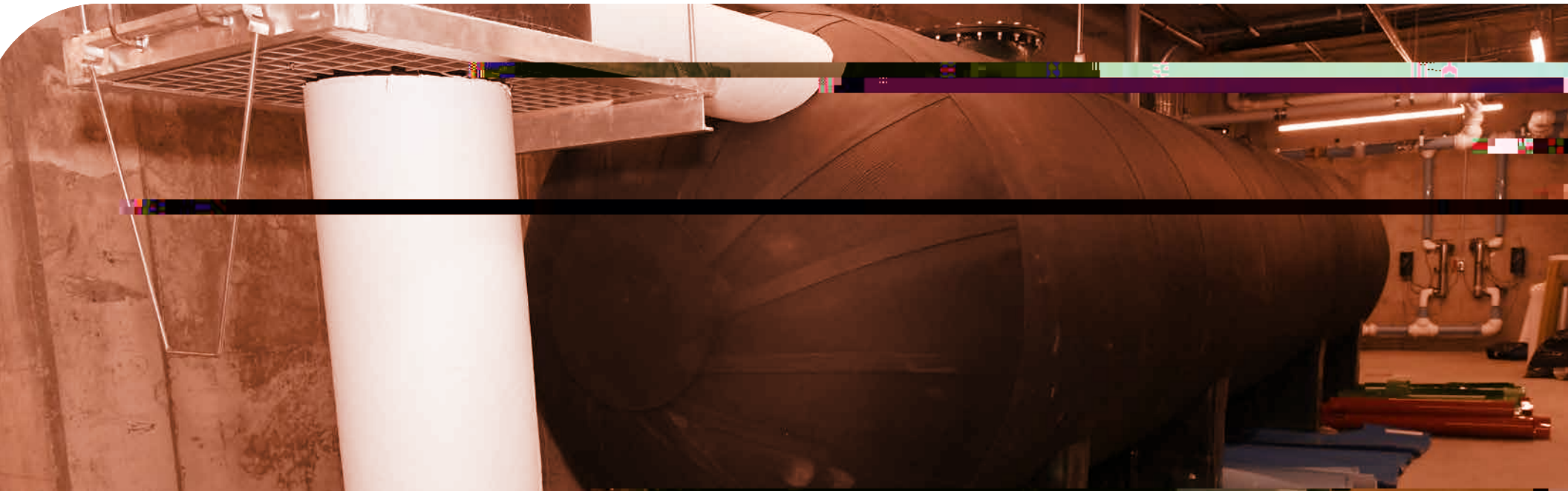
## Targets

### GHG reductions (o sets growth)



### Adaptation

Adaptation strategies focus on preparing buildings to cope with the adverse effects of climate change. This includes measures such as improving thermal mass, enhancing ventilation, and implementing water conservation systems. These strategies are crucial for maintaining building performance and occupant health in a changing climate.





## Knowledge and Behaviour

### Actions

#### *Operations Changes*

• *Operations Changes*

#### *University Plans*

• *University Plans*

## Natural Environment

### Actions

#### *Green and White Roofs*

Green roofs are a sustainable building strategy that can help reduce the urban heat island effect, improve air quality, and provide habitat for wildlife. White roofs, also known as cool roofs, reflect more sunlight and absorb less heat than traditional dark roofs, helping to reduce energy consumption and greenhouse gas emissions. Both types of roofs can also help reduce stormwater runoff and improve water quality in urban areas.

#### *Native Trees and Vegetated Swales*

Planting native trees and shrubs can help improve the natural environment by providing habitat for local wildlife, reducing water consumption, and improving air quality. Vegetated swales, also known as bioswales, are shallow channels that collect and filter stormwater runoff, helping to reduce erosion and improve water quality in urban areas.

#### *Rainwater Harvesting*

Rainwater harvesting is a sustainable building strategy that can help reduce water consumption and improve water quality. It involves collecting and storing rainwater from a roof for use in irrigation, flushing toilets, and other non-potable uses. Rainwater harvesting can also help reduce stormwater runoff and improve water quality in urban areas.

## | Carbon Offsets and Sinks

### | Actions

*Land procurement*

→ *Land procurement*



# References

1. Z. Li, L. Wang, and E. F. Yang, "A new method for the synthesis of the  $Li^+$  ion-selective membrane based on the poly(ethylene glycol) and the poly(vinylidene fluoride) copolymer," *Journal of Membrane Science*, vol. 150, pp. 1-10, 1998.

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**DALHOUSIE**

For more information on Dalhousie's  
Sustainability Strategy, visit  
dal.ca/sustainability