

**Saving Architectural Heritage:
Climate Change Resilience and Conservation Management**

by

Danielle Myronyk

A thesis submitted to the Faculty of Graduate and Postdoctoral Affairs in partial
fulfillment of the requirements for the degree of

Master

Of

Architecture

Carleton University
Ottawa, Ontario

© 2022
Danielle Myronyk

Abstract

This research paper will discuss the technical aspects of preserving historic to achieve resiliency to the ever-changing effects of climate change. As a case study, an updated conservation management plan will be created for Maplelawn, former estate and walled garden, that considers the architecture, the urban setting, and the landscape within the context of climate change and site constraints. This research will consist of a combination of digital storytelling and visual inspection as well as the use of a Climate Vulnerability Index (CVI) to determine levels of sensitivity to change, maintenance requirements, and risk assessments. Moreover, the ramifications of climate change will be explored in greater detail focusing on effects to the aesthetics, structure, and user comfort of the building. Lastly, the context of the site will be used to determine the building's and site's ability to evolve over time to improve its resiliency to climate change.

Acknowledgements

First, I would like to thank my thesis supervisor, Mario Santana Quintero. This thesis would not have evolved into what it is without your continued guidance, belief, and advice.

I would also like to extend my gratitude to the National Capital Commission, whose generous contributions in the form of feedback and support allowed for this document to be realized. I am forever grateful for being provided access to archival imagery and government-prepared reports on Maplelawn.

Thank you to my friends and family that gave me strength to complete this journey during a global pandemic. I deeply appreciate being allowed to brainstorm project ideas with you, even though you did not always fully understand my heritage architecture-specific language.

Lastly, an enormous thank you to the Azrieli School of Architecture and Urbanism. The past seven years completing both my Bachelor of Architectural Studies and Master of Architecture at Carleton University have been life changing.

Table of Contents

<i>Abstract</i>	2
<i>Acknowledgements</i>	3
<i>Table of Contents</i>	4
<i>List of Tables</i>	5
<i>List of Illustrations</i>	7
<i>Introduction</i>	8
<i>Maplelawn: Former Estate and Garden</i>	11
<i>Climate Change Implications and Ramifications</i>	16
<i>Risk Assessment</i>	24
<i>Visual Condition Assessment</i>	28
<i>A Glance Forward</i>	38
<i>Conservation Management Plan</i>	40

Figures, Tables and Authorship

Table 1: Historical Chronology of Maplelawn Estate and Garden

Heritage Ottawa (Information Authorship)
Danielle Myronyk (Representation Authorship)

Table 2: Global Climate Change Policy

ICOMOS and United Nations (Information Authorship)
Danielle Myronyk (Representation Authorship)

Table 3: Local Climate Change Policy

Various; as specified (Information Authorship)
Danielle Myronyk (Representation Authorship)

Table 4: Provincial Climate Change Policy

ACO and Federal Government (Information Authorship)
Danielle Myronyk (Representation Authorship)

Table 5: International Climate Change Policy

ICOMOS and UNESCO (Information Authorship)
Danielle Myronyk (Representation Authorship)

Table 6: Provincial Architectural Climate Change Policy

OAA, Canada Green Building Council, and Ministry of
the Environment, Conservation and Parks (Authorship)
Danielle Myronyk (Representation Authorship)

Table 7: Risk Events Assessment Categories

Danielle Myronyk
Carleton University

Table 8: Natural Risk Assessment with Mitigation Strategies

Danielle Myronyk
Carleton University

Figures, Tables and Authorship

Table 9: Anthropogenic Risk Assessment with Mitigation Strategies

Danielle Myronyk
Carleton University

Figures, Tables and Authorship

Figure 1: Aerial Views of the Site at Various Scales Showing Maplelawn's Location

01.MAR.2022
Danielle Myronyk
Carleton University

Figure 2: A Winter Photograph of Maplelawn in its Current Condition

07.DEC.2021
Danielle Myronyk
Carleton University

Figure 3: A Historic Winter Photograph of Maplelawn within its Urban Context

1993
Nancy Smith
National Capital Commission

Figure 4: A Visual Assessment of Maplelawn Estate Building with Deterioration Callouts

07.DEC.2021
Danielle Myronyk
Carleton University

Figure 5-7: A Visual Assessment of Maplelawn Estate Building with Deterioration Callouts (cont.)

07.DEC.2021
Danielle Myronyk
Carleton University

Figure 8: A Visual Assessment of Maplelawn Historic Walled Garden with Deterioration Callouts

16.APR.2021
Danielle Myronyk
Carleton University

Figure 9-11: A Visual Assessment of Maplelawn Historic Walled Garden with Deterioration Callouts (cont.)

07.DEC.2021
Danielle Myronyk
Carleton University

Introduction

Arising from current initiatives and new government policy to prioritize the conservation of Canada's built heritage, climate change has become a prevalent topic within the profession's discourse. Previously, traditional skillsets and the generational learned expertise of craft people ensured heritage buildings were appropriately maintained. Unfortunately, this is no longer sufficient interventions due to the unprecedented ramifications of climate change. Moving forward, technological innovation and education must be cohesively included into management plans along with traditional techniques to provide a holistic approach to architectural conservation. This strategy increases the built environment's resiliency towards preventing ongoing global climate crisis deterioration.

This specific heritage building was chosen to be studied at greater depth because it is currently in good condition and the owner's intent is to ensure that its condition continues improving. Maplelawn will require an updated management plan to ensure its resiliency to climate change through actioning of mitigation strategies. Coming from the mindset that preventing deterioration from occurring is superior to correcting it, the building becomes more sustainable by reducing a potential new carbon utilization through regular maintenance. As well, it allows for a more holistic approach to conservation rooted in minimal minor interventions, preventing the necessity to complete a major rehabilitation project during its lifespan.



Figure 1: Aerial Views of the Site at Various Scales Showing Maplelawn's Location



Figure 1: Aerial Views of the Site at Various Scales Showing Maplelawn's Location

Maplelawn: Former Estate and Garden

Maplelawn is a former estate and walled garden located in Ottawa, Canada (fig 1). It is an early example of the British Classical Georgian architectural style imposed in Canada during the nineteenth century. Built from 1831 until 1834, it has remained as a private residence for one hundred and fifty years prior to being bought by the National Capital Commission. As a public property, the interior of the heritage masonry building has been previously renovated to facilitate a restaurant occupying the space. It was designated as a Classified Federal Heritage building in 1983 and, along with its landscape, recognized as a National Historic Site of Canada in 1989.¹ Maplelawn is one of the few remaining preserved former estates with rare complete walled garden that historically lined Richmond Road.

Having occupied various uses over its lifespan, Maplelawn transferred from private to public ownership. Evolving over time, the site was converted from a private residence into a functional dairy farm on the outskirts of town. Driven by the introduction of the streetcar in 1899 and increased urban fabric development, portions of the former estate were sold off to create the neighbourhood now known as Highland Park while the remainder of the property became the first farm in Canada to use electric lights and machinery. By the mid 20th Century, the Maplelawn estate was bought by the National Capital Commission (NCC), formerly the Federal District Commission, to ensure its preservation. Within the 50 years that followed, the

¹ "Maplelawn." Canada's Historic Places.

temporarily vacant building was designated by the City of Ottawa under Part IV of the Ontario Heritage Act: recognized as requiring conservation of property of cultural heritage value or interest (table 1).² Distinguishing itself from other government-owned heritage buildings within the National Capital Region, Maplelawn Former Estate and Garden (fig 2) is occupied while being managed collaboratively by multiple stewards: NCC as the building's owner, the Keg Steakhouse as long-term tenants and Friends of Maplelawn, a volunteer group tasked at historically preserving the public garden. Moreover, the relationship of the buildings with its site has remained historically unchanged, acting as a landmark within its surrounding community as one of the oldest preserved residences.

As outlined by Canada's Historic Places registry, the following character-defining elements of the heritage site have been identified.³ The building's aesthetics, function, and craftsmanship are highlighted through the symmetrical restraint of all facades of the classical building. A five-bay front façade with centered door in tandem with an exterior devoid of decoration further illustrate the British colonial architectural influence at the time of its construction. Lastly, the historically preserved garden of native plant species further solidifies the relationship to the site, including the estate house, circular drive, and walled garden within a mature landscape (fig 3).

² Jones, Danielle. "Maplelawn House and Garden." Heritage Ottawa.

³ "Maplelawn." Canada's Historic Places.

Maplelawn Estate and Garden

Historical Chronology



1831-1834: Maplelawn Estate and Garden was built for William Thomson

1877: The property was converted into an operational dairy farm, renamed Highland Park Dairy Farm

1899: Owned by John Cole, the land is subdivided for residential lots. It became the first farm in Canada to use electric lights and machinery.

1935: A summer kitchen and additional bedrooms are added to Maplelawn. The walled garden plantings are re-envisioned.

1952: The estate is bought by the National Capital Commission (NCC) to ensure its preservation

1983: Maplelawn recognized as a Classified Federal Heritage Building

1989: Estate and Garden are formally designated as a National Historic Site of Canada

1993: Friends of Maplelawn, a volunteer-based group studying and preserving the garden, was formed and began maintaining the historic landscape.

1994-1995: Designated by the City of Ottawa under Part IV of the Ontario Heritage Act; recognized as requiring conservation of property for cultural heritage value or interest.

The building is leased and interior renovated by Peter Fallis to create a cafe.

1999: Maplelawn is leased by the Keg Steakhouse, creating the Keg Manor Ottawa.



Figure 2: A winter photograph of Maplelawn in its Current Condition



Figure 3: A Historic Winter Photograph of Mapelawn within its Urban Context

Climate Change Implications and Ramifications

Climate change has become an ever-present issue that needs to be addressed within the built environment. Regions across Canada are already experiencing its impacts and they are forecast to continue worsening over time, should drastic measures not be taken to prevent them. Ontario and Quebec are currently predicted to experience increasing events of extreme weather, smog and ecological issues that will threaten both architecture and its users. Therefore, it is of utmost importance to implement environmentally oriented architectural interventions on historic buildings that improve their resiliency to these previously unimagined events. For this reason, it is important to recognize that climate change ramifications effect all aspects of the built environment, including aesthetics, structural and user comfort.

Primarily, a Climate Vulnerability Index (CVI) will be conducted on the building and walled garden. CVI is an assessment tool for world heritage properties intended to determine climate change risk. Developed by James Cook University, this systematic tool takes into consideration both Outstanding Universal Value and Community vulnerabilities. Once a baseline vulnerability assessment has been completed, the value of the character-defining heritage elements will be evaluated to determine their hierarchical significance. This will provide a means of identifying what must be preserved within the site while considering both the significance of the building and the intact walled garden. From this information, an appropriate updated management and maintenance plan can be developed that considers the scale of risks posed by

climate change for the heritage site. Lastly, within the larger context of the site, the implications of rapid urban densification and infrastructure upgrades over time will be analyzed for their impact on the National Historic Site of Canada. Through this extensive climate change analysis, the building's and site's abilities to evolve over time as well as resiliency to climate change will be identified.

Although carbon dioxide-related global warming and climate change caused by human activities was discovered by Guy Callendar, Milutin Milankovic and Gilbert Plass during the early to mid-20th century, it was not included in architectural policy until 2016.⁴ Prior to this date, preservation policy, specifically the Venice Charter (table 2), focused on appropriate minimal interventions and continuous maintenance over time that relied on the skillsets of traditional crafts people. Still considered industry standard presently, these policies were rooted in the idea that climate was relatively predictable and consistent. However, this is no longer the case, climate change ramifications have quickly become one of the largest variables that must be accounted for in the architectural conservation profession.

In 2013, the severity of climate change was formally acknowledged in a report published by the World Meteorological Organization's (WMO's) and the United Nations Environment Programme's (UNEP's) Intergovernmental Panel on Climate Change (IPCC). It concluded that "climate change is real and human activities, largely

⁴ "Climate Change Evidence: How Do We Know?" The National Aeronautics and Space Administration.

the release of polluting gases from burning fossil fuel (coal, oil, gas), is the main cause.”⁵ A few years later, COP21 created the Paris Agreement outlining the importance of climate change policy within architecture because it was identified that 38% of the total amounts of polluting greenhouse gases were derived solely from the construction industry.⁶ It became the first of many policies identifying actions to mitigate the global climate crisis (tables 2-6).

Across the ten international and nationally recognized policies that would follow, common themes began to present themselves. Firstly, it was recognized that climate change is a global challenge that must be addressed globally within a collected effort of solidifying community values.⁷ Secondly, circular economies and local supply chain must be prioritized to facilitate carbon reduction, eventual decarbonization,⁸ and sustainable renewable energy sources.⁹ Thirdly, the importance of the inclusion of cultural heritage knowledge and the promotion of non-western safeguarding of heritage.¹⁰ Finally, insight was gained acknowledging the fact that the physical integrity of world heritage is effected by climate change. It became evermore apparent that deterioration conditions and sources of failure needed to be addressed through innovative strategies guided by clear, useful, and attainable objectives.

⁵ U.N.E.P. “Facts about the Climate Emergency.”

⁶ “The Paris Agreement.” United Nations Framework Convention on Climate Change.

⁷ “COP26 And Climate Heritage Action - Seizing Momentum and the ‘Heritage Reset.’” *Gathering of the Heritage Sector*.

⁸ Ibid.

⁹ “Addressing Climate Change.” UNESCO.

¹⁰ Lucile, Smirnov. “ICOMOS Work on Climate Change.”

Climate Change Policy Frameworks

The Venice Charter (1964-1967)

- a historic monument must embrace the architectural work and the urban or rural setting in which it is found
- conservation and restoration must have recourse to all the sciences and techniques which can contribute to preserving architectural heritage
- conservation intentions must focus equally on its preservation as art and historical evidence
- maintenance must be continuously performed over time
- modifications to facilitate use are permitted so long as they do not impact the layout or decoration of the architecture
- No new construction, demolition or modifications are not permitted to prevent alterations to the scale of the structure's setting
- The conserved object is inseparable from its history and cannot be relocated except in justifiable means.
- items of decoration may only be removed to enable preservation purposes
- restoration interventions are highly specialized and must be based on respect for the original material and authentic documents
- if traditional techniques are inadequate for preservation, modern techniques and technology may be used as long as its efficacy is proven through scientific data and experience
- the contributions of all periods to the building must be acknowledged in respect of the unity of style within successful restorations
- Replacements of missing parts must integrate harmoniously with the whole, but distinguishable from the original
- Additions cannot be allowed except in so far as they do not detract from the interesting parts of the building, its traditional setting, the balance of its composition and its relation with its surroundings
- In all works of preservation, restoration or excavation, there should always be precise documentation in the form of analytical and critical reports, illustrated with drawings and photographs

The Paris Agreement - COP21 (2016)

- limit global warming below the projected 2 degrees celsius temperature goal, aiming for only 1.5 degrees celsius above pre-industry levels
- Achieve global carbon neutrality by 2050
- Countries immediately peak their greenhouse gas emissions
- Create a means of economic and social transformation on a 5-year cycle
- Countries submit individualized climate action plans; Nationally Determined Contributions (NDCs)

Climate Change Policy Frameworks

COP26 & Climate Heritage Action (2021)

Robert Pajot, Ewan Hyslop, Julianne Polanco, Mark THompson Brandt, Chris Wiebe

- Climate change is a global challenge that must be addressed globally, within a collected effort by solidifying community values
- Fostering widespread engagement in heritage discourse and how conservation is a key element to the climate crisis
- Minimal, thoughtful interventions are required to preserve heritage architecture
- the construction industry needs to rethink its role in enabling climate change, accounting for 38% of all greenhouse gas emissions

COP26 Key Takeaways

- importance of heritage policies
- promote the use of indigenous knowledge
- improved agriculture resiliency
- prioritize circular economies and local supply chains
- increase prevalence of building reuse
- reduce embodied carbon within the construction industry
- retention of generational skillsets and local craftsmanship

Construction Industry Initiatives

- carbon reduction and decarbonization
- prioritize reuse and retrofit
- facilitate local supply chains
- focus on material reuse instead of demolition
- adaptive reuse
- allow buildings to evolve

Heritage Professionals' Insights

Professor Mario Santana Quintero, James Maddigan, Golnaz Karimi, Tom Morrison

- World heritage is under seige by climate change and its physical integrity has been effected
- Ensuring heritage discourse is based on the surrounding community and the people the building serves
- Strive towards an interdisciplinary and inclusive approach to heritage conservation
- deterioration conditions as well as sources of failure need to be addressed through clear, useful and attainable objectives
- developing a holistic maintenance plan is crucial
- accepting the fact that restoration is not an end in itself, buildings last when they are regularly used
- traditional knowledge and skillsets should be fostered
- the field of heritage conservation must be allowed to evolve and learn over time

Table 3: Local Climate Change Policy

Climate Change Policy Frameworks

Architectural Conservancy Ontario (ACO)

- Promote education and advocacy of the importance of heritage buildings across Ontario
- Encourage conservation and adaptive reuse measures for existing buildings
- Establish branches to monitor communities and determine risk assessments
- Mitigate heritage emergencies through profession knowledge sharing
- Enable fundraising efforts to aid in the protection of cultural heritage

Canada's Nationally Determined Contribution (NDC) (Paris Agreement - 2021)

- Reduction in greenhouse gas emissions by 40-45% by 2030
- Net zero emissions by 2050
- implementation of the Pan-Canadian Framework on Clean Growth and Climate Change (PCF); reducing GHG emissions, prioritize clean economic growth, and incorporate climate change resiliency
- Allocate over \$53 billion of federal funding towards green recovery
- Reduction of energy waste and enable housing to become more affordable
- Ensuring affordable, clean transportation is available to all Canadian communities
- Increasing pricing on carbon pollution while promoting clean innovation
- Reduction of heavy industry and natural resource development pollution
- Advocate for biodiversity and natural carbon sequesters as action to the climate crisis
- Involve Indigenous knowledge to aid in mitigating climate change
- Advocate for transparency and ongoing annual evaluation of progress towards the Paris Agreement compliant initiatives
- Amend the building code for net-zero retrofits and adaptive reuse

Ontario's Key Action

- Reduction of greenhouse gas emissions of 30% by 2030
- Finalize policy that ensures large industry emitters are accountable for their pollution
- Implement regulation for gasoline and diesel to include 15% and 4% renewable contents, respectively.
- Begin discussion and research surrounding low-carbon hydrogen strategy; increasing job opportunities while reducing GHG emissions
- Support and financially invest in clean technology innovation
- Increase public transportation network capacity
- Issue \$4.95 billion worth of green bonds
- Phase out organic waste and food sent to landfills by 2030
- Increase natural gas access across the province

Table 4: Provincial Climate Change Policy

Climate Change Policy Frameworks

UNESCO (United Nations Educational, Scientific and Cultural Organization)

- help mitigate and adapt to climate change
- sustainable development education within the context of climate change
- determine risk assessment of natural disasters due to climate change
- ongoing monitoring of climate change effects on UNESCO designated heritage sites
- promotion of low carbon economies and sustainable uses of renewable energy sources

UNESCO's Strategy for Action on Climate Change (SACC)

- Promote public awareness and education through programmes accompanied by policies
- Enable scientific cooperation and support interdisciplinary climate change knowledge
- Facilitate inclusive social development, diverse cultural discourse and ethical principles related to climate change
- Promote cultural diversity and non-western safeguarding of heritage

ICOMOS (International Council on Monuments and Sites)

- Emphasize the necessity to respond to the risks of climate change and advocate heritage resiliency as an action to mitigating the climate crisis
- Mobilize the cultural heritage community
- Promote cultural solutions to rapidly reduce Greenhouse Gas emissions
- Focus on vulnerable communities and ecosystems adapting to climate change predictions
- Promote a thorough understanding of action to climate change in relation to heritage loss and deterioration
- Provide financial assistance to aid in the safeguarding of heritage from climate change

ICOMOS' Climate Change and Heritage Working Group (CCHWG)

- Support the development of vulnerability assessment tools
- Develop new conservation policies and management methodologies
- Facilitate cultural heritage and climate science intersections
- Promote cultural heritage solutions to the climate crisis
- Inclusion of cultural heritage knowledge within global climate policy

Table 5: International Climate Change Policy

Climate Change Policy Frameworks

Ontario Association of Architects (OAA)

- Ensure government agencies streamline review processes while retaining critical criteria
- Reevaluate the development of greenbelts and adjacent watershed areas, instead conserving the biodiversity of the land
- Promote urban intensification and densification
- Improve the Ontario Building Code in relation to building environmental performance
- Promote real-time monitoring of provincial carbon dioxide emissions
- Facilitate the use of hydropower from Quebec, a renewable resource
- Mandate building energy standards and necessary monitoring
- Reduce the infiltration of plastics into waterways through improved filtering at outlets
- Advocate for greater building flexibility, including designing for assembly and disassembly

Canada Green Building Council

- Provide incentives to improve energy efficiency in existing buildings
- Promote building energy benchmarking, reporting and disclosure initiatives
- Create a net-zero building initiative and Canadian standard
- Reduce the government's greenhouse gas emissions by introducing carbon reducing activities for publically-owned buildings
- Ensure Canada's climate change targets are met by 2030

Ministry of the Environment, Conservation and Parks

The Made-in-Ontario Environment Plan

- Reduction and diverting of waste into landfills
- Strive towards a circular economy for packaging and products
- Ensure water quantity is sustainably managed within Ontario
- Implement actions to protect the Great Lakes
- Enhanced the Air Quality Health Index with associated monitoring
- Implement an enhanced emissions testing program for commercial vehicles
- Invested \$20 million towards Ontario's land conservation actions
- Launched the first-ever broad, multi-sector provincial climate change impact assessment to determine climate change vulnerability
- Consult on developed initiatives to mitigate pollution

Table 6: Provincial Architectural Climate Change Policy

Risk Assessment

Heritage architecture in Ottawa is exposed to three levels of deterioration risk associated with the global climate crisis: minor, severe, and drastic (table 7). Minor events encompass small-scale continuous implications of climate change, including air pollution, temperature fluctuations and water infiltration. Severe events cause more immediate deterioration to the heritage element. Urban development, mass tourism and structural failing would fall under this category. Finally, there is flooding, soil subsidence and lack of government policy that are drastic events that cause eminent danger to heritage conservation. Despite the distinct categorization of the previously outlined risk events, they operate along a spectrum. This is because a continuous minor risk could eventually accumulate to drastic levels. Alternatively, should a drastic event occur at a distance from the site, it may have a less severe effect on the conservation project.

Analyzing the risks associated with Maplelawn estate and walled garden, in-depth research was conducted of the sites surroundings as well as predicting potential climate change impacts of the region. The risks are divided into two main categories: natural risk factors and anthropogenic risk factors (tables 8-9). These main categories are further subdivided to provide greater explanation of the characteristics of each risk, its temporality, level of decay, and probability of occurring. Moreover, mitigation strategies have been outlined. It should be noted that although the information can be presented separately and clearly within a table to best explain the totality of the

Risk Assessment

Minor Events	<ul style="list-style-type: none">- Salt accumulation and solubility- Water infiltration and deterioration (Freeze/Thaw Cycle)- Air pollution- Bio-deterioration- Temperature fluctuations (daily and annually)- Solar radiation- Precipitation intensity and acidity- Atmospheric-related deterioration- Internal environmental factors- Interior management
Severe Events	<ul style="list-style-type: none">- Masonry degradation- Urban development- Inadequate maintenance plan- Mass tourism and user comfort- Structural instability- Inappropriate previous restoration
Drastic Events	<ul style="list-style-type: none">- Flooding- Fire- Seismic activity- Soil subsidence- Severe meteorological events- Economic development- Lack of government policy

Table 7: Risk Events Assessment Categories

chosen site's risk vulnerability, real-world application of these principles evolves along a spectrum with interconnected risks and many more simultaneous variables that need to be addressed.

As a government-owned public site, Maplelawn estate and walled garden is vulnerable to specific risks that private heritage buildings are not subjected to, specifically mass tourism. Broadly speaking, tourism is not inherently positive nor negative and therefore must be assessed on an individual basis. Tourism allows for education on the history of the region as well as greater community engagement with the designated heritage site. Also, it enables the preservation of heritage building by ensuring its continued use. This is a key phenomenon because architectural heritage is best preserved through continued usage, by being allowed to evolve over time. Although this may be true, mass tourism can cause expediated deterioration of the built environment that must be mitigated. Due to safety reasons leading to excessive salting of public drives and pathways, many tourists' buildings experience substantial salt accumulation causing rapid masonry deterioration during the winter months. This introduction of external de-icing salts causes efflorescence of soluble salts within the façade to varying degrees of degradation, from premature repointing of mortar to structural instability of portions of the wall assembly. This risk can be mitigated using a salt-alternative but can be more difficult to source and potentially more costly. Similarly, heritage infrastructure was originally intended to be sustainably resilient to a certain number of users. By introducing tourists, this amount of people can be

Natural Risk Factors	Temporality	Level of Decay	Probability	Mitigation Strategies
Biological Factors <i>Lichen, mosses, grasses, animals</i>	Long-term	Minor	Continuous	Introduce physical (laser cleaning) and/or biological removal methods (enzymes) to maintenance plan that do not damage the historic garden
Meteorological <i>Solar radiation</i>	Long-term	Minor	Continuous	Reflect the exterior elements to reduce solar gain; allowing interior air humidity and temperature to remain consistent Evaluate the existing management plan and emergency preparedness measures to determine vulnerabilities
<i>Air humidity & temperature</i>	Long-term	Minor	Continuous	
<i>Lightning</i>	Rapid Onset	Drastic	Infrequent	
<i>Gale winds, tornadoes, hurricanes</i>	Rapid Onset	Drastic	Rare	
Geochemical <i>Groundwater erosion</i>	Long-term	Drastic	Continuous	Control urban runoff to prevent groundwater erosion and efflorescence from soluble salts
<i>Salt solubility</i>	Long-term	Minor	Continuous	
Natural Hazards <i>Fire</i>	Rapid Onset	Drastic	Rare	Evaluate the emergency preparedness measures to determine vulnerabilities. Identify non-invasive means of preventing natural hazards from causing irreversible damage to the historic building
<i>Landslides</i>	Rapid Onset	Drastic	Rare	
<i>Seismic Activity</i>	Rapid Onset	Drastic	Infrequent	
<i>River Flooding</i>	Rapid Onset	Drastic	Frequent	
<i>Soil subsidence</i>	Long-term	Drastic	Continuous	

Table 8: Natural Risk Assessment with Mitigation Strategies

Anthropogenic Risk Factors	Temporality	Level of Decay	Probability	Mitigation Strategies
Pollution <i>Air pollution</i>	Long-term	Minor	Continuous	Short-term mitigation can be achieved through laser cleaning exterior surfaces, but to stop the re-occurrence, greenhouse gas emissions are to be reduced
<i>Acid rain</i>	Long-term	Minor	Continuous	
Mass Tourism <i>Salt accumulation</i>	Long-term	Minor	Frequent	Mechanically ploughing in tandem to salt-free grit and sand mixtures are alternatives to limit salt-related deterioration
Management <i>Heating, air conditioning, ventilation, lighting</i>	Long-term	Minor	Continuous	Gradual introduction of HVAC systems ensure the building materials do not experience drastic temperature changes. Reliance on integrated passive heating and cooling will further prevent deterioration of the building interior
<i>Improper cleaning</i>	Long-term	Minor	Continuous	
<i>Inappropriate standards of comfort</i>	Long-term	Minor	Continuous	
Inappropriate Use <i>Transformation of historic buildings</i>	Rapid Onset	Drastic	Frequent	Identification and protection of heritage character-defining elements mitigates detrimental changes to the building's interior as its use changes over time
Restoration/ Repair <i>Late interventions</i>	Rapid Onset	Drastic	Infrequent	Ensuring inappropriate previous restorations are corrected and the management plan has been outlined/updated by a heritage professional mitigates drastic decay for the historic building
<i>Conservation Treatments</i>	Long-term	Minor	Frequent	
<i>Improper Repairs</i>	Long-term	Drastic	Rare	
<i>Inappropriate Restoration</i>	Long-term	Drastic	Rare	
Human Hazards <i>Economic Development</i>	Medium-term	Drastic	Continuous	Promote collaborative learning and advocacy with stakeholders to promote a holistic approach to conservation
<i>Governmental policy</i>	Medium-term	Drastic	Infrequent	

Table 9: Anthropogenic Risk Assessment with Mitigation Strategies

surpassed causing expediated deterioration of materials. Because of this, a “care and capacity” limit, a restriction of how many people can occupy the site without causing drastic degradation, may need to be imposed upon the site to prevent irreversible damage from occurring.

Visual Condition Assessment

A visual condition assessment was conducted on the estate and walled garden to provide an updated account of the site’s current baseline condition. The use of various documentation methodologies enabled a thorough understanding of the building and surrounding landscape at various scales. Relying on photographic, point cloud and total station surveying data, the condition of the site is more thoroughly analyzed without the need to repeatedly visit the site.

The photographic documentation was very promising in its demonstration of the current good condition of the building and walled garden (fig 4-5). At this point, the former estate house is only demonstrating minor deterioration that is to be expected given the climate changes and surrounding urban development. For example, precipitation accumulation can be seen along portions of the roof. As well, there is minor water staining on the masonry surfaces, preliminary biodeterioration from vines climbing the façades and minor masonry spalling in a few areas. At this point, the current management plan is highly effective in mitigating degradation of the heritage materials.

Estate House - Visual Assessment

Water Accumulation, Infiltration & Staining



Figure 4: A Visual Assessment of Maplelawn Estate Building with Deterioration Callouts 29

Estate House - Visual Assessment

Masonry Deterioration



Figure 5: A Visual Assessment of Maplelawn Estate Building with Deterioration Callouts (cont.)

Estate House - Visual Assessment

General Deterioration



Figure 6: A Visual Assessment of Maplelawn Estate Building with Deterioration Callouts (cont.)

Estate House - Visual Assessment

Biodeterioration



Figure 7: A Visual Assessment of Maplelawn Estate Building with Deterioration Callouts (cont.)

Walled Garden - Visual Assessment

Structural Failure



Figure 8: A Visual Assessment of Maplelawn Historic Walled Garden with Deterioration Callouts

Walled Garden - Visual Assessment

Masonry Deterioration

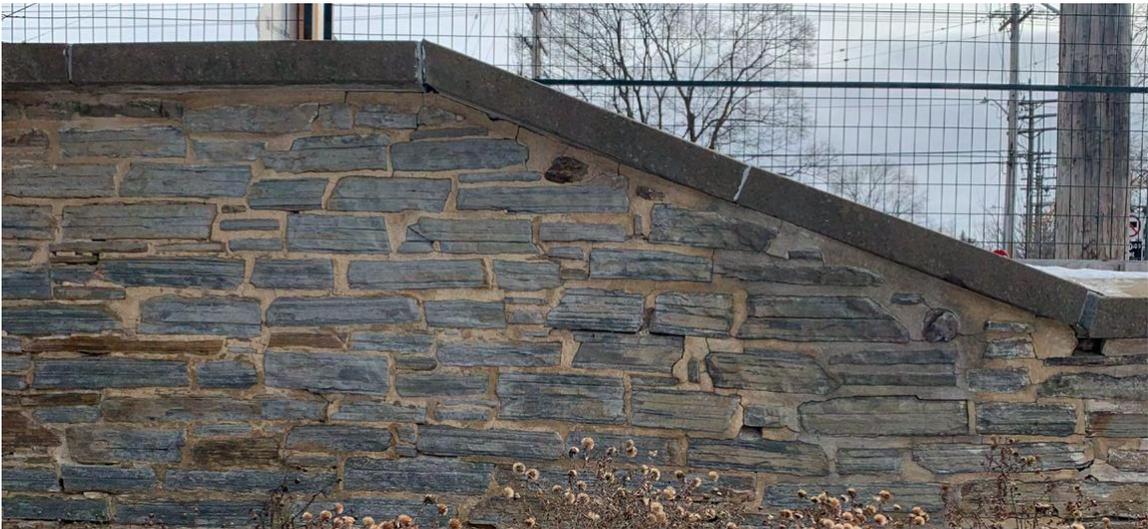


Figure 9: A Visual Assessment of Maplelawn Historic Walled Garden with Deterioration Callouts (cont.)

Walled Garden - Visual Assessment

Mortar Deterioration



Figure 10: A Visual Assessment of Maplelawn Historic Walled Garden with Deterioration Callouts (cont.)

Walled Garden - Visual Assessment

Inappropriate Interventions

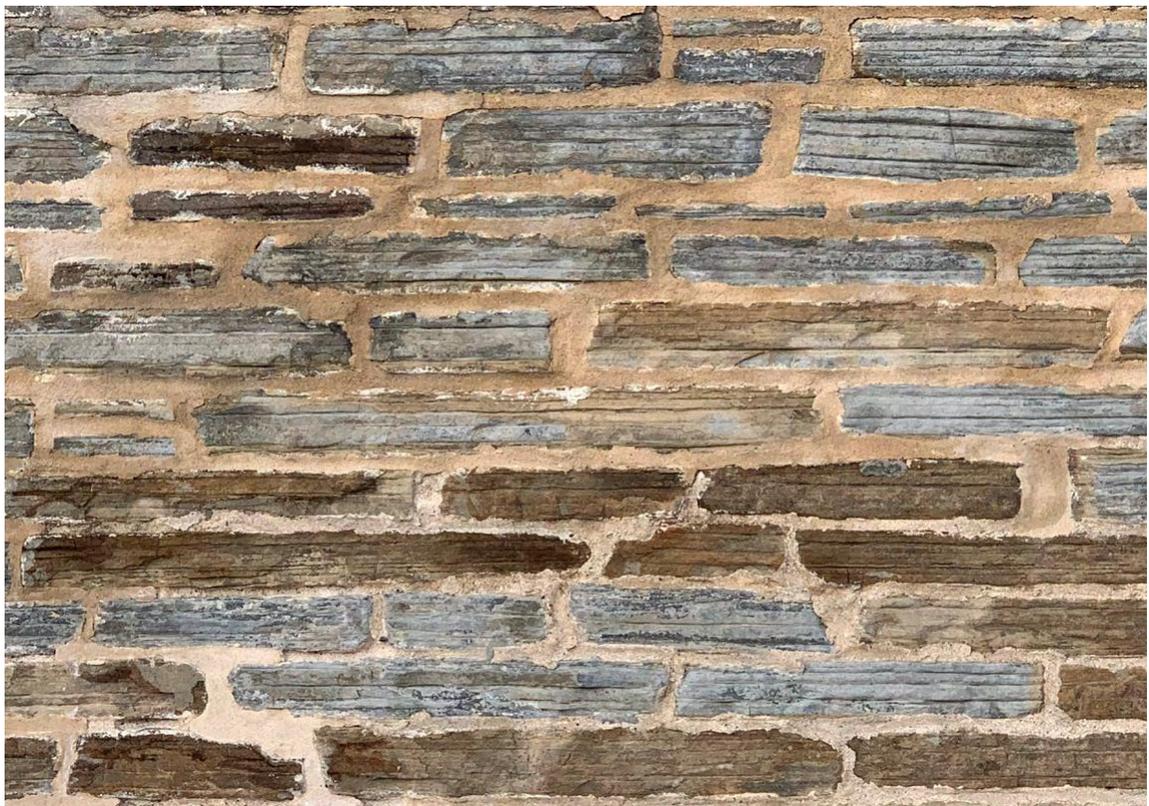


Figure 11: A Visual Assessment of Maplelawn Historic Walled Garden with Deterioration Callouts (cont.)

The historic walled garden is experiencing more severe deterioration in comparison to the estate in some areas but is overall in fair condition (fig 6-7). In two areas of the walled garden, a partial and full structural failure is visible, parallel to Richmond Road and the west façade, respectively. It could be hypothesized that these issues are due to recent drastic risk events. Since the walled garden does not have a foundation, it becomes more susceptible to changing forces and loads acting upon the material. The partial failure is only occurring on the interior face of the wall running parallel to the main road. Due to this characteristic of the failure, it could be hypothesized that it is caused by urban development. When the walled garden was built, it was a free-standing structure. Once the city and urban fabric densified within the region, that length became a retaining wall for the newly installed sidewalk and road. Not only does this effect the overall character and grandeur of the walled garden but the built-up soil also exerts a lateral force onto the masonry. As a historic building material, masonry is excellent in compression, but fails quickly through tension and shear forces. On the contrary, the full structural failure seems to have been caused by natural risks, by the soil heaving during global warming-induced freeze/thaw cycles. Over time, this repeated movement would shift the structural masonry until the wall portion began collapsing. This would reveal the masonry rubble core to higher amounts of precipitation than intended, further degrading the structural component. Other signs of deterioration noted on the walled garden include bedding plane

degradation on some stones, required mortar repointing caused by routine moisture infiltration and some areas of incorrectly cured mortar.

In addition, the information gathered during this process acts as a basis for future analysis, documentation, deterioration monitoring and possible appropriate interventions for Maplelawn. By producing photogrammetric orthomosaic images of the heritage building and walled garden, information is disseminated in a manner that is easily interpreted without a necessity for a knowledge of heritage documentation conventions. This further promotes the inclusion of diverse knowledge surrounding climate change and cultural heritage within the profession by removing the prerequisite of having an architectural conservation-based education.

A Glance Forward

Simultaneously reflecting on the history of the site and its future possibilities, a Getty Conservation Institute-style management plan has been created to ensure the survival of Maplelawn to Climate Change predictions. Through the management plan, it is apparent of the intrinsic nature between the walled garden and the former Georgian estate. The two will be analyzed to an equal extent emphasizing their interconnection as well as joint designation as a National Historic Site of Canada. Moreover, hierarchical character-defining elements have been identified using a whole building and landscape approach. This holistic consideration to climate, economical and cultural impacts help capture both the tangible and affective significance of the Ottawa Valley

property. The thesis presents an overall updated conservation management plan with detailed recommendations suited to climate change, outside that which is typically outlined in regular maintenance management. The goal is to demonstrate the possible resiliency of heritage urban fabric to unprecedented global climate challenges.

Conservation Management Plan



Maplelawn Estate and Garden

A Conservation Management Plan

Danielle Myronyk
Master of Architecture Thesis

May 2022

Title Page: A Fall Photograph of the Front Facade of Maplelawn Estate
Preliminary Page: The Owner Requested Garden Entrance to the Residence

Table of Contents

Introduction	.....	Page 5
Climate Change	.....	Page 14
Climate Change Initiatives	.....	Page 19
Historical Development of Maplelawn Estate	.....	Page 27
Physical Evidence/Condition	.....	Page 32
Comparative Assessment	.....	Page 44
Assesment of Heritage Significance	.....	Page 54
<i>Heritage Significance</i>	.....	<i>Page 55</i>
<i>Climate Vulnerability Index</i>	.....	<i>Page 57</i>
Priorities for Implementation	.....	Page 68
Conclusion	.....	Page 97
Appendix	.....	Page 103
<i>Glossary</i>	.....	<i>Page 104</i>
<i>Figures, Tables and References</i>	.....	<i>Page 105</i>
<i>Works Cited</i>	.....	<i>Page 115</i>



Introduction

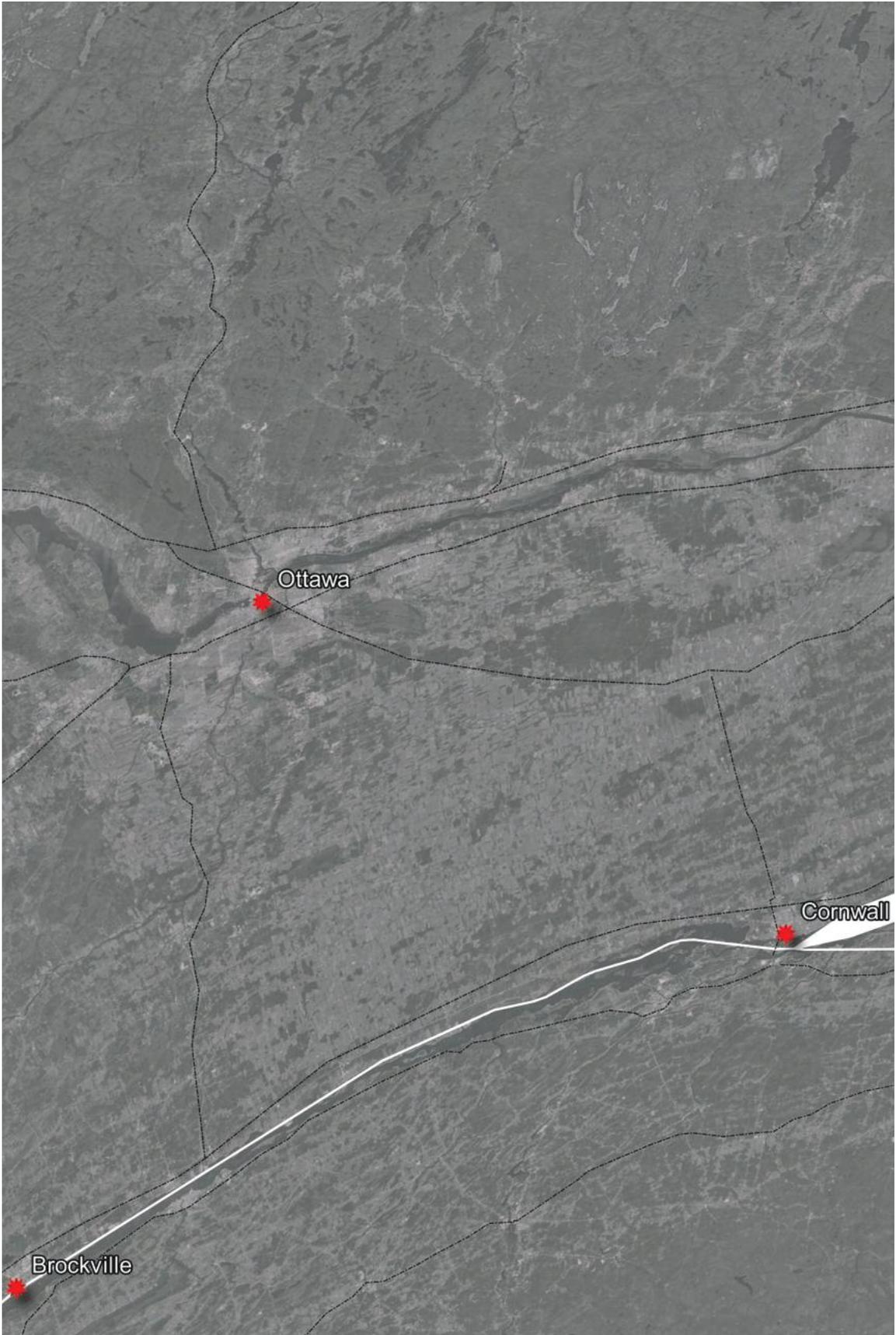


Figure 1: An Aerial View of the Site denoting Maplelawn's Location within Ontario



Figure 2: An Aerial View of the Site denoting Maplelawn's Location within the Ottawa Region



Figure 3: An Aerial View of the Site denoting Maplelawn's Property



Introduction

This Conservation Management Plan (CMP) provides a framework for the ongoing use and management of Maplelawn Estate and Walled Garden. Based on various thorough assessments of the heritage building and its surroundings, maintenance suggestions have been developed to increase the climate change resiliency of the National Historic Site of Canada. This identification process will facilitate predicting possible implications from climate change and the resulting mitigation strategies. As an application to this information, an appropriate management and maintenance plan will be developed that considers the scale of risks posed by climate change for the heritage site. Finally, this paper will consider the surrounding urban context of the site, particularly the rapid urban densification and necessary infrastructure upgrades over time.

Maplelawn Estate

Maplelawn is a former estate and walled garden located in Ottawa, Canada (figure 1). It is an early example of the British Classical Georgian architectural style imposed in Canada during the nineteenth century. Built from 1831 until 1834, it has remained as a private residence for more than a sesquicentennial prior to being bought by the National Capital Commission. As a public property, the interior of the heritage masonry building has been previously renovated to facilitate a restaurant occupying the space. It was designated as a Classified Federal Heritage building in 1983 and, along with its landscape, recognized as a National Historic Site of Canada in 1989.¹ Maplelawn is one of the few remaining preserved former estates with rare complete walled garden that historically lined Richmond Road.

Having occupied various uses over its lifespan, Maplelawn transferred from private to public ownership. Evolving over time, the site was converted from a private

¹ "Maplelawn." Canada's Historic Places.

residence into a functional dairy farm on the outskirts of town. Driven by the introduction of the streetcar in 1899 and increased urban fabric development, portions of the former estate were sold off to create the neighbourhood now known as Highland Park while the remainder of the property became the first farm in Canada to use electric lights and machinery. By the mid 20th Century, the Maplelawn estate was bought by the National Capital Commission (NCC), formerly the Federal District Commission, to ensure its preservation. Within the 50 years that followed, the temporarily vacant building was designated by the City of Ottawa under Part IV of the Ontario Heritage Act: recognized as requiring conservation of property of cultural heritage value or interest (table 1).² Distinguishing itself from other government-owned heritage buildings within the National Capital Region, Maplelawn Former Estate and Garden is occupied while being managed collaboratively by multiple stewards: NCC as the building's owner, the Keg Steakhouse as long-term tenants and Friends of Maplelawn, a volunteer group tasked at historically preserving the public garden. Moreover, the relationship of the buildings with its site has remained historically unchanged, acting as a landmark within its surrounding community as one of the oldest preserved residences. As outlined by Canada's Historic Places registry, the following character-defining elements of the heritage site have been identified.³ The building's aesthetics, function, and craftsmanship are highlighted through the symmetrical restraint of all facades of the classical building. A five-bay front façade with centered door in tandem with an exterior devoid of decoration further illustrate the British colonial architectural influence at the time of its construction. Lastly, the historically preserved garden of native plant species further solidifies the relationship to the site, including the estate house, circular drive and walled garden within a mature landscape

² Jones, Danielle. "Maplelawn House and Garden." Heritage Ottawa.

³ "Maplelawn." Canada's Historic Places.

Heritage Listings

Maplelawn Estate and Walled Garden have been designated as of high heritage importance at both local and national scales:

- The building has been identified as a Classified Federal Heritage Building (1983)
- The former estate and walled garden have been recognized, in tandem, as a National Historic Site of Canada (1989)
- The City of Ottawa has designated the site under Part IV of the Ontario Heritage Act (1994-1995)

Methodology of the CMP

The International Council on Monuments and Sites (ICOMOS) and the National Lottery Heritage Fund define a conservation management plan as “a document which sets out the significance of a heritage asset, and how that significance will be retained in any future use, management, alteration or repair.”⁴ This document extensively researched Maplelawn Estate and Walled Garden to determine its current condition and significance within the community. With this information, a vulnerability to climate change has been determined through the form of three key climate drivers and a comprehensive Climate Vulnerability Index (CVI) has been prepared that holistically analyzes the building, site and garden. Finally, management and appropriate interventions will be outlined to ensure Maplelawn can be properly conserved for future generations to enjoy.

The Conservation Management Plan follows a conservative approach to heritage conservation, suggesting minor interventions that do not effect the overall heritage significance of the building and the associated walled garden. The management

⁴ “Conservation Management Plans: A Guide”. National Lottery Heritage Fund.

plan outlines strategies and principles in alignment with various conservation professionals, government agencies and those outlined in the “Standards and Guidelines for the Conservation of Historic Places in Canada” and ICOMOS’ Burra Charter. Adapted from the structure described in the Burra Charter, the Conservation Management Plan provides a holistic understanding of the place and assess its significance (figure 2). Once gathering information from applicable conservation and climate change policies, interventions and ongoing maintenance will be recommended.

Structure of the CMP

The Conservation Management Plan will begin by explaining the significance of climate change for the heritage built environment. The second and third chapters will outline the historical development of Maplelawn Estate as well as a visual condition assessment of the site currently. Chapter four will outline comparative assessments as a means of gathering management strategies and worst-case scenario predictions should the building experience incorrect maintenance. The fifth chapter will assess the holistic heritage significance of Maplelawn in addition to presenting the Climate Vulnerability Index for the National Historic Site. The last two chapters will summarize applicable conservation policies and rank priorities for implementation. The Conservation Management Plan will finish with a conclusion summarizing the document’s findings and provide insight into the future of the heritage designated site.

Specialized Terminology

All specialized terminology will be outlined within a glossary in the appendix at the end of the Conservation Management Plan that can easily be referenced. With that being considered, the document is outlined in such a way to ensure the universal accessibility of information shared and will not require extensive understanding of complex architectural heritage conservation methodologies.

The Conservation Planning Process

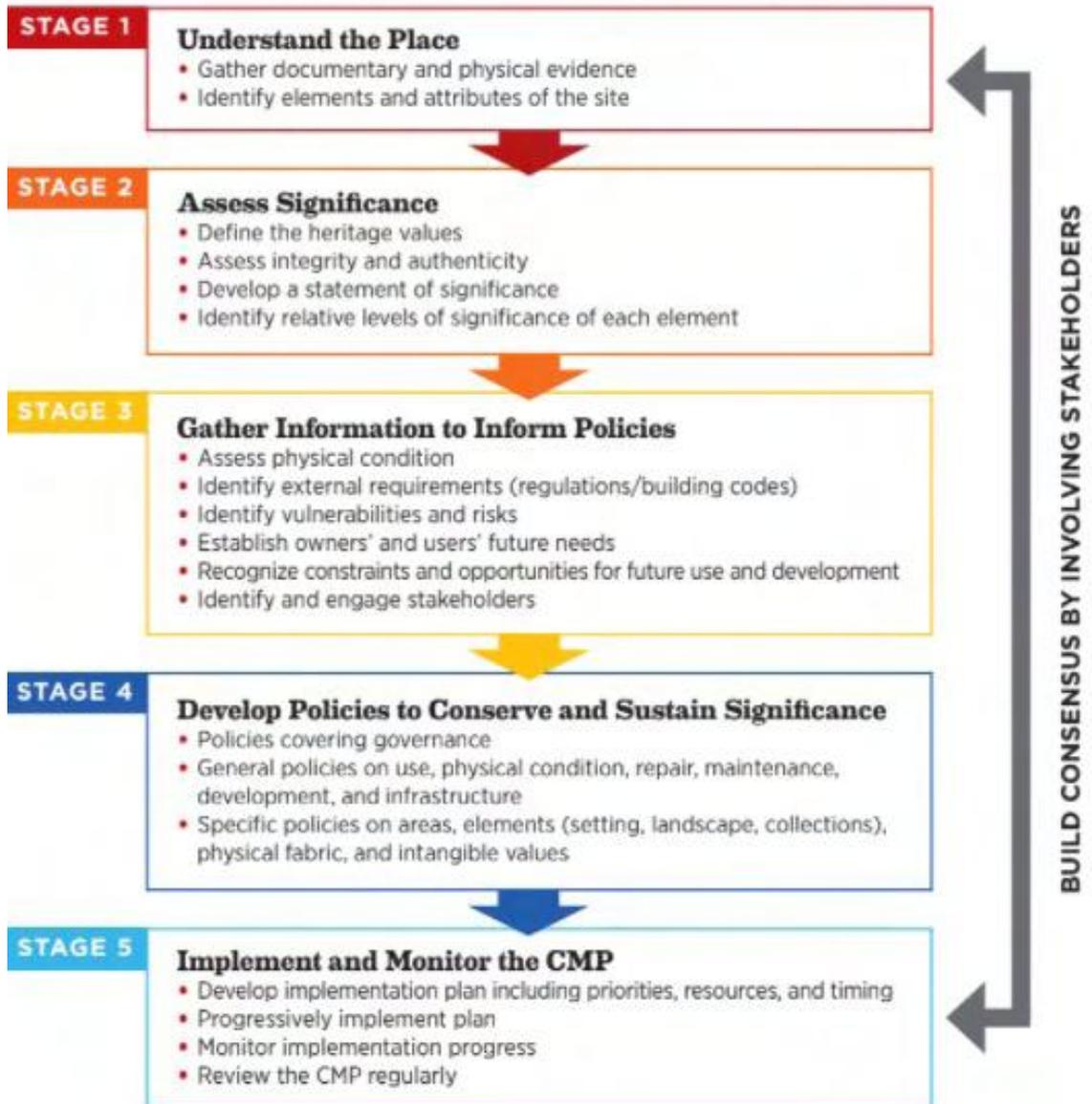


Table 1: The Conservation Planning Process as outlined within the Burra Charter.

Limitations

The information discussed and scope of work demonstrated within this report is the result of two days of visual assessments without the use of drones and/or ladders. The site visits to the building occurred during Fall 2021 and documentation involved the use of photography. Due to a global pandemic and the building being privately leased, solely the exterior of the building and its surrounding landscape have been properly assessed.

When considering Maplelawn Estate and Walled Garden as a whole, the interior of the building and its modern interventions would require further information and documentation. Having not gained access to these areas at this time, due to an inability for conducting site visits, it would be worth revisiting these areas in greater depth at a later date to better understand their effect on the heritage building. Moreover, it would be interesting to see how these interior spaces have evolved over the course of the building's timeline. By placing emphasis on the interior of the building being the next priority, in terms of documentation, it will enable a more thorough and complete management plan for the former estate.

Climate Change



Climate Change

Importance of Climate Change Resiliency

Climate change has become an ever-present issue that needs to be addressed within the built environment. Regions across Canada are already experiencing its impacts and they are forecast to continue worsening over time, should drastic measures not be taken to prevent them. Ontario and Quebec are currently predicted to experience increasing events of extreme weather, smog and ecological issues that will threaten both architecture and its users. Therefore, it is of utmost importance to implement environmentally-oriented architectural interventions on historic buildings that improve their resiliency to these previously unimagined events. Also, anthropogenic climate change effects all sectors of society: including agriculture, forestry, engineering, urban planning, public health, water management, in addition to the preparation of standards and guidelines. For this reason, it is important to recognize that climate change ramifications have quickly become one of the largest variables that must be accounted for in the architectural conservation profession.

National Scale Implications

"Canada's climate is expected to warm almost double than the global average due to warming amplification at high northern latitudes"

- Canada's Changing Climate Report (2019)

Current predictions highlight the fact that it is very easy to disrupt the delicate Canadian ecosystem due to the changing climate. With a global warming of between 1 degrees Celsius (low-emission scenario) and 3.7 degrees Celsius (high-emission scenario),⁵ caused by rising greenhouse gas emissions, rapid and large emission reductions

² "Canada's Changing Climate Report". Government of Canada.

are required. Staying below the catastrophic temperature cutoff, outlined in the Paris Agreement, enables the evasion of extreme weather effects and ecological issues while simultaneously preventing irreversible temperature change on a multi-century timescale. To make matters worse, once global temperatures remain constant and level out, the climate system will continue to fluctuate even after greenhouse gas emissions cease. To comply with the Paris Agreement, Canadian temperatures need to peak immediately and maintain drastic reductions thereafter indefinitely.

The ramifications of these temperature changes are increased projections for annual and winter precipitation levels everywhere in Canada. Moreover, summer precipitation levels are set to decrease over southern parts of the country leading to both increased risks of wildfires and urban flooding. Similarly, it can be expected that there will be a reduced amount of the year covered by snow. This is mostly due to raised permafrost temperatures affecting sea ice, glaciers and ice caps. In addition, a decreasing of river and lake ice will be noticed resulting from a later fall freeze and an earlier spring thaw. The thawing permafrost may also cause surface water levels of lakes and Oceans temperatures surrounding Canada will likely increase in a similar manner to air temperatures. Salinity and density stratification changes will cause slight long-term freshening of the water. This will diminish GHG sequestration, dissolved oxygen levels and marine ecosystems. Continuing the cycle of destruction, the diminishing of sub-surface oxygen concentrations is detrimental to marine life, further worsening climate change. Lastly, sea levels will rise and fall depending on local vertical land motion; increasing the frequency and magnitude of extreme high water events (ie. Flooding, wave action, and storm surges).

Regional Climate Change

Since the mid-twentieth century, southern Canada's has experienced an average uniform air temperature increase of 1.7 degrees Celsius with minor warming during the winter months. In Ontario, higher daily precipitation extremes and increased rain-generated local flooding in urban areas are predicted. In addition, decreased seasonal snow accumulation will result in earlier snow melt floods and less fall snow cover. Although precipitation in all seasons will increase, rainfall will supersede snowfall during the cooler months due to global warming. In spite of this, the southernmost area of the country is predicted to have a decrease in rain amounts by the end of the century, under high GHG emission scenarios. As a worst case scenario, this presents risks of lower surface water levels and a higher frequency of droughts.

Local Effects on Maplelawn Estate

Applying this data to a local scale, annual mean air temperatures are predicted to increase between 1.5 degrees Celsius and 6.3 degrees Celsius over the century.⁶ Consequently, the water levels of the James Bay and Hudson Bay as well as the Laurentian Great Lakes may decrease as temperatures continue to rise due to surface evaporation. In addition, flooding will likely become a prominent risk to the heritage built environment as annual mean precipitation levels increase between 5.3% and 17.3% by the year 2100.⁷

Specific to Maplelawn, it is predicted that the surrounding landscape will experience more frequent and severe freeze/thaw cycles during the winter months. Paired with less snow cover, the historic plant species will be presented with hostile growing conditions and will not experience the appropriate amount of insulation from the ele-

³ "Canada's Changing Climate Report". Government of Canada.

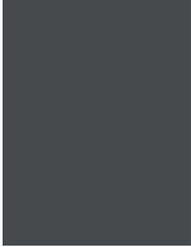
⁴ Ibid.,

ments as experienced under current snowfall expectations. Lastly, increased warming makes the occurrences of both fire and drought a new found reality for the National Historic Site of Canada.

"The largest uncertainty about the magnitude of future climate change is rooted in uncertainty about human behavior-related [GHG] emission levels (...) until climate is stabilized, there will not be a new 'normal' climate."

- Canada's Changing Climate Report (2019)

Climate Change Initiatives



Climate Change Initiatives

Government Agency Frameworks and Conservation Policies

Although carbon dioxide-related global warming and climate change caused by human activities was discovered by Guy Callendar, Milutin Milankovic and Gilbert Plass during the early to mid-20th century, it was not included in architectural policy until 2016.⁸ Prior to this date, preservation policy, specifically the Venice Charter (table 2), focused on appropriate minimal interventions and continuous maintenance over time that relied on the skill sets of traditional crafts people. Still considered industry standard presently, these policies were rooted in the idea that climate was relatively predictable and consistent. However, this is no longer the case, climate change ramifications have quickly become one of the largest variables that must be accounted for in the architectural conservation profession.

In 2013, the severity of climate change was formally acknowledged in a report published by the World Meteorological Organization's (WMO's) and the United Nations Environment Programme's (UNEP's) Intergovernmental Panel on Climate Change (IPCC). It concluded that "climate change is real and human activities, largely the release of polluting gases from burning fossil fuel (coal, oil, gas), is the main cause."⁹ A few years later, COP21 created the Paris Agreement outlining the importance of climate change policy within architecture because it was identified that 38% of the total amounts of polluting greenhouse gases were derived solely from the construction industry.¹⁰ It became the first of many policies identifying actions to mitigate the global climate crisis (tables 2-6).

⁵ "Climate Change Evidence: How Do We Know?" The National Aeronautics and Space Administration.

⁶ U.N.E.P. "Facts about the Climate Emergency."

⁷ "The Paris Agreement." United Nations Framework Convention on Climate Change.

Across the ten international and nationally-recognized policies that would follow, common themes began to present themselves. Firstly, it was recognized that climate change is a global challenge that must be addressed globally within a collected effort of solidifying community values.¹¹ Secondly, circular economies and local supply chain must be prioritized to facilitate carbon reduction, eventual decarbonization,¹² and sustainable renewable energy sources.¹³ Thirdly, the importance of the inclusion of cultural heritage knowledge and the promotion of non-western safeguarding of heritage.¹⁴ Finally, insight was gained acknowledging the fact that the physical integrity of world heritage is effected by climate change. It became evermore apparent that deterioration conditions and sources of failure needed to be addressed through innovative strategies guided by clear, useful and attainable objectives.

⁸ "COP26 And Climate Heritage Action - Seizing Momentum and the 'Heritage Reset.'" Gathering of the Heritage Sector.

⁹ Ibid.,

¹³ "Addressing Climate Change." UNESCO.

¹⁴ Lucile, Smirnov. "ICOMOS Work on Climate Change."

Climate Change Policy Frameworks

The Venice Charter (1967)

- a historic monument must embrace the architectural work and the urban or rural setting in which it is found
- conservation and restoration must have recourse to all the sciences and techniques which can contribute to preserving architectural heritage
- conservation intentions must focus equally on its preservation as art and historical evidence
- maintenance must be continuously performed over time
- modifications to facilitate use are permitted so long as they do not impact the layout or decoration of the architecture
- No new construction, demolition or modifications are npt permitted to prevent alterations to the scale of the structure's setting
- The conserved object is inseparable from its history and cannot be relocated except in justifiable means.
- items of decoration may only be removed to enable preservation purposes
- restoration interventions are highly specialized and must be based on respect for the original material and authentic documents
- if traditional techniques are inadequate for preservation, modern techniques and technology may be used as long as its efficacy is proven through scientific data and experience
- the contributions of all periods to the building must be acknowledged in respect of the unity of style within successful restorations
- Replacements of missing parts must integrate harmoniously with the whole, but distinguishable from the original
- Additions cannot be allowed except in so far as they do not detract from the interesting parts of the building, its traditional setting, the balance of its composition and its relation with its surroundings
- In all works of preservation, restoration or excavation, there should always be precise documentation in the form of analytical and critical reports, illustrated with drawings and photographs

The Paris Agreement - COP21 (2016)

- limit global warming below the projected 2 degrees celsius temperature goal, aiming for only 1.5 degrees celsius above pre-industry levels
- Achieve global carbon neutrality by 2050
- Countries immediately peak their greenhouse gas emissions
- Create a means of economic and social transformation on a 5-year cycle
- Countries submit individualized climate action plans; Nationally Determined Contributions (NDCs)

Climate Change Policy Frameworks

COP26 & Climate Heritage Action (2021)

Robert Pajot, Ewan Hyslop, Julianne Polanco, Mark THompson Brandt, Chris Wiebe

- Climate change is a global challenge that must be addressed globally, within a collected effort by solidifying community values
- Fostering widespread engagement in heritage discourse and how conservation is a key element to the climate crisis
- Minimal, thoughtful interventions are required to preserve heritage architecture
- the construction industry needs to rethink its role in enabling climate change, accounting for 38% of all greenhouse gas emissions

COP26 Key Takeaways

- importance of heritage policies
- promote the use of indigenous knowledge
- improved agriculture resiliency
- prioritize circular economies and local supply chains
- increase prevalence of building reuse
- reduce embodied carbon within the construction industry
- retention of generational skillsets and local craftsmanship

Construction Industry Initiatives

- carbon reduction and decarbonization
- prioritize reuse and retrofit
- facilitate local supply chains
- focus on material reuse instead of demolition
- adaptive reuse
- allow buildings to evolve

Heritage Professionals' Insights

Professor Mario Santana Quintero, James Maddigan, Golnaz Karimi, Tom Morrison

- World heritage is under seige by climate change and its physical integrity has been effected
- Ensuring heritage discourse is based on the surrounding community and the people the building serves
- Strive towards an interdisciplinary and inclusive approach to heritage conservation
- deterioration conditions as well as sources of failure need to be addressed through clear, useful and attainable objectives
- developing a holistic maintenance plan is crucial
- accepting the fact that restoration is not an end in itself, buildings last when they are regularly used
- traditional knowledge and skillsets should be fostered
- the field of heritage conservation must be allowed to evolve and learn over time

Climate Change Policy Frameworks

UNESCO (United Nations Educational, Scientific and Cultural Organization)

- help mitigate and adapt to climate change
- sustainable development education within the context of climate change
- determine risk assessment of natural disasters due to climate change
- ongoing monitoring of climate change effects on UNESCO designated heritage sites
- promotion of low carbon economies and sustainable uses of renewable energy sources

UNESCO's Strategy for Action on Climate Change (SACC)

- Promote public awareness and education through programmes accompanied by policies
- Enable scientific cooperation and support interdisciplinary climate change knowledge
- Facilitate inclusive social development, diverse cultural discourse and ethical principles related to climate change
- Promote cultural diversity and non-western safeguarding of heritage

ICOMOS (International Council on Monuments and Sites)

- Emphasize the necessity to respond to the risks of climate change and advocate heritage resiliency as an action to mitigating the climate crisis
- Mobilize the cultural heritage community
- Promote cultural solutions to rapidly reduce Greenhouse Gas emissions
- Focus on vulnerable communities and ecosystems adapting to climate change predictions
- Promote a thorough understanding of action to climate change in relation to heritage loss and deterioration
- Provide financial assistance to aid in the safeguarding of heritage from climate change

ICOMOS' Climate Change and Heritage Working Group (CCHWG)

- Support the development of vulnerability assessment tools
- Develop new conservation policies and management methodologies
- Facilitate cultural heritage and climate science intersections
- Promote cultural heritage solutions to the climate crisis
- Inclusion of cultural heritage knowledge within global climate policy

Climate Change Policy Frameworks

Architectural Conservancy Ontario (ACO)

- Promote education and advocacy of the importance of heritage buildings across Ontario
- Encourage conservation and adaptive reuse measures for existing buildings
- Establish branches to monitor communities and determine risk assessments
- Mitigate heritage emergencies through profession knowledge sharing
- Enable fundraising efforts to aid in the protection of cultural heritage

Canada's Nationally Determined Contribution (NDC) (Paris Agreement - 2021)

- Reduction in greenhouse gas emissions by 40-45% by 2030
- Net zero emissions by 2050
- implementation of the Pan-Canadian Framework on Clean Growth and Climate Change (PCF); reducing GHG emissions, prioritize clean economic growth, and incorporate climate change resiliency
- Allocate over \$53 billion of federal funding towards green recovery
- Reduction of energy waste and enable housing to become more affordable
- Ensuring affordable, clean transportation is available to all Canadian communities
- Increasing pricing on carbon pollution while promoting clean innovation
- Reduction of heavy industry and natural resource development pollution
- Advocate for biodiversity and natural carbon sequesters as action to the climate crisis
- Involve Indigenous knowledge to aid in mitigating climate change
- Advocate for transparency and ongoing annual evaluation of progress towards the Paris Agreement compliant initiatives
- Amend the building code for net-zero retrofits and adaptive reuse

Ontario's Key Action

- Reduction of greenhouse gas emissions of 30% by 2030
- Finalize policy that ensures large industry emitters are accountable for their pollution
- Implement regulation for gasoline and diesel to include 15% and 4% renewable contents, respectively.
- Begin discussion and research surrounding low-carbon hydrogen strategy; increasing job opportunities while reducing GHG emissions
- Support and financially invest in clean technology innovation
- Increase public transportation network capacity
- Issue \$4.95 billion worth of green bonds
- Phase out organic waste and food sent to landfills by 2030
- Increase natural gas access across the province

Climate Change Policy Frameworks

Ontario Association of Architects (OAA)

- Ensure government agencies streamline review processes while retaining critical criteria
- Reevaluate the development of greenbelts and adjacent watershed areas, instead conserving the biodiversity of the land
- Promote urban intensification and densification
- Improve the Ontario Building Code in relation to building environmental performance
- Promote real-time monitoring of provincial carbon dioxide emissions
- Facilitate the use of hydropower from Quebec, a renewable resource
- Mandate building energy standards and necessary monitoring
- Reduce the infiltration of plastics into waterways through improved filtering at outlets
- Advocate for greater building flexibility, including designing for assembly and disassembly

Canada Green Building Council

- Provide incentives to improve energy efficiency in existing buildings
- Promote building energy benchmarking, reporting and disclosure initiatives
- Create a net-zero building initiative and Canadian standard
- Reduce the government's greenhouse gas emissions by introducing carbon reducing activities for publically-owned buildings
- Ensure Canada's climate change targets are met by 2030

Ministry of the Environment, Conservation and Parks

The Made-in-Ontario Environment Plan

- Reduction and diverting of waste into landfills
- Strive towards a circular economy for packaging and products
- Ensure water quantity is sustainably managed within Ontario
- Implement actions to protect the Great Lakes
- Enhanced the Air Quality Health Index with associated monitoring
- Implement an enhanced emissions testing program for commercial vehicles
- Invested \$20 million towards Ontario's land conservation actions
- Launched the first-ever broad, multi-sector provincial climate change impact assessment to determine climate change vulnerability
- Consult on developed initiatives to mitigate pollution

Historical Development

Maplelawn Estate and Garden

Historical Chronology

1831-1834: Maplelawn Estate and Garden was built for William Thomson

1877: The property was converted into an operational dairy farm, renamed Highland Park Dairy Farm

1899: Owned by John Cole, the land is subdivided for residential lots. It became the first farm in Canada to use electric lights and machinery.

1935: A summer kitchen and additional bedrooms are added to Maplelawn. The walled garden plantings are re-envisioned.

1952: The estate is bought by the National Capital Commission (NCC) to ensure its preservation

1983: Maplelawn recognized as a Classified Federal Heritage Building

1989: Estate and Garden are formally designated as a National Historic Site of Canada

1993: Friends of Maplelawn, a volunteer-based group studying and preserving the garden, was formed and began maintaining the historic landscape.

1994-1995: Designated by the City of Ottawa under Part IV of the Ontario Heritage Act; recognized as requiring conservation of property for cultural heritage value or interest.

The building is leased and interior renovated by Peter Fallis to create a cafe.

1999: Maplelawn is leased by the Keg Steakhouse, creating the Keg Manor Ottawa.

Table 7: A Historical Chronology of Maplelawn

Historical Development

Maplelawn is a former estate and walled garden located in Ottawa, Canada. It is an early example of the British Classical Georgian architectural style imposed in Canada during the nineteenth century. Built from 1831 until 1834, it has remained as a private residence for more than a sesquicentennial prior to being bought by the National Capital Commission. As a public property, the interior of the heritage masonry building has been previously renovated to facilitate a restaurant occupying the space. It was designated as a Classified Federal Heritage building in 1983 and, along with its landscape, recognized as a National Historic Site of Canada in 1989.¹⁵ Maplelawn is one of the few remaining preserved former estates with rare complete walled garden that historically lined Richmond Road.

Having occupied various uses over its lifespan, Maplelawn transferred from private to public ownership. Evolving over time, the site was converted from a private residence into a functional dairy farm on the outskirts of town. Driven by the introduction of the streetcar in 1899 and increased urban fabric development, portions of the former estate were sold off to create the neighbourhood now known as Highland Park while the remainder of the property became the first farm in Canada to use electric lights and machinery. By the mid 20th Century, the Maplelawn estate was bought by the National Capital Commission (NCC), formerly the Federal District Commission, to ensure its preservation. Within the 50 years that followed, the temporarily vacant building was designated by the City of Ottawa under Part IV of the Ontario Heritage Act: recognized as requiring conservation of property of cultural heritage value or interest (table 7).¹⁶ Distinguishing itself from other government-owned heritage

¹⁵ "Maplelawn." Canada's Historic Places.

¹⁶ Jones, Danielle. "Maplelawn House and Garden." Heritage Ottawa.

buildings within the National Capital Region, Maplelawn Former Estate and Garden is occupied while being managed collaboratively by multiple stewards: NCC as the building's owner, the Keg Steakhouse as long-term tenants and Friends of Maplelawn, a volunteer group tasked at historically preserving the public garden. Moreover, the relationship of the buildings with its site has remained historically unchanged, acting as a landmark within its surrounding community as one of the oldest preserved residences.

As outlined by Canada's Historic Places registry, the following character-defining elements of the heritage site have been identified.¹⁷ The building's aesthetics, function, and craftsmanship are highlighted through the symmetrical restraint of all facades of the classical building. A five-bay front façade with centered door in tandem with an exterior devoid of decoration further illustrate the British colonial architectural influence at the time of its construction. Lastly, the historically preserved garden of native plant species further solidifies the relationship to the site, including the estate house, circular drive and walled garden within a mature landscape.

¹⁷ "Maplelawn." Canada's Historic Places.

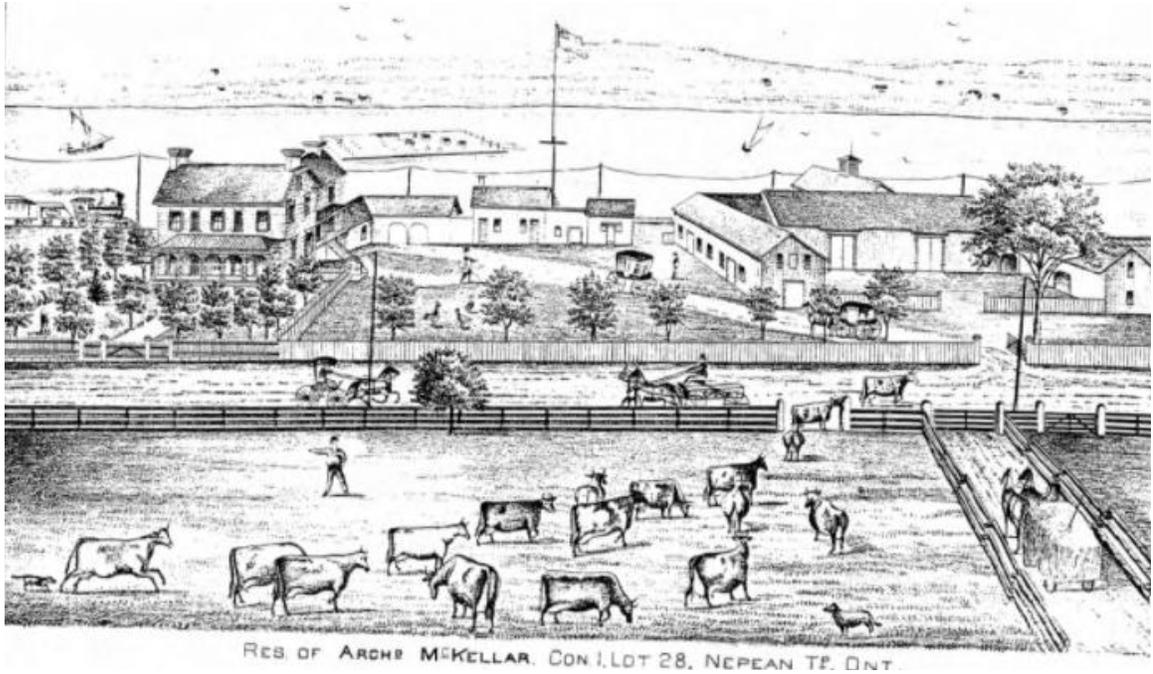


Figure 4: Historical Atlas of Carleton County

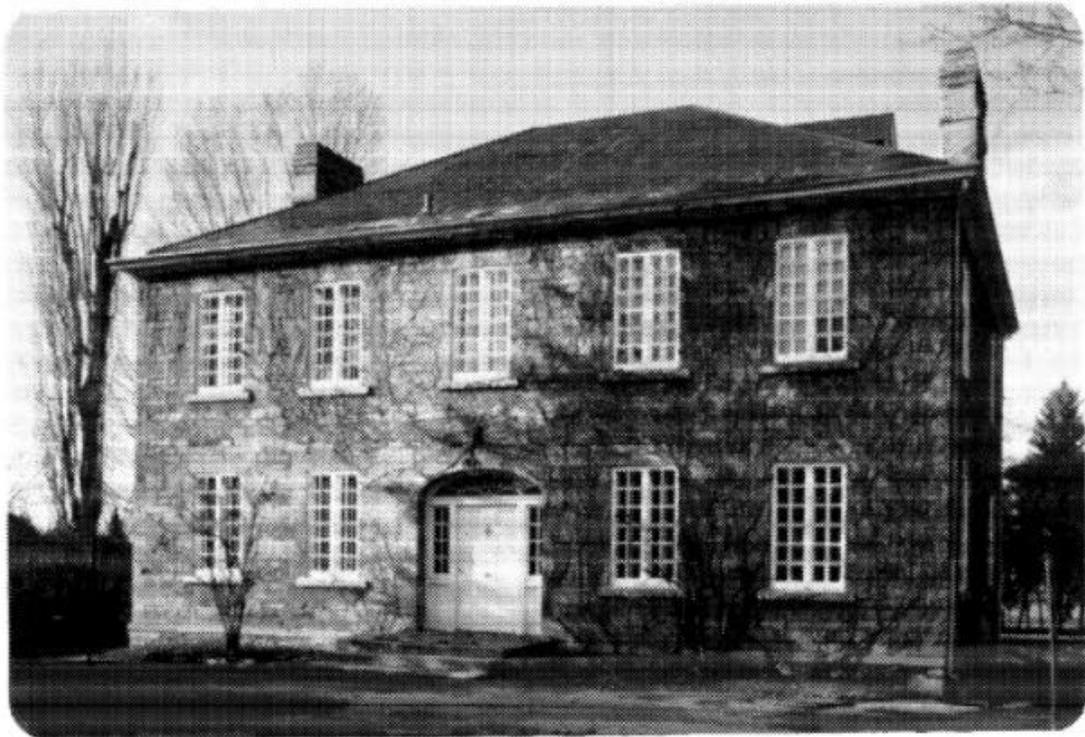


Figure 5: A Historic Photograph of the Front Facade of Maplelawn

Physical Condition



Physical Condition

Introduction

Maplelawn Estate and Walled Garden overall have remained in excellent condition since being built in 1834. Located on Richmond Road in Ottawa, Ontario, the building illustrates early colonial settlement of traditional British architectural styles within the city as well as the growing importance for agriculture and gardening for the area. Situated along major routes of various transportation methods through the urban fabric, the management plan intends to return Maplelawn to its grandeur and emphasize its recognition as the “glory of the neighbourhood.”¹⁸ In alignment with its commemorative plaque fastened to the sites entry gate posts, its conservation is essential “because of the quality of the house, but more particularly because its gardens are the best preserved of the few known surviving examples of early 19th century walled gardens in Canada, ‘Maplelawn’ and its gardens are of national architectural significance.”

Existing Site and Architecture

Reduced from its original 200-acre size as a working cattle ranch, Maplelawn still occupies an unprecedented one acre lot in the Westboro neighbourhood. The five-bay symmetrical estate house, overlooking the property, is only demonstrating minor general deterioration that is to be expected given the changing climate and surrounding urban development. This is most commonly seen in the form of a general corticated layer across the exterior masonry of the former estate. This is not something of concern for the buildings management, it is simply a physical manifestation of an oxidation process, occurring when air and water interact with stones’ mineral contents to form a discrete thin surface layer over time.¹⁹ The former estate also has some bio-de-

¹⁸ von Baeyer, Edwinna. “Maplelawn 1817-1995 Landscape History”. 1.

¹⁹ Whitley, Darrell and Thomas S. Elias. “Patina in Viewing Stone Appreciation”. VSANA.

terioration to the stone face and mortar where vines have anchored themselves to the facade. This deterioration form is particularly apparent from a visual assessment during the winter months when the vegetation has lost its leaves and fallen into dormancy. Lastly, there is visible signs of water accumulation, staining and possible infiltration across the building. For example, there is inconsistent snow cover on the roof and green staining can be seen surrounding the gambles on the wooden shingles. The extent of possible water damage is too difficult to determine from solely visual assessments from grade and a more intrusive exploration will be required at a later date.

Landscape and Garden

Although a highly prized staple in Europe, walled gardens never became widespread within Canada. This is why it is of utmost importance to ensure its preservation. Built at the same time as the former estate, it is intrinsic to the heritage designation of the property. Theorized that masons were brought over from England to aid in the construction of the walled garden, Ontario Archaeological Consulting Services concluded that the path layout: four symmetrical garden beds with a central circular path, has remained with slight alteration since 1831.²⁰

The historic walled garden is experiencing more severe deterioration in comparison to the estate in some areas but is overall in fair condition. The worst deterioration of the walled garden are instances of complete and partial structural failure to the stone and lime mortar wall. Likely caused by drastic risk factors, including both extreme freeze/thaw exposure and the close proximity to contemporary infrastructure. When the walled garden was built, it was a free-standing structure. Once the city and urban fabric densified within the region, that length became a retaining wall for the newly installed sidewalk and road. Not only does this effect the overall character and grandeur of the walled garden but the built-up soil also exerts a lateral force onto the

²⁰ von Baeyer, Edwinna. "Maplelawn 1817-1995 Landscape History". 6.

masonry. If not properly repaired, they pose the risk of causing rapid deterioration to further lengths of the masonry wall as neighbouring stones compensate for increased loads.

Other signs of deterioration noted on the walled garden include bedding plane degradation on some stones. This exposure of the bedding planes is the result of prolonged weathering causing the exterior stone face to delaminate.²¹ This is a fairly common occurrence for sedimentary stones being used for buildings. Moreover, the walled garden requires a mortar repointing and has some areas of incorrectly cured mortar. It is hypothesized that the stones are no longer as breathable as originally causing water infiltration-related spalling.

²¹ Grimmer, Anne E. "A Glossary of Historic Masonry Deterioration Problems and Preservation Treatments".

Estate House - Visual Assessment

Water Accumulation, Infiltration & Staining



Figure 6: A Visual Assessment of Maplelawn Estate Building with Deterioration Callouts

Estate House - Visual Assessment

Masonry Deterioration

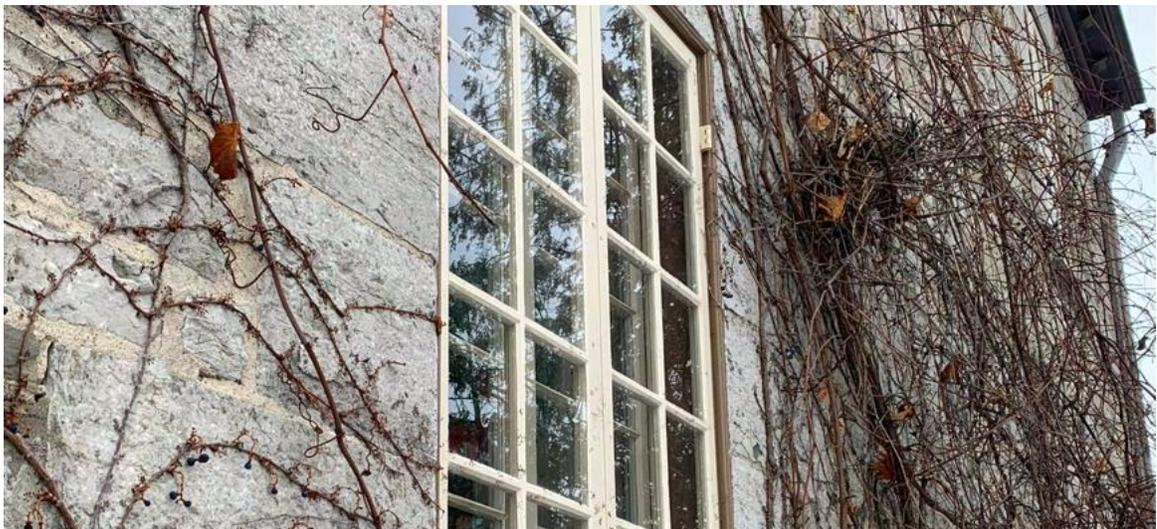


Figure 7: A Visual Assessment of Maplelawn Estate Building with Deterioration Callouts (cont.)

Estate House - Visual Assessment

General Deterioration



Figure 8: A Visual Assessment of Maplelawn Estate Building with Deterioration Callouts (cont.)

Estate House - Visual Assessment

Biodeterioration



Figure 9: A Visual Assessment of Maplelawn Estate Building with Deterioration Callouts (cont.)

Walled Garden - Visual Assessment

Structural Failure



Figure 10: A Visual Assessment of Maplelawn Historic Walled Garden with Deterioration Callouts

Walled Garden - Visual Assessment

Masonry Deterioration



Figure 11: A Visual Assessment of Maplelawn Historic Walled Garden with Deterioration Callouts (cont.)

Walled Garden - Visual Assessment

Mortar Deterioration



Figure 12: A Visual Assessment of Maplelawn Historic Walled Garden with Deterioration Callouts (cont.)

Walled Garden - Visual Assessment

Inappropriate Interventions



Figure 13: A Visual Assessment of Maplelawn Historic Walled Garden with Deterioration Callouts (cont.)

Comparative Assessment



Comparative Assessment

Introduction

As one of the few remaining estate houses with walled garden, Maplelawn does not have any exact comparative assessments. In spite of this, six case studies have been profiled in this report that all have some form of similarity to the heritage site. Relying on similar buildings and walled gardens situated in northern locations as a means of predicting possible maintenance plans to implement at Maplelawn to improve climate change resiliency. In contrast, some are intended to illustrate tangible worst-case scenarios of expected deterioration if inappropriate interventions take place. The intention is through comparative assessment, Maplelawn can remain in its current condition as climate change progresses in the future decades and/or centuries.

Estate House Comparative Assessments

Matheson House is a five-bay Palladian-style sandstone house with masonry garden wall. Other than the prominent pediment and extension wings, the age and landscaping of the case study closely match that of Maplelawn Estate. As a consequence of its original owner being a former Confederation senator and its location within a heritage conservation district, Matheson House has been remained a museum, being restored accordingly.

John Losee House was built in 1828 and has remained as a private residency. A masonry Federal-style masonry building demonstrating early vernacular architecture in the region. Its geographic location, Watertown, is directly south of Maplelawn Estate and therefore will likely experience climate change deterioration similarly. Its materiality and general massing will prove immensely valuable to predict and extrapolate

climate vulnerability.

Built in 1819, Macdonell-Williamson House is designed in a regional Palladian style and features remnants of a former working estate. Similar to Maplelawn Estate, this case study has a newer building extension off of the original structure, a former summer kitchen that has been enclosed from the elements. Furthermore, the site is operated by a volunteer group, "Friends of the Macdonell-Williamson House", acting as advocates for the Historic Site of Canada. Saved from demolition, extensive architectural and archaeological investigations have been conducted that could be extrapolated to inform future Maplelawn Estate interventions. Originally identified in 1995 by the National Capital Commission,²² Macdonell-Williamson House remains the most similar comparative Canadian example to Maplelawn.

Walled Garden Comparative Assessments

This newer brick building, inspired by British estate architectural design, acts as a worst case scenario for unmaintained walled gardens. The Lotten-Cawthra Estate walled garden appears to be constructed using the same methods as that of Maplelawn; free-standing masonry with mortar. The remains of the garden demonstrate the possibility of rapid deterioration due to lack of maintenance and prolonged exposure to the elements. It can be inferred, that this deterioration would mirror that of Maplelawn without appropriate intervention to mitigate climate change deterioration.

The Long Walk garden, one of fifteen on the site, features a dry stone wall that resembles that of Maplelawn Estate. Admired for being built under adverse atmospheric conditions in northern Quebec, Reford Gardens proves that historic English-style gardens can be resilient to climate fluctuations. This case study may predict

²² von Baeyer, Edwinna. "Maplelawn 1817-1995 Landscape History". 11.

how to maintain landscaping to thrive despite climate vulnerabilities.

Estate House with Walled Garden Comparative Assessments

Considered the oldest surviving building in Northern Ontario, Ermatinger demonstrates the increasing prevalence of vernacular Georgian architecture in Ontario, using local materials. Much in the same way as Maplelawn, the walled garden is inherent to the site's and building's heritage significance. Visually less refined or organized in its construction technique than Maplelawn, Ermatinger Old Stone House is a physical illustration of the rapid improvement of mason craftsmanship within Ontario at the turn of the 19th century.



Figure 14: Maplelawn Estate during Winter, 2022.

CASE STUDY:

Matheson House

Perth, Ontario, Canada

Original Owner:

Roderick Matheson - A Confederation Canadian Senator

Construction Date: 1840

Private Residential
Public Institution - Museum

Heritage Designation:

National Historic Site of Canada (1966)

Significance

A five-bay Palladian-style sandstone house with masonry garden wall. Other than the pediment and extension wings, the age and landscaping of the case study closely match that of Maplelawn Estate.



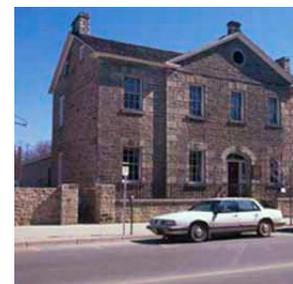
Source: Richard McGuire



Source: Avrex Travel



Source: Gauvin Alexander Bailey



Source: Parks Canada Agency

Figure 15: Matheson House Case Study

CASE STUDY:

John Losee House

Watertown, New York, United States

Original Owner:
John Losee

Construction Date: 1828
Private Residential

Heritage Designation:
National Register of Historic Places (2014)

Significance

A masonry Federal-style masonry building demonstrating early vernacular architecture in the region. Its geographic location is very similar to Maplelawn estate and therefore will likely experience climate change deterioration similarly.



Source: Dave King



Source: David F. Lane



Source: NY Mews



Source: David F. Lane

Figure 16: John Losee House Case Study

CASE STUDY:

Macdonell-Williamson House

Chute-à-Blondeau, Ontario, Canada

Owners:

John Macdonell (1819)
William Williamson
Ontario Heritage Trust (1978)

Construction Date: 1817-1819

Private Residential
Public Institutional

Heritage Designation:

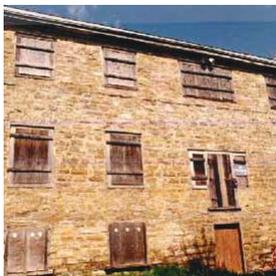
National Historic Site of Canada (1969)

Significance

Macdonell-Williamson House is built in a regional Palladian style and features remnants of a former working estate. Similar to Maplelawn Estate, this case study has a newer building extension and the site is operated by a volunteer group ("Friends of the Macdonell-Williamson House"). Saved from demolition, extensive architectural and archaeological investigations have been conducted that could be extrapolated to inform future Maplelawn Estate interventions.



Source: Historic Places Day



Source: Shannon Ricketts



Source: Macdonell-Williamson House



Source: Parks Canada

Figure 17: Macdonell-Williamson Case Study

CASE STUDY:

Lotten-Cawthra Estate

Mississauga, Ontario, Canada

Architect:

William L. Somerville

Construction Date: 1926

Private Residential
Public Civic Building

Heritage Designation:

Ontario Heritage Act - Part IV (1992)

Significance

This newer brick building, inspired by British estate architectural design, acts as a worst case scenario for unmaintained walled gardens. The remains of the garden demonstrate the possibility of rapid deterioration due to lack of maintenance and prolonged exposure to the elements. It can be inferred, that this deterioration would mirror that of Maplelawn without appropriate intervention to mitigate climate change deterioration.



Source: City of Mississauga



Source: Hiking the GTA Blog



Source: Hiking the GTA Blog



Source: City of Mississauga

Figure 18: Lotten-Cawthra Estate Case Study

CASE STUDY:

Reford Gardens: the Long Walk

Grand-Metis, Quebec, Canada

Designer:
Elise Reford

Construction Date: 1926-1958
Private Landscape
Public Landscape

Heritage Designation:
National Historic Sites of Canada (1995)
Quebec Heritage Site (2013)

Significance

The Long Walk garden, one of fifteen on the site, features a dry fit stone wall that resembles that of Maplelawn Estate. Admired for being built under adverse atmospheric conditions in northern Quebec, Reford Gardens proves that historic gardens can be resilient to climate fluctuations. This case study may predict how to maintain landscaping to thrive despite climate vulnerabilities.



Source: Parks Canada



Source: Jennifer - 3 Dogs in a Garden Blog



Source: Jennifer - 3 Dogs in a Garden Blog



Source: Jennifer - 3 Dogs in a Garden Blog

Figure 19: Reford Garden Case Study

CASE STUDY:

Ermatinger Clergue Old Stone House

Sault Ste. Marie, Ontario, Canada

Original Owner:
Charles Oakes Ermatinger

Construction Date: 1814-1823
Private Residential
Public Institutional - Museum

Heritage Designation:
National Historic Sites of Canada (1957)
Ontario Heritage Act - Part IV (1993)

Significance

Considered the oldest surviving building in Northern Ontario, Ermatinger demonstrates the increasing prevalence of vernacular Georgian architecture in Ontario, using local materials. Much in the same way as Maplelawn, the walled garden is inherent to the site's and building's heritage significance.



Source: Algoma Kinniwabi Travel Association



Source: Attractions Ontario



Source: Parks Canada



Source: Wikimedia Commons

Figure 20: Ermatinger Clergue Case Study

Assessment of Heritage Significance & CVI



Assessment of Heritage Significance & Climate Vulnerability Index

Introduction

Heritage architecture in Ottawa is exposed to three levels of deterioration risk associated with the global climate crisis: minor, severe and drastic. Minor events encompass small-scale continuous implications of climate change, including air pollution, temperature fluctuations and water infiltration. Severe events cause more immediate deterioration to the heritage element. Urban development, mass tourism and structural failing would fall under this category. Finally, there is flooding, soil subsidence and lack of government policy that are drastic events that cause eminent danger to heritage conservation. Despite the distinct categorization of the previously outlined risk events they operate along a spectrum. This is because a continuous minor risk could eventually accumulate to drastic levels. Alternatively, should a drastic event occur at a distance from the site, it may have a less severe effect on the conservation project.

Analyzing the risks associated with Maplelawn estate and walled garden, in-depth research was conducted of the sites surroundings as well as predicting potential climate change impacts of the region. The risks are divided into two main categories: natural risk factors and anthropogenic risk factors (tables 8-9). These main categories are further subdivided to provide greater explanation of the characteristics of each risk, its temporality, level of decay, and probability of occurring. Moreover, possible mitigation strategies have been outlined. It should be noted that although the information can be presented separately and clearly within a table to best explain the totality of the chosen site's risk vulnerability, real-world application of these principles

evolves along a spectrum with interconnected risks and many more simultaneous variables that need to be addressed.

Canadian Assessment Criteria and Listings

Within Canada, heritage designations are determined through a collaborative approach of various governing bodies. Parks Canada provides professional support to the Historic Sites and Monuments Board of Canada (HSMBC) as well as the Federal Heritage Buildings Review Office (FHBRO) to develop designations for Federal Heritage Buildings and National Historic Sites of Canada. The objective of FHBRO is to assist the Federal government in protecting heritage buildings in accordance with the Management of Real Property Policy put in place by the Treasury Board.²³ Similarly, according to the Parks Canada Agency government website, the “mandate of the Historic Sites and Monuments Board of Canada is to advise the Government of Canada, through the Minister of the Environment and Climate Change, on the commemoration of nationally significant aspects of Canada’s history.”²⁴

Receiving the highest heritage designation as a Classified Federal Heritage Building by the Minister of the Environment and Climate Change, the former estate’s heritage character is protected as a federally owned historic building.²⁵ Having been owned by only two families throughout its history prior to being acquired by the National Capital Commission, the Classified Federal Heritage Building’s designation has been justified due to its architectural features:

“[Maplelawn] is a very fine, if late, example of a substantial country house designed in the British classical tradition of the 18th Century. It provides an excellent illustration of this phase of domestic design in Canada and one of its best preserved examples. It is also one of the oldest surviving residences in the Ottawa area. The austere exterior is enhanced by the surviving period landscape, including a walled garden and by the

²³ “Federal Heritage Buildings Review Office” Parks Canada.

²⁴ “Historic Sites and Monuments Board of Canada”. Parks Canada.

²⁵ “Directory of Federal Heritage Designations”. Parks Canada.

refined elegance of the interior.”²⁶

In addition, Maplelawn has been identified as a National Historic Site (NHS) due to its significance as an “integral part of Canada’s past and present.”²⁷ Recognized for its excellent condition and rarity within Canada, Maplelawn Estate and Walled Garden were jointly designated as a National Historic Site of Canada because “ its gardens are the best preserved of the few known surviving examples of early 19th century walled gardens in Canada and the quality of this finely crafted home in the British classical tradition is exceptional.”²⁸ Lastly, Maplelawn has been designated individually under Part IV of the Ontario Heritage Act. Approved by the City of Ottawa and the Ontario Heritage Trust, this designation type provides protection to properties that satisfy one or more of the provincial regulations highlighting their design or physical value, historical or associative value, and contextual value to ensure the properties survival for future generations.²⁹

Climate Vulnerability Index

The Climate Vulnerability Index is an assessment tool for world heritage properties intended to determine climate change risk through the lens of three severe and specific climate drivers. Developed by James Cook University,³⁰ this systematic tool takes into consideration both Outstanding Universal Value and Community vulnerabilities. Due to the siting of Maplelawn Estate and Walled Garden in addition to predicted climate change for the region, the following climate drivers have been identified: air temperature changes, precipitation changes and river level changes.

²⁶ “Maplelawn - Classified Federal Heritage Building”. Parks Canada Directory of Federal Heritage Designations.

²⁷ “Directory of Federal Heritage Designations”. Parks Canada.

²⁸ “Maplelawn & Gardens National Historic Site of Canada”. Parks Canada Directory of Federal Heritage Designations.

²⁹ “Individual Designation”. City of Ottawa.

³⁰ “About Climate Vulnerability Index”. James Cook University.

Risk Assessment

Minor Events	<ul style="list-style-type: none">- Salt accumulation and solubility- Water infiltration and deterioration (Freeze/Thaw Cycle)- Air pollution- Bio-deterioration- Temperature fluctuations (daily and annually)- Solar radiation- Precipitation intensity and acidity- Atmospheric-related deterioration- Internal environmental factors- Interior management
Severe Events	<ul style="list-style-type: none">- Masonry degradation- Urban development- Inadequate maintenance plan- Mass tourism and user comfort- Structural instability- Inappropriate previous restoration
Drastic Events	<ul style="list-style-type: none">- Flooding- Fire- Seismic activity- Soil subsidence- Severe meteorological events- Economic development- Lack of government policy

Table 7: Risk Events Assessment Categories

Natural Risk Factors	Temporality	Level of Decay	Probability	Mitigation Strategies
Biological Factors <i>Lichen, mosses, grasses, animals</i>	Long-term	Minor	Continuous	Introduce physical (laser cleaning) and/or biological removal methods (enzymes) to maintenance plan that do not damage the historic garden
Meteorological <i>Solar radiation</i> <i>Air humidity & temperature</i> <i>Lightning</i> <i>Gale winds, tornadoes, hurricanes</i>	Long-term Long-term Rapid Onset Rapid Onset	Minor Minor Drastic Drastic	Continuous Continuous Infrequent Rare	Reflect the exterior elements to reduce solar gain; allowing interior air humidity and temperature to remain consistent Evaluate the existing management plan and emergency preparedness measures to determine vulnerabilities
Geochemical <i>Groundwater erosion</i> <i>Salt solubility</i>	Long-term Long-term	Drastic Minor	Continuous Continuous	Control urban runoff to prevent groundwater erosion and efflorescence from soluble salts
Natural Hazards <i>Fire</i> <i>Landslides</i> <i>Seismic Activity</i> <i>River Flooding</i> <i>Soil subsidence</i>	Rapid Onset Rapid Onset Rapid Onset Rapid Onset Long-term	Drastic Drastic Drastic Drastic Drastic	Rare Rare Infrequent Frequent Continuous	Evaluate the emergency preparedness measures to determine vulnerabilities. Identify non-invasive means of preventing natural hazards from causing irreversible damage to the historic building

Table 8: Natural Risk Assessment with Mitigation Strategies

Anthropogenic Risk Factors	Temporality	Level of Decay	Probability	Mitigation Strategies
Pollution <i>Air pollution</i> <i>Acid rain</i>	Long-term Long-term	Minor Minor	Continuous Continuous	Short-term mitigation can be achieved through laser cleaning exterior surfaces, but to stop the re-occurrence, greenhouse gas emissions are to be reduced
Mass Tourism <i>Salt accumulation</i>	Long-term	Minor	Frequent	Mechanically ploughing in tandem to salt-free grit and sand mixtures are alternatives to limit salt-related deterioration
Management <i>Heating, air conditioning, ventilation, lighting</i> <i>Improper cleaning</i> <i>Inappropriate standards of comfort</i>	Long-term Long-term Long-term	Minor Minor Minor	Continuous Continuous Continuous	Gradual introduction of HVAC systems ensure the building materials do not experience drastic temperature changes. Reliance on integrated passive heating and cooling will further prevent deterioration of the building interior
Inappropriate Use <i>Transformation of historic buildings</i>	Rapid Onset	Drastic	Frequent	Identification and protection of heritage character-defining elements mitigates detrimental changes to the building's interior as its use changes over time
Restoration/ Repair <i>Late interventions</i> <i>Conservation Treatments</i> <i>Improper Repairs</i> <i>Inappropriate Restoration</i>	Rapid Onset Long-term Long-term Long-term	Drastic Minor Drastic Drastic	Infrequent Frequent Rare Rare	Ensuring inappropriate previous restorations are corrected and the management plan has been outlined/updated by a heritage professional mitigates drastic decay for the historic building
Human Hazards <i>Economic Development</i> <i>Governmental policy</i>	Medium-term Medium-term	Drastic Drastic	Continuous Infrequent	Promote collaborative learning and advocacy with stakeholders to promote a holistic approach to conservation

Table 9: Anthropogenic Risk Assessment with Mitigation Strategies

Climate Vulnerability Index

Key Heritage Value/ Heritage Statement:

Historical Value

"Maplelawn is a visual reminder of the early economic history of the Ottawa valley as an agricultural community. This substantial family residence, which once occupied 200 acres of land, was an early farming estate in the Ottawa-Hull region and quickly became one of the most prosperous in the area. One of the oldest houses in the Ottawa valley, the building has continually functioned as a residence; initially it served as a home for the Thomsons and later for the Coles – both of whom represented leading families in the community, participating in its political, business and agricultural spheres."

Architectural Value

"Valued for its excellent aesthetics and functional design, Maplelawn is a fine example of a house designed in the British Classical tradition of the 18th century. It provides an excellent illustration of this phase of domestic design in Canada, and is also one of the best-preserved examples. The symmetrical and ordered appearance of the building's elevations is characteristic of the classical style. The rectangular main façade is punctuated by five bays with a central doorway surrounded by sidelights and an elliptical fanlight. The austere exterior is enhanced by the refined elegance of the interior, laid out in a centre hall plan, which features the original trim and a prominent, spiral staircase."

Environmental Value

"Maplelawn maintains an unchanged historical relationship with its site. The house sits in a spacious lot, set back from the road, with the original stonewalls that isolates the house from the busy street. A one-acre, walled garden can still be seen at the southeast corner of the property. Maplelawn reinforces the present character of the area as a mixed-use residential and commercial community, and as one of the oldest surviving residences in the area, it provides an important visual landmark for the community."

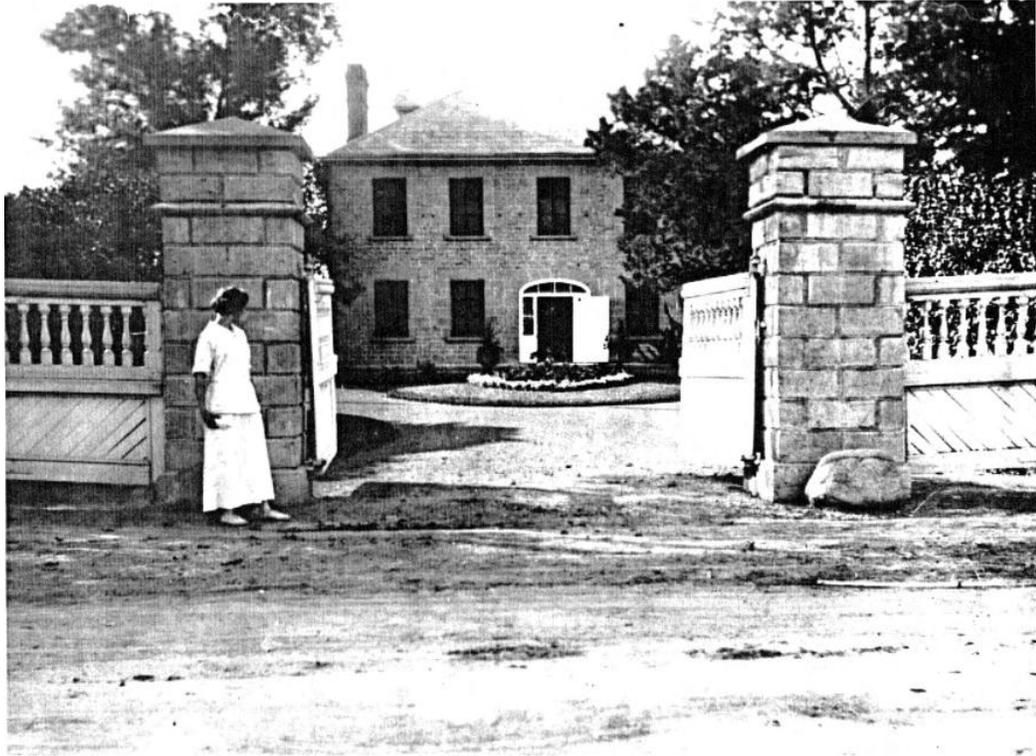


Figure 21: Archival Photograph of the Unaltered Maplelawn Entrance

CVI - Economic Impact

In spite of the walled garden being accessible to the general public, Maplelawn estate still incurs an economic impact for the region. With more emphasis on the historic site, tourism within the area will increase. Not only will this likely increase the restaurant income but also increase the use of the nearby neighbourhood of Westboro. This will improve the economy of the city while simultaneously encouraging local spending. If Maplelawn fell into disrepair, it is predicted that it would greatly effect the circular economy of the area. To help offset costs associated with continued maintenance, it may be of interest to evaluate if a portion of the restaurants income was collected by the NCC for Maplelawn on top of the amount received for renting the building for private use.

CVI - Social Impact

The social impact of Maplelawn is mostly rooted in the public access and visibility to the gardens. Providing a green space against the built-up surrounding urban environment, public seek refuge from the daily mundane at the property of the former estate. Acting as a recognizable landmark and known meeting place, the public are invited to explore the immaculate landscaping. This is further facilitated due to its location along a central public transportation route, expanding its possible reach from people outside of its originally intended walking radius.

CVI - Cultural Impact

As a government-owned public site, Maplelawn estate and walled garden is vulnerable to specific risks that private heritage buildings are not subjected to, specifically mass tourism. Broadly speaking, tourism is not inherently positive nor negative and therefore must be assessed on an individual basis. Tourism allows for education on the history of the region as well as greater community engagement with the designated heritage site. Also, it enables the preservation of heritage building by ensuring its continued use. This is a key phenomenon because architectural heritage is best preserved through continued usage, by being allowed to evolve over time.

Similarly, heritage infrastructure was originally intended to be sustainably resilient to a certain number of users. By introducing tourists and transferring the building ownership from private to public, this amount of people can be greatly surpassed causing expedited deterioration of materials. Because of this, a “care and capacity” limit, a restriction of how many people can occupy the site without causing drastic degradation, may need to be imposed upon the site to prevent irreversible damage from occurring.

Climate Vulnerability Index Findings

After completing the Climate Vulnerability Index for Maplelawn Estate and Walled Garden, the property currently is predicted to have a moderate vulnerability to climate changes in the coming years. Both the heritage value (HV) vulnerability and the community vulnerability have identified low to moderate vulnerability for the property. This promotes optimism that the building and surround landscape are already at an advantage in terms of resiliency to climate change.

To begin, each of the three climate drivers, air temperature changes, precipitation changes and river level changes were separately analyzed in terms of their effect on the heritage value of Maplelawn. The overall exposure, sensitivity, potential impact, and adaptive capability were considered for both the building and walled garden to determine the overall impact to the heritage elements of the site. Although predicted to have a potentially extreme impact on the Historic Site of Canada, the largest counter-indication was related to its adaptability. The rare occurrence of three stakeholders simultaneously involved with the property enables a high level of support and management response. Between the National Capital Commission, as building owner, The Keg Steakhouse, the tenant, and the Friends of Maplelawn, the garden volunteer group, various areas of the property can be monitored for deterioration at a more regular frequency. This allows for the ability to flag potential issues prior to them impacting the heritage fabric.

The community vulnerability considered the economic, social and cultural implications surrounding the former estate and walled garden. Through the analysis of site users, the surrounding built environment and residents of the area, a moderate community vulnerability was concluded. Determining both the negative and positive impacts of the deterioration of Maplelawn, the adaptive capability once again

outweighed the detrimental dependency and impact of the National Historic Site of Canada.

The climate vulnerability index confirmed the climate change resiliency possible at Maplelawn. With an appropriate holistic management plan, it can be expected that the designated heritage site will be able to withstand the predicted climate change implications of the region.

Hierarchical Ranking of Heritage Elements Based on CVI

The hierarchical ranking of the heritage elements is determined by the results of the Climate Vulnerability Index for the three key climate drivers for the region. In addition, it is based on their current visual condition assessment, potential exposure to predicted changing climates and the invasiveness of treatment methodologies. The hierarchical ranking considers current climate change implications: including more frequent freeze/thaw cycles during the winter months, increased risk of flooding, an overall warming of air temperature resulting in possible fire risks, less and later snow cover during the winter season, more severe precipitation, and increased drought cycles.



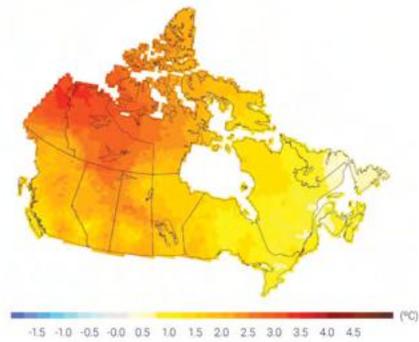
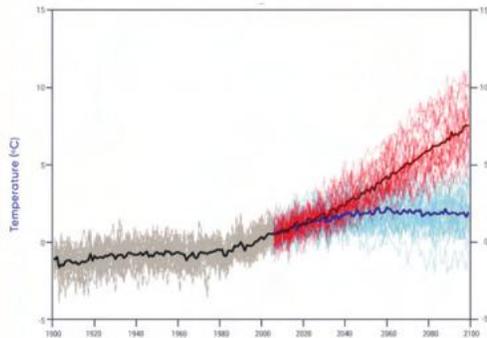
Figure 22: Maplelawn and Garden Aerial View. Parks Canada Agency. 2009.

Climate Vulnerability Index

Climate Change Predictions:

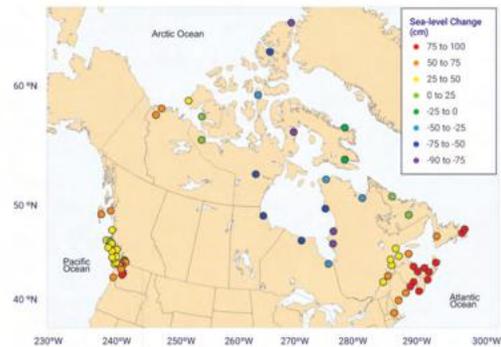
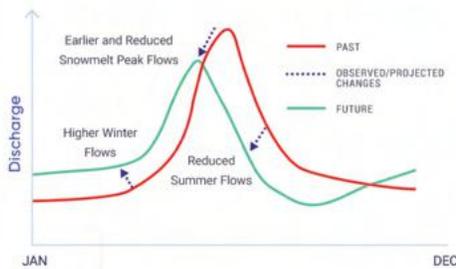
Air Temperature Changes

Graphics depicting annual climate change-related air temperature warming considering the past, future high emission scenarios (red) and low emission scenarios (blue)[left] as well as average temperature changes across Canada [right].



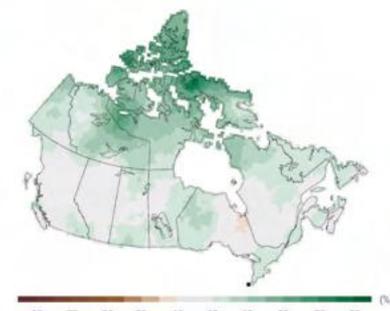
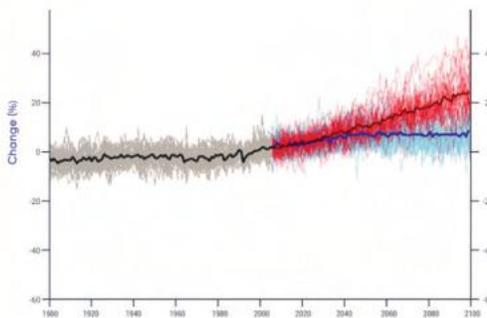
River Level Changes

Illustrations explaining water flow changes [left], with overall earlier and reduced snowmelt peaks resulting in both less snow cover during winter and more of a spring thaw (blue). As well, predicted sea level changes are demonstrated on a national scale [right].



Precipitation Changes

Diagrams illustrations depicting precipitation fluctuations due to climate change annually [left] considering the past, future high emission scenarios (red) and low emission scenarios (blue) as well as national predicted precipitation percentage changes [right].



Climate Vulnerability Index

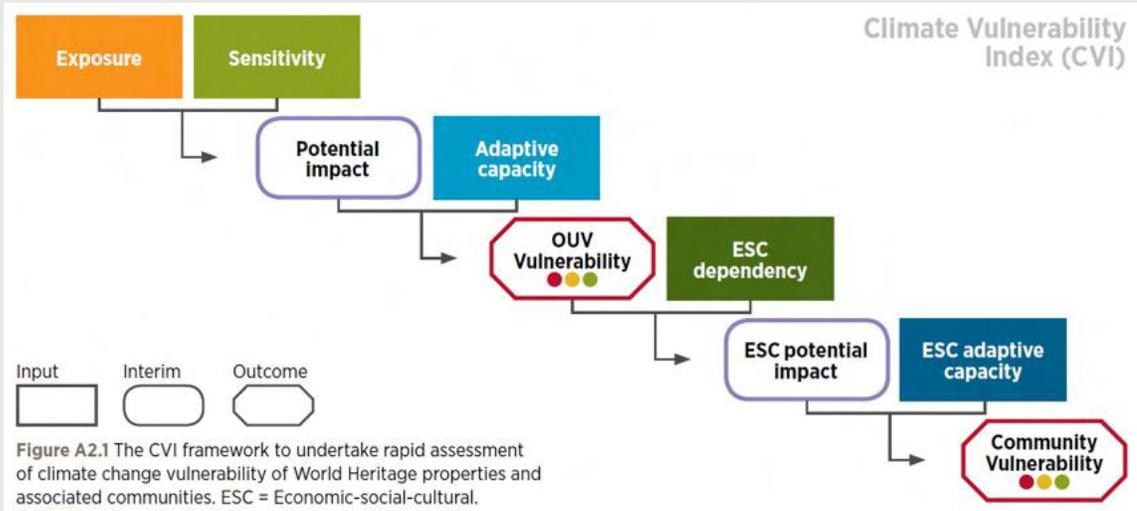


Table 10: Climate Vulnerability Index Framework
 Source: Day et al. 2019

Key Climate Drivers	Air Temperature Changes	Precipitation Changes	River Level Changes
Exposure Temporal Scale Trend	Very Likely On-going Moderate Increase	Very Likely On-going Moderate Increase	Likely On-going Moderate Increase
Exposure	Very Likely ○○○●	Very Likely ○○○●	Likely ○●○○
Sensitivity Spatial Scale Compounding Factors	Moderate Extensive High Probability	Moderate Localised-Extensive Medium Probability	Moderate Restricted-Localised Low Probability
Sensitivity	Very High ○○○●	High ○○○●	Low ●○○○
Potential Impact	Extreme ○○○●	Extreme ○○○●	Moderate ○●○○
Local Management Response Scientific/Technical Support Effectiveness	High Capacity High Level of Support Moderate Level of Effectiveness	High Capacity High Level of Support High Level of Effectiveness	Moderate Capacity High Level of Support Moderate Level of Effectiveness
Adaptive Capacity	High ○○○●	High ○○○●	Moderate ○●○○
Heritage Value (HV) Vulnerability	Moderate ○●○○	Moderate ○●○○	Low-Moderate ○●○○
Economic Social Cultural	Moderate - Negative High - Negative Low - Negative	Moderate - Negative High - Negative Low - Negative	Minimal - Negative Low - Negative Low - Negative
ESC Dependency	Moderate-Negative ○●○○[-]	Moderate-Negative ○●○○[-]	Low-Negative ●○○○[-]
ESC Potential Impact	Moderate ○●○○	Moderate ○●○○	Low ●○○○
Economic Social Cultural	High - Positive High - Positive Low - Positive	Moderate - Positive High - Positive Low - Positive	Moderate - Positive Moderate - Positive Minimal - Positive
ESC Adaptive Capacity	High-Positive ○○○●[+]	Moderate-Positive ○●○○[+]	Low-Positive ●○○○[+]
Community Vulnerability	Low-Moderate ○●○○	Moderate ○●○○	Moderate ○●○○
Combined HV Vulnerability	Moderate ○●○○	Moderate ○●○○	Moderate ○●○○

Table 12: Mapleawn Climate Vulnerability Index

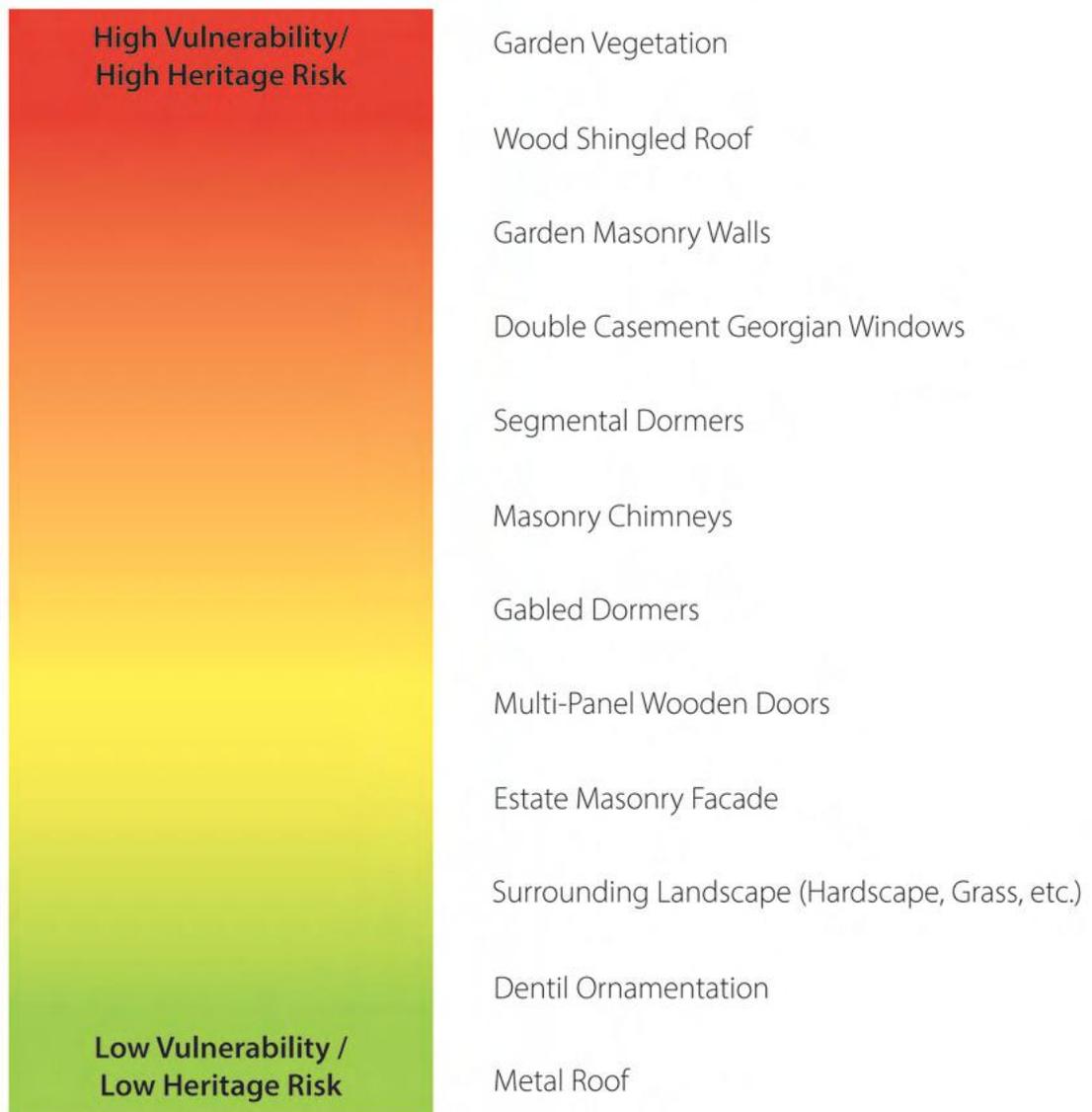
Climate Vulnerability Index

Climate Change Implications

As Climate Change progresses, the following local-scale implications will be come more apparent in quotidian life:

- More frequent freeze/thaw cycles during the winter months
- Increased risk of flooding
- An overall warming of air temperature resulting in possible fire risks
- Less and later snow cover during the winter season
- Higher and more severe precipitation
- Increased drought cycles

Hierarchical Ranking of Heritage Elements based on C.V.I.



Priorities for Implementation

Priorities for Implementation

Introduction

The priorities for implementation section of the report describes in detail each heritage element of Maplelawn Estate and Garden as well as its significance to the site. A visual assessment of its current condition as well as climate vulnerabilities will be identified. The architectural elements are elaborated upon from most vulnerable to climate and highest heritage vulnerability to least. Lastly, a maintenance plan and conservation policies will be outlined to best prevent further deterioration and/or make appropriate repairs to the items, as needed. It will be of particular importance to closely monitor the heritage elements that are more susceptible to climate change-related deterioration to ensure potential problems are prevented prior to them impacting the heritage significance to the site as a whole.

Garden Vegetation & Flowering Plants



Figure 23: A Photograph of Maplelawn Walled Garden Plantings during the Early Spring

Element Description

Arranged within the framework of the walled garden, flowering plants line the freestanding walls, central oval pathway, estate facades and the four symmetrical lawns of the garden. Bringing notions of serenity and paradise to the urban built environment,

the walled garden at Maplelawn is intrinsic to its heritage significance due to its rarity. Since its original planting, it has evolved from solely practical, with vegetables and

fruit trees, to an ornamental garden.

Significance to Site

- Former kitchen garden to provide vegetables to the estate
- Inclusion of relocated marker trees to commemorate key familial events (ie. marriage, building a house, having a child, etc.)³¹
- Became appealing to tourists and those that attended garden parties throughout history at Maplelawn
- An example of British planting styles as designed by landscape architect Oliver Warren³² and maintained by the volunteer group, 'Friends of Maplelawn Garden'

Condition

Currently, the garden has been maintained impeccably. Those that visit the site appear to stay on the designated paths. The plantings are well cared for and have stayed true to the design put in place during the mid 20th Century.

Climate Vulnerabilities

Plants require very specific growing conditions which will be harder to achieve due to predicted climate change for the region. Due to their exposure to natural elements, they will most likely be most effected by the severe weather patterns. Flooding due to increased amounts of precipitation and periods of drought-induced wildfires leave the ornamental garden vulnerable. In addition, less snow cover during the winter months will result in less insulation from the elements and in turn potentially cause issues later in the year when the plants bloom. The intent is to preserve the existing vegetation on the site by implementing protection measures to mitigate plant loss due to climate

³¹ von Baeyer, Edwinna. "Maplelawn 1817-1995 Landscape History". 22.

³² Ibid., 27.

change.

Maintenance Plan

- Ensure plants are adequately watered to compensate for prolonged drought-like conditions
- Clean growing beds and cut back dead plant stems once the winter months are over. By waiting to complete this clean up process it allows for the dead portions to protect the surviving plants to a greater degree.
- Garden plants and site vegetation should be preserved at all costs. Loss of mature greenery, due to any cause, will immediately stop the filtering of carbon dioxide from the air through photosynthesis and release the embodied carbon back into the atmosphere. Both outcomes of this scenario increase carbon emissions, accelerating climate change.



Figure 24: Mature Trees Cut-down to Facilitate Masonry Rehabilitation

Conservation Plan

- Once the ground freezes, apply 6 inches of organic materials to protect the roots and soil while insulating from extreme temperatures associated with frequent freeze/thaw cycles.³³
- Cedars and similar trees are to be wrapped in burlap fabric or netted fabric to prevent damage caused by extreme wind exposure. This encourages the branches to remain close to the trunk and prevents excessive bending forces on the branches from snow accumulation or ice.³⁴

Wood Shingled Roof

Element Description

³³ "How to Protect Perennials for the Winter". Better Homes and Gardens.

³⁴ "Winter Tree Care – Wrapping Cedars, Boxwoods, and Other Evergreens" Greenhouse to Garden.

The northwestern addition to the former estate residence features a weathered wooden shingle roof. The small rectangular shingles provide cohesiveness between the summer living areas and the main estate building's dormer walls. The wing covered by the shingles has been used as a service area for the duration of its history.



Figure 25: A View of the Wood Shingled Roof on the later Northern Addition

Significance to Site

- Location of the former summer living room and kitchen for the estate
- Became a connected wing to the main estate house during the 20th Century
- Features a “garden entrance” and service area, as requested by the owner³⁵

Condition

The wood shingles are in good condition. Water staining is apparent in some areas of the roof line leading a trail of dark grey visible along the dormers and chimneys' paths. Some shingles have begun to loosen and lift from weathering.

Climate Vulnerabilities

Wood shingles are particularly susceptible to large gusts of winds due to their size, shape and fastening method. Moreover, they are left exposed to the harsh element without any protection from other architectural elements. Due to the combination of both of these realities of this shingle type, they are particularly vulnerable to climate change weather predictions.

Maintenance Plan

³⁵ von Baeyer, Edwinna. “Maplelawn 1817-1995 Landscape History”. 25.

- Wooden shingles should be replaced as sections begin to fail to ensure continued protection to the masonry facades and to promote interior user comfort

- Should large portions of the wood shingle roof fail, it is worth considering replacing with a metal counterpart that matches or closely resembles that of the main estate building



Figure 26: A View of the Wood Shingled Roof on the later Northern Addition at Dusk

Conservation Plan

- Conduct a more thorough non-intrusive as well as an intrusive investigations to ensure infiltration has not occurred at the water staining locations. Close attention and care should be made to ensure there are not any issues where the two roof lines meet.

- The interior spaces below the roof should be inspected for signs of water damage, including but not limited to bubbles in the paint, staining or changes in surface texture



Figure 27: A View of the Wood Shingled Roof on the later Northern Addition at Dusk

Garden Masonry Walls

Element Description

A limestone and mortar freestanding masonry garden wall delineates the Maplelawn property from that of the built environment. Original to the site, the construction matches that of the estate house. Inspired by traditional British walled gardens, the architectural element is intrinsic to the estate's heritage designation and significance.

Significance to Site

- Provide protection to the plants from exposure to the elements and predators
- Surrounds the entire site creating a boundary from the neighbouring urban fabric
- Helps emphasize the grandeur of the former estate through traditional British design elements
- Acts as a physical barrier between Maplelawn and transportation on Richmond Road



Figure 28: A Photograph of the Full Structural Failure of a Portion of the Property Masonry Wall

Condition

The walled garden is not in the worst condition of the analyzed architectural elements at Maplelawn. Experiencing various levels of deterioration, including partial and complete structural failure in various locations, the walled garden requires significant maintenance to correct its current state of decay. Due to meteorological and physical forces acting upon the freestanding element, extensive and rapid interventions are required to prevent further damage to the walls and to prevent deterioration extending to the garden plantings.

Climate Vulnerabilities

The location of the garden walls leave it particularly susceptible to climate vulnerabilities due to exposure. Throughout history, the garden walls have inadvertently acted as a buffer between the estate and the surrounding urban fabric. During the 1970s, it was documented that numerous vehicles would hit and damage the stone walls when Richmond road doubled in width.³⁶ Since then, the wall has continued to experience issues relating to a potential collapse inwards towards the plants. These structural failures were likely never properly addressed and were instead quickly resolved with short-term solutions still plaguing the stability of the wall.

Figure 29: A Photograph of the Full Structural Failure of a Portion of the Property Masonry Wall



Maintenance Plan

- Remove incorrectly cured mortar from the masonry joints. It is distinguishable by its lighter colouring likely due to uncontrolled, accelerated, unprotected curing of the joints.
- Repointing (backpointing and frontpointing) of areas where the mortar has dissolved, due to precipitation exposure and infiltration, with appropriate lime-based mortar mix that does not compromise the structural integrity of the heritage limestone
- Partial or full dismantle and rebuild of portions of the garden wall where

³⁶ von Baeyer, Edwinna. "Maplelawn 1817-1995 Landscape History". 35.

structural failure is occurring. This will correct stone movement caused by prolonged ground heaving cycles during the winter months

Conservation Plan

- Create separation between the garden wall and Richmond road. It is predicted that the sideways forces exerted by the contemporary infrastructure are causing structural failure as the wall attempts to retain the built-up soil.
- Apply a clay-based poultice to pull the efflorescent and mineral staining from the surface of the masonry. Once applied, allow the mixture to dry and be allowed to fall off or be brushed off delicately. This procedure can be repeated until the desired amount of staining/colouration has been removed from the limestone face.



Figure 30-31: The Typical Deterioration Conditions visible on areas of the Masonry Garden Walls

Double Casement Georgian Windows **Element Description**

Symmetrically placed within five bays of the two storey former estate are double casement Georgian windows. The heritage manual hinges, wooden frames and 24 panes of glass of the window style further reinforce the classical nature of the architectural design. The woodwork has been previously painted in a coordinating colour of taupe to match surrounding the limestone facade.

Significance to Site

- Manifestation of inherent classicism of the Palladian architectural style due to a lack of ornamentation and enforced symmetry.
- Indication of the local influence of French Canadian building traditions on the Ottawa Valley regional vernacular architecture because of the atypical use of casement windows within the Georgian architectural style.³⁷

Condition

Overall, the casements windows appear to be in good condition. There is no obvious deterioration other than what would be expected given the elements age and exposure to the elements. A more thorough investigation would be required to determine if water infiltration is occurring at these openings to the building envelope. Moreover, the paint may be hiding potential issues in the woodwork. It should be determined if the paint has caused any issues to the operability of the windows themselves nor that they are causing interference to the manual hinge system.



Figure 32: A Close-up Photograph of the Georgian-style Windows

³⁷ "Maplelawn". Ontario Heritage Trust. 4.

Climate Vulnerabilities

As the major opening in the building envelope, failure at window locations can cause severe and rapid deterioration to the estate building. If the area is not properly sealed, user comfort can also easily be effected. Due to the nature of the architectural element, extreme weather patterns, specifically elevated precipitation levels can cause particular vulnerability.

Maintenance Plan

- Inspection of paint at regular intervals to ensure deterioration is caught early especially after extreme weather events.
- Ensure paint characteristics align with woodwork weather-related expansion and contraction. This will mitigate damage occurring to the frame and the panes of glass

Conservation Plan

- Utilize dutchman repairs with comparable wood species if areas of the frame require rebuilding or replacement as opposed to complete replacement of the window. Repair should always be favoured over replacement.³⁸



Figure 33: A Series of Georgian Windows within Bays of the Front Facade of the Estate House

³⁸

"Windows, Shutters and Doors". Practical Conservation Guide for Heritage Properties

Segmental Dormers

Element Description

The segmental dormers, distinguishable by their arched roof, are located along the second floor of the new wing addition to the main estate building. Although they improve the user comfort of the space by enabling daylight to enter the upper storey interior spaces, the design is not very fitting of the architectural style of the remainder of the property instead referencing the later neoclassical period. Fitted with 20-pane double casement Georgian windows, the dormers do not possess the same quality of craftsmanship nor symmetry as the original estate.

Significance to Site

- Increase the natural daylight entering the upper level of the new wing addition
- Appear to be manually operable allowing for cross ventilation within the building when opened.

Figure 34: A Series of Segmental Dormers on the Estate House Addition



Condition

The dormers appear to be in good condition considering they are that much newer and have been exposed to the elements for less time. It can be hypothesized that there is issues relating to user comfort. On three out the four northeastern windows there is a single pane fixed storm window to mitigate water or wind infiltration.

Climate Vulnerabilities

Due to their location above the roof line, dormers are particularly vulnerable to the elements. Increased precipitation and winds are predicted climate vulnerabilities for the architectural elements. Ranked just above the midpoint for climate vulnerability, the dormers are susceptible to changing climate but are of less heritage significance than the remainder of the National Historic Site of Canada.

Maintenance Plan

- Conduct a more invasion investigation to determine the root cause of the addition of the exterior storm windows to the dormer
- Replace the storm windows with replica 20-pane double casement Georgian-style windows to match the other segmental dormers

Conservation Plan

- Visually inspect the roof shingles of the dormer to identify any potential water infiltration where the dormer joins the roof line.

Masonry Chimneys **Element Description**

Brick and mortar two end chimneys sit atop the original portion of the rectangular estate building. Three bands of brick provide minor, simplistic ornamentation to the silhouette of the architectural elements. They visually balance the front facade of the building and offset the galvanized hipped roof.



Figure 35: The Masonry Chimney on the Estate House with an Auxiliary Garden Building in the Foreground

Significance to Site

- Reinforce symmetry of the Georgian Estate
- Demonstrate “fine craftsmanship and surviving original detailing drawn from classical traditions”³⁹

Condition

Conducting visual inspections from grade, the chimneys seem to be in very good condition. The galvanized metal caps are functioning properly to aid with water shedding from the masonry below. In addition, the bricks and mortar are in good condition and are presenting with minor deterioration.

Climate Vulnerabilities

The largely unprotected nature of chimneys increase their probably vulnerability to changing climate due to exposure. Similarly, the end chimneys are susceptible to precipitation runoff from the hipped roof. Increased levels of precipitation throughout the year and more frequent freeze/thaw cycles will be detrimental to the condition of the chimneys.

³⁹ “Maplelawn & Gardens National Historic Site of Canada”. Parks Canada Directory of Federal Heritage Designations

Maintenance Plan

- Conduct a more thorough investigation of the architectural element through the use of ladders, scaffolding or boom lifts to ensure that no deterioration is missed from grade.

Conservation Plan

- If mortar is beginning to fail, the joints should be cleaned and repointed with comparable strength heritage mix mortar.
- If bulges are noticed, portions or entire dismantling and rebuilding of the effected chimney is recommended to prevent structural failure that could cause a safety risk to tourists visiting the site (ie. a stone falls).



Figure 36 (LEFT): View of the Eastern Masonry Chimney on the Estate House from the East Facade

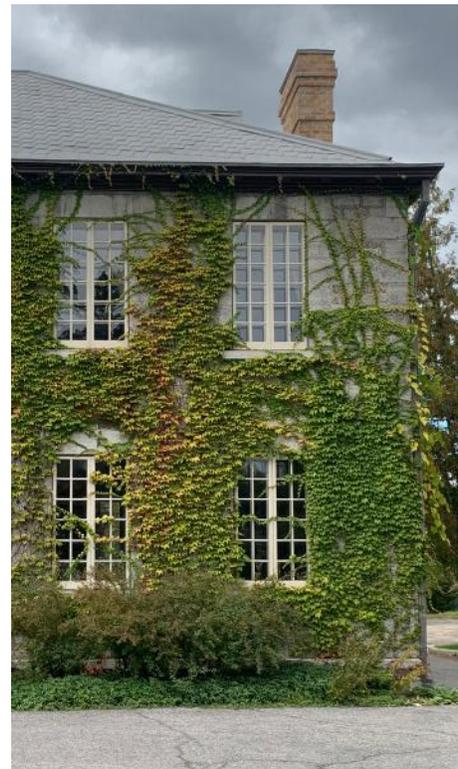


Figure 37 (RIGHT): View of the Eastern Masonry Chimney on the Estate House from the Front Facade

Gabled Dormers

Element Description

The gabled dormers are located on the north roof line of the estate house and are original to the architectural design. Their main purpose is to provide daylighting to the attic space of the main portion of the building. Created with high degrees of care and craftsmanship, the dormers further reinforce the symmetry of the front facade. Each dormer features a 16-pane double casement Georgian window with manual hinges. Moreover, the gabled roofs match the original hipped roof line to provide cohesion within the design and materiality.



Figure 38: Gabled Dormers Along the Roof of the Estate's North Elevation

Significance to Site

- Provide daylighting to the attic space of the former estate
- Allows for natural ventilation when opened
- The exterior architectural features solidify the British classical tradition of the site.

Condition

The condition of the gabled dormers are excellent when visually inspected from grade. There appears to be very little deterioration to the cheek walls and roof of the dormers, with the exception of a missing casement storm window on the east dormer closest to the garden. It is encouraging to see the limited decay to the materials due to the age of the heritage element and its prolonged exposure to the elements throughout its history.

Climate Vulnerabilities

Dormers usually are very vulnerable to changing climate because they act as a first line of defense to protect the building envelope. Since the gabled roof has been replaced with galvanized metal, its susceptibility to extreme weather-related failure has significantly reduced. The shingled cheek walls supporting the gabled roof are also in excellent condition.

Maintenance Plan

- Continue to monitor the dormers to notice deterioration in the preliminary stages to retain heritage value and user comfort
- Confirm that the dormers are properly sealed at their connection to the hipped roof line. This joint is typically vulnerable to premature failure
- Due to the many components of the dormer (ie, windows, cheek-walls, roof) it is essential to ensure that building envelope openings are functioning properly because they are the locations most likely to cause issues.

Conservation Plan

- Conduct a more thorough investigation to ensure water and wind are not infiltrating the building envelope, especially after extreme weather events
- Should elements begin to fail, they are to be corrected following the most minimal, least invasive methodology first, with a material with characteristics that closely match the original heritage one.

Multi-panel Wooden Doors **Element Description**

The multi-panel wooden doors provide entry to the estate building. All implemented at various times, they denote changes of evolutionary style within the academic Palladian style of Maplelawn. The owner-requested garden door on the north facade has a six-pane glazing situated above three debossed panels. Its location hints at the possibility of it being used to obscure the connection of the original estate building to the newer addition. The former main entrance, left unused by the current tenants, is centrally located in the middle bay of the south facade, flanked by fanlights and sidelights, directly below the third Georgian window.

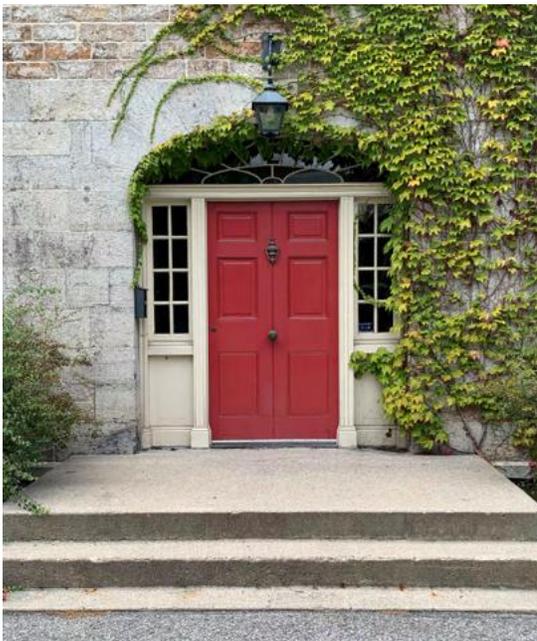


Figure 39: A Zoomed-in Photograph of the Wooden Front Door with Side Lights

Significance to Site

- Reinforces the symmetrical architectural design of the Estate
- Demonstrate the craftsmanship and attention to detail of the workers during the early 19th and 20th Centuries.
- Garden entrance solidifies the intrinsic nature of the walled garden to the residential building

Condition

The condition of all the multi-paneled wooden doors are excellent given their age and exposure to changing climates over the past sesquicentennial. This is very promising given the excessive amounts of salt laid down by the National Capital Commission to ensure the safety of tourists visiting the walled garden and restaurant. Lastly, it is apparent that the doors are routinely painted, which would inadvertently provide more protection to the door surface.

Climate Vulnerabilities

The multi-panel wooden doors are moderately vulnerable to predicted climate drivers for the region. Being situated slightly within the depth of the masonry facades, the woodwork is granted some protection from the environment. With this in mind, strong winds may cause water infiltration to these openings in the building envelope.

Figure 40: A Zoomed-in Photograph of the Owner-Requested Addition of a Garden Entrance



Maintenance Plan

- Perform more invasion investigations to ensure the paint is not hiding deterioration of the woodwork
- At regular intervals, fully remove the exterior paint from the door to ensure the material is allowed to continue expanding and contracting in response to extreme weather conditions. The use of a heat gun and manual scraping will best preserve the craftsmanship of the doors and maintain the characteristics of the wood while still removing the paint. This is essential because as the paint layer becomes thicker and thicker, the material becomes limited in how it can react over time to changing conditions.

Conservation Plan

- If chipping at the bottom of the doors occur, attach compatible wood dutchman repairs to the door section to limit future damage
- If minor repairs are needed, a mixture of wood filler and compatible wood sawdust may be mixed into a putty to fill minor blemishes in the wood. Once cured, the putty would be sanded smooth and painted to match the remainder of the door.

Estate Masonry Facade **Element Description**

Locally-sourced limestone and mortar create the load-bearing exterior masonry facade. Organized in a brick-like overlapping pattern, the rectangular shaped former estate building matches the walled garden to emphasize the visual language of British architectural design. Key structural elements present in the stone laying help ensure its longevity by facilitating the transference of exerted forces. This is particularly apparent by the stone ledger below the double casement Georgian windows and the use of quoin stones along the entire 2 1/2 storey building.

Significance to Site

- Demonstrate prevalence and quality of locally-sourced materials
- Directly references the British architectural style transplanted into Canada
- Creates cohesiveness between the residence and the walled garden through the use of the same material language.



Figure 41: A Three-quarter View of the Front and Eastern Facades of the Former Estate

Condition

The condition of the masonry facade is excellent. Although no longer looking as pristine as it once did, the stones now showcase a beautiful cortification, a patina for masonry. It is a naturally occurring instance for masonry which adds dimension to architectural design by visually enriching the surface of the material through the oxidation of atmospheric compounds. Although possible to be removed with laser cleaning, it is recommended to not try to correct the natural aging of the material. Instead, its presence visually celebrates the history of the residence. It should be noted that there is some minor overall deterioration and bio-deterioration occurring to the masonry surface. Presently, this is not of particular concern as long as water is not infiltrating.

Climate Vulnerabilities

Due to the nature of load-bearing free-standing masonry facades, it can become vulnerable to changing climate, particularly by precipitation and wind. Because masonry is only as strong as its sacrificial mortar, once it is removed, likely from prolonged precipitation, can cause rapid and complete deterioration. This repeated exposure to rain storms greatly increases the chances of water infiltration into the building envelope. In a similar way, rising river levels and flooding also pose the risk of removing mortar from the stone wall. Lastly, cycles of freezing and thawing can cause the masonry to heave as a reaction to changing soil conditions. If a worst case scenario, repeated soil upheaval can cause structural failure of masonry buildings.

Maintenance Plan

- Correct instances of severe bio-deterioration by removing vines from the facade

Conservation Plan

- Larger deterioration with the masonry faces can be corrected through the placement of stone dutchman repairs of a comparable material
- If the cortification layer becomes too thick and the masonry can no longer breathe, laser cleaning can be conducted on the masonry surface to return its native characteristics.
- If it is desired to remove mineralization/efflorescence, a clay based poultice will remove mineral staining-related discolouration.
- The masonry joints should be routinely repointed with similar lime-based mortar, as needed, to facilitate the breathability of the building envelope and to prevent drastic deterioration



Figure 42: A Three-quarter View of the Front and Eastern Facades of the Former Estate During the Late Fall



Figure 43: The Front Facade of the Estate at Dusk during Early Spring

Surrounding Landscape

Element Description

The surrounding landscape includes the green space and entry of the site, excluding the walled garden. The surrounding landscape is composed of a grass lawn, a round-about-style front driveway and a central oval planting box. Although largely original, except for slight alterations when the outbuildings were demolished, the landscape's use of common vegetation causes the elements to have less heritage significance.

Significance to Site

- "Naturalistic plantings with the central organizing element as a symmetrical oval driveway connecting the house to the street, approached through paired entrance piers and framing plantings"⁴⁰ support the British classical architectural style
- A "strict adherence to symmetry and regularity in design."⁴¹



Figure 44: The Front Facade of the Estate during Fall Covered in Climbing Vegetation

⁴⁰ "Maplelawn & Gardens National Historic Site of Canada". Parks Canada Directory of Federal Heritage Designations

⁴¹ "Maplelawn" FHBRO. 214.

Condition

The condition of the surrounding landscaping is fine. The grass and entry driveway appear to be well maintained at regular intervals.

Although the architectural element does not possess the same rarity as the walled garden, it is essential in preserving the visual integrity of the heritage site as a whole.



Figure 45: Surrounding Landscaping Growing Along the Exterior of the Garden Wall

Climate Vulnerabilities

Although they exhibit the same vulnerabilities to changing climate as the walled garden, its vernacular design provides a lower heritage designation. Due to this, the elements is more easily replaced should extreme deterioration occur and is given a lower priority for heritage vulnerability.

Maintenance Plan

- Continue regular maintenance for the surrounding landscape to retain the heritage characteristics of the National History Site of Canada

Conservation Plan

- Should chemicals (ie. insecticides, biocides, etc) need to be applied to the landscaping, care must be taken to make sure that it will not cause detrimental harm to the garden plantings nor the built heritage fabric

Dentil Ornamentation

Element Description

The dentil is a form of wooden blocked trim located in the bed mould of a cornice,⁴² below the overhang of the hipped roof. Historically, a dentil was named after the blocks resemblance to teeth. It is a considered a classical, simplistic ornamentation.

Significance to Site

- A simple and symmetrical type of ornamentation for the exterior of the vernacular estate
- Was a common occurrence in later architectural styles, including the neoclassical style which is also echoed in the Georgian Windows.



Figure 46: Dentil Ornamentation Situated Below the Roofline of the Former Estate

Condition

The dentil ornamentation is complete and in very good condition. The only deterioration remarked during the visual inspection was some minor peeling of the paint.

⁴² "Glossary--Dentil". Woodworking History.

Climate Vulnerabilities

In much the same way as other woodwork, exposure to precipitation and extreme winds can cause deterioration to the ornamentation. In spite of this, the protection provided by its location below the hipped overhang greatly reduces its vulnerability to changing climates.

Maintenance Plan

- Regular stripping of paint on the dentil to ensure the woodwork maintains its adaptability characteristics.

Conservation Plan

- Should a dentil block be damaged or broken off due to climate triggers, a dutchman repair with comparable wood is required



Figure 47: Dentil Ornamentation Situated Below the Roofline of the Former Estate along the Front Facade

Galvanized Metal Roof **Element Description**

An embossed galvanized metal roof covers the original portion of the residence at Maplelawn. This was likely a later alteration to replace the original weathered wood shingles. The metal has been coated in a neutral grey tone that complements the colour variations in the locally sourced limestone.



Figure 48: A Portion of Galvanized Metal Roof on the Southern Facade of the Estate House

Significance to Site

- Hipped roof shape reinforces the symmetrical British Georgian architectural style, devoid of ornamentation.
- Creates a cohesive design with the twin brick chimney caps.
- Intertwining of technology and tradition through the recreation of a heritage visual pattern in a lighter, more durable material.

Condition

The galvanized metal roof is in excellent condition. No deterioration was noted during the visual assessment of the site.

Climate Vulnerabilities

Galvanized metal roofs are incredibly durable and can withstand various types of extreme weather conditions. It is currently predicted that it will present negligible vulnerability towards worsening climate conditions in the future.

Maintenance Plan

- Monitor the roofing material for early signs of deterioration
- Galvanized metal roofs are very good preventing excessive snow loads because the material promotes the breaking up of snow loads before they can accumulate. Due to this, it is essential that user and tourism safety be prioritized. Areas of significant snow fall should be identified and temporarily blocked off to mitigate potential injuries

Conservation Plan

- Be prepared to replace the roof once it has reached the end of its lifespan



Figure 49: The Front Facade of the Estate with Galvanized Metal Roof Visible

Conclusion



Conclusion

Visual investigations in tandem with academic research revealed insights to the tangible and cultural heritage significance of Maplelawn Estate and Walled Garden. The rarity of the exterior landscaping, specifically the intact walled garden, and its lack of major alterations throughout its history solidified the site's designation as requiring protection at national and regional scales. Since its construction in 1834, Maplelawn has been a key example of the British Georgian architectural style transplanted into North American colonies. As emphasized by the Federal Heritage Buildings Review Office, "Maplelawn represents the tradition [of academic Palladian design] reduced to its simplest form"⁴³ due to the rectangular plan of the residence that is devoid of ornamentation. In addition, the close proximity and integration between the former estate and the walled garden demonstrate the intrinsic nature of intent between the architectural elements and the holistic use of the site.

At the same time, visual assessments revealed that the property is experiencing varying degrees of deterioration. This already present decay will cause the architectural elements to be more vulnerable to climate change predictions for the region. Further intensive explorations of both the interior and exterior of Maplelawn with the use of ladders in addition to other documentation techniques are required to definitely determine the level of deterioration. Due to current limitations of site access related to weather conditions and sanctions put in place by a global pandemic, it is recommended that the next assessment be conducted during the summer. This will ensure there are no environmental factors obscuring the exterior face of the exterior doors from having their condition assessed. For a building of this heritage significance, it is

⁴³ "Maplelawn" FHBRO. 213-214.

recommended to consider seasonal cycles of maintenance. This will ensure that all deterioration is observed without being concealed by various vegetation. In addition, by getting in the habit of routinely monitoring the site, the progress of deterioration can be noted, due to external and internal stressors, and a holistic baseline for the property can be established.

Through the implementation of priorities identified within this management plan, Maplelawn will lessen its vulnerability to changing climates. By increasing its resiliency to external factors, the heritage significance of the former estate is protected for future generations to enjoy. By completing regular maintenance and integrating appropriate interventions to correct deterioration into its management plan, Maplelawn will survive climate change.

Although Maplelawn Estate and Walled Garden is a former residence, it is recommended that it does not become a historic house museum. Contrary to historic traditionalists, the built environment remains viable through continued use. Although an important source of local history, Maplelawn's past is also politically charged. Although outside of the scope of this thesis, an estate house built in the British architectural style in a country that was a former colony of the monarch, is deeply rooted in colonialism. It is an important history to acknowledge, but this report is focused on extending the future of the site based on accessibility and inclusion to all. In agreement with Dr. Gretchen Sullivan Sorin, professor of the Cooperstown Graduate Program of Museum Studies, "museums cannot remain stagnant as visitors, technologies, interests, and the world around us change."⁴⁴ By not being converted into a house museum, Maplelawn can retain its vital role within the community and be returned to the public.

44 Sorin, Gretchen Sullivan. *The Anarchist's Guide to Historic House Museums*. 13.

This report is based on the methodology of minimal continuous maintenance. The concept of continuous maintenance revolves around the idea that by implementing regular, ongoing maintenance, catastrophic failure can be entirely prevented. Falling between the usual binary of reactionary maintenance -- what has happened to the built fabric -- and predictive maintenance -- what could happen to the heritage structure --, this method analyzes what is happening to the site in real time. This technique and monitoring schedule is beneficial to heritage projects in multiple facets. To begin, it is better economically. Small amounts of money can be allocated routinely as opposed to large sums of finances forced to be used for a major corrective rehabilitation project. Moreover, this technique benefits the heritage site itself. By completing minimal maintenance, the building remains accessible and usable to patrons and tourists year round. Also, it ensures that corrections are made gradually, preventing the other building materials from reacting badly due to drastic implementations of new materials. Lastly, minimal continual maintenance promotes the retention of highly specific skill sets within the profession. The rehabilitation of heritage fabric requires workers to possess a traditional hands-on knowledge of materiality that was previously passed down from generation to generation. Much like any other skill, if it is not practiced, it disappears. If maintenance on heritage buildings is deferred for extended periods of time, eventually there will be no craftspeople left with this knowledge.



Concluding Page: A Photograph of Maplelawn during the Winter Months

Appendix



Appendix

Glossary

CMP: Conservation Management Plan

CVI: Climate Vulnerability Index. A tool for assessing vulnerability to key climate change drivers.

Dormer Cheek Walls: Small walls that emerge from the main roof line on a building to create a dormer.

FHBRO: Federal Heritage Buildings Review Office

GHG: Greenhouse Gas

HSMBC: Historic Sites and Monuments Board of Canada

ICOMOS: International Council on Monuments and Sites

NCC: National Capital Commission

NHS: National Historic Site

PSPC/ PWGSC: Public Services and Procurement Canada, formerly Public Works and Government Services Canada

Figures, Tables and Authorship

Figures

Title Page: A Fall Photograph of the Front Facade of Maplelawn Estate

05.OCT.2021
Danielle Myronyk
Carleton University

Preliminary Page: The Owner Requested Garden Entrance to the Residence

05.OCT.2021
Danielle Myronyk
Carleton University

Figure 1: An Aerial View of the Site denoting Maplelawn's Location within Ontario

01.MAR.2022
Danielle Myronyk
Carleton University

Figure 2: An Aerial View of the Site denoting Maplelawn's Location within the Ottawa Region

01.MAR.2022
Danielle Myronyk
Carleton University

Figure 3: An Aerial View of the Site denoting Maplelawn's Property

01.MAR.2022
Danielle Myronyk
Carleton University

Figure 4: Historical Atlas of Carleton County

1879
--
Belden Publishing Company

Figure 5: A Historic Photograph of the Front Facade of Maplelawn.

1980
--
Parks Canada Agency

Figures, Tables and Authorship

Figure 6: A Visual Assessment of Maplelawn Estate Building with Deterioration Callouts

07.DEC.2021
Danielle Myronyk
Carleton University

Figure 7: A Visual Assessment of Maplelawn Estate Building with Deterioration Callouts (cont.)

27.NOV.2021 and 07.DEC.2021
Danielle Myronyk
Carleton University

Figure 8: A Visual Assessment of Maplelawn Estate Building with Deterioration Callouts (cont.)

07.DEC.2021
Danielle Myronyk
Carleton University

Figure 9: A Visual Assessment of Maplelawn Estate Building with Deterioration Callouts (cont.)

07.DEC.2021
Danielle Myronyk
Carleton University

Figure 10: A Visual Assessment of Maplelawn Historic Walled Garden with Deterioration Callouts

07.DEC.2021 and 16.APR.2022
Danielle Myronyk
Carleton University

Figure 11: A Visual Assessment of Maplelawn Historic Walled Garden with Deterioration Callouts (cont.)

07.DEC.2021
Danielle Myronyk
Carleton University

Figures, Tables and Authorship

Figure 12: A Visual Assessment of Maplelawn Historic Walled Garden with Deterioration Callouts (cont.)

27.NOV.2021 and 07.DEC.2021
Danielle Myronyk
Carleton University

Figure 13: A Visual Assessment of Maplelawn Historic Walled Garden with Deterioration Callouts (cont.)

07.DEC.2021
Danielle Myronyk
Carleton University

Figure 14: Maplelawn Estate during Winter, 2022

07.DEC.2021
Danielle Myronyk
Carleton University

Figure 15: Matheson House Case Study

Unknown Date
Various Authorship (as specified on figure)
Danielle Myronyk (Representational Authorship)
Carleton University

Figure 16: John Losee House Case Study

Unknown Date
Various Authorship (as specified on figure)
Danielle Myronyk (Representational Authorship)
Carleton University

Figure 17: Macdonell-Williamson House Case Study

Unknown Date
Various Authorship (as specified on figure)
Danielle Myronyk (Representational Authorship)
Carleton University

Figures, Tables and Authorship

Figure 18: Lotten-Cawthra Estate Case Study

Unknown Date
Various Authorship (as specified on figure)
Danielle Myronyk (Representational Authorship)
Carleton University

Figure 19: Reford Garden Case Study

Unknown Date
Various Authorship (as specified on figure)
Danielle Myronyk (Representational Authorship)
Carleton University

Figure 20: Ermatinger Clergue Case Study

Unknown Date
Various Authorship (as specified on figure)
Danielle Myronyk (Representational Authorship)
Carleton University

Figure 21: Archival Photograph of the Unaltered Maplelawn Entrance

1914
--
Ottawa City Archives

Figure 22: Maplelawn and Garden Aerial View

2009
--
Parks Canada Agency

Figure 23: A Photograph of Maplelawn Walled Garden Plantings during the Early Spring

16.APR.2022
Danielle Myronyk
Carleton University

Figure 24: Mature Trees Cut-down to Facilitate Masonry Rehabilitation

16.APR.2022
Danielle Myronyk
Carleton University

Figures, Tables and Authorship

Figure 25: A View of the Wood Shingled Roof on the later Northern Addition

27.NOV.2021
Danielle Myronyk
Carleton University

Figure 26: A View of the Wood Shingled Roof on the later Northern Addition at Dusk

16.APR.2022
Danielle Myronyk
Carleton University

Figure 27: The Wood Shingled Roof of the Former Estate Addition during Winter

07.DEC.2021
Danielle Myronyk
Carleton University

Figure 28: A Photograph of the Full Structural Failure of a Portion of the Property Masonry Wall

16.APR.2022
Danielle Myronyk
Carleton University

Figure 29: A Photograph of the Partial Structural Failure of a Portion of the Property Masonry Wall

16.APR.2022
Danielle Myronyk
Carleton University

Figure 30-31: The Typical Deterioration Conditions visible on areas of the Masonry Garden Walls

16.APR.2022
Danielle Myronyk
Carleton University

Figure 32: A Close-up Photograph of the Georgian-style Windows

27.NOV.2021
Danielle Myronyk
Carleton University

Figures, Tables and Authorship

Figure 33: A Series of Georgian Windows within Bays of the Front Facade of the Estate House

27.NOV.2021
Danielle Myronyk
Carleton University

Figure 34: A Series of Segmental Dormers on the Estate House Addition

07.DEC.2021
Danielle Myronyk
Carleton University

Figure 35: The Masonry Chimney on the Estate House with an Auxiliary Garden Building in the Foreground

07.DEC.2021
Danielle Myronyk
Carleton University

Figure 36: View of the Eastern Masonry Chimney on the Estate House from the East Facade

27.NOV.2021
Danielle Myronyk
Carleton University

Figure 37: View of the Eastern Masonry Chimney on the Estate House from the Front Facade

27.NOV.2021
Danielle Myronyk
Carleton University

Figure 38: Gabled Dormers Along the Roof of the Estate's North Elevation

07.DEC.2021
Danielle Myronyk
Carleton University

Figure 39: A Zoomed-in Photograph of the Wooden Front Door with Side Lights

27.NOV.2021
Danielle Myronyk
Carleton University

Figures, Tables and Authorship

Figure 40: A Zoomed-in Photograph of the Owner-Requested Addition of a Garden Entrance

07.DEC.2021
Danielle Myronyk
Carleton University

Figure 41: A Three-quarter View of the Front and Eastern Facades of the Former Estate

07.DEC.2021
Danielle Myronyk
Carleton University

Figure 42: A Three-quarter View of the Front and Eastern Facades of the Former Estate During the Late Fall

27.NOV.2021
Danielle Myronyk
Carleton University

Figure 43: The Front Facade of the Estate at Dusk during Early Spring

16.APR.2022
Danielle Myronyk
Carleton University

Figure 44: The Front Facade of the Estate during Fall Covered in Climbing Vegetation

27.NOV.2021
Danielle Myronyk
Carleton University

Figure 45: Surrounding Landscaping Growing Along the Exterior of the Garden Wall

27.NOV.2021
Danielle Myronyk
Carleton University

Figure 46: Dentil Ornamentation Situated Below the Roof Line of the Former Estate

27.NOV.2021
Danielle Myronyk
Carleton University

Figures, Tables and Authorship

Figure 47: Dentil Ornamentation Situated Below the Roof Line of the Former Estate along the Front Facade

27.NOV.2021
Danielle Myronyk
Carleton University

Figure 48: A Portion of Galvanized Metal Roof on the Southern Facade of the Estate House

27.NOV.2021
Danielle Myronyk
Carleton University

Figure 49: The Front Facade of the Estate with Galvanized Metal Roof Visible

16.APR.2022
Danielle Myronyk
Carleton University

Concluding Page: A Photograph of Maplawn during the Winter Months

07.DEC.2021
Danielle Myronyk
Carleton University

Figures, Tables and Authorship

Tables

Table 1: The Conservation Planning Process outlined within the Burra Charter

2013
Australia ICOMOS

Table 2: Global Climate Change Policy

ICOMOS and United Nations (Information Authorship)
Danielle Myronyk (Representation Authorship)

Table 3: Local Climate Change Policy

Various; as specified (Information Authorship)
Danielle Myronyk (Representation Authorship)

Table 4: Provincial Climate Change Policy

ACO and Federal Gov. (Information Authorship)
Danielle Myronyk (Representation Authorship)

Table 5: International Climate Change Policy

ICOMOS and UNESCO (Information Authorship)
Danielle Myronyk (Representation Authorship)

Table 6: Provincial Architectural Climate Change Policy

OAA, Canada Green Building Council, and Ministry of the Environment,
Conservation and Parks (Informational Authorship)
Danielle Myronyk (Representation Authorship)

Table 7: Historical Chronology of Maplelawn Estate and Garden

Heritage Ottawa (Information Authorship)
Danielle Myronyk (Representation Authorship)

Table 8: Natural Risk Assessment with Mitigation Strategies

Danielle Myronyk
Carleton University

Figures, Tables and Authorship

Table 9: Anthropogenic Risk Assessment with Mitigation Strategies

Danielle Myronyk
Carleton University

Table 10: CVI Maplelawn Heritage Statement

2019
FHBRO Report
Day et al, (Chart Graphic)

Table 11: CVI Climate Change Predictions

2019
Government of Canada

Table 12: Climate Vulnerability Index

Danielle Myronyk
Carleton University

Table 13: CVI Climate Change Implications

Danielle Myronyk
Carleton University

Works Cited

- "About ACO." Architectural Conservancy Ontario. Accessed March 29, 2022. https://www.acontario.ca/about_aco.php.
- "Addressing Climate Change." UNESCO. Accessed January 16, 2022. <https://en.unesco.org/themes/addressing-climate-change>.
- Avrami, Erica, Susan MacDonald, Randall Mason, and David Myers. *Values in Heritage Management: Emerging Approaches and Research Directions*. Los Angeles: The Getty Conservation Institute, 2019.
- Baer, N. S., and R. Snethlage, eds. *Saving Our Architectural Heritage: The Conservation of Historic Stone Structures*. New York: John Wiley & Sons, 1997.
- "Building Solutions to Climate Change." Canada Green Building Council. Accessed March 29, 2022. https://www.cagbc.org/CAGBC/Advocacy/Building_Solutions_to_Climate_Change.aspx.
- Burke, Burke, Somerville Somerville, Ostergren Ostergren, Laura Matarese, and McCoy McCoy. *Eames House Conservation Management Plan*. Los Angeles: The Getty Conservation Institute, 2018.
- Cappitelli, Francesca, Cristina Cattò, and Federica Villa. "The Control of Cultural Heritage Microbial Deterioration." *Microorganisms*. MDPI, October 7, 2020. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7600914/>.
- "Climate Change Evidence: How Do We Know?" The National Aeronautics and Space Administration. United States Federal Government. Accessed January 16, 2022. <https://climate.nasa.gov/evidence/#:~:text=In%201938%2C%20Guy%20Callendar%20connected,of%20Climate%20Change%20in%201956>.
- "COP26." Climate Heritage Network, January 21, 2022. <https://climateheritage.org/>. "Eames House Conservation Management Plan Overview". The Getty Conservation Institute. 2018.
- Friends of Maplelawn Garden. Maplelawn Historic Garden. National Capital Commission. Accessed March 29, 2022. <https://www.maplelawn.ca/>.
- Gates, Bill. *How to Avoid a Climate Disaster: the Solutions We Have and the Breakthroughs We Need*. London: Allen Lane, 2021.

- "Glossary - Dentil." Woodworking History. Accessed March 29, 2022.
http://www.woodworkinghistory.com/glossary_dentil.htm.
- Government of Canada. "Canada's 2021 Nationally Determined Contribution Under the Paris Agreement." United Nations Framework Convention on Climate Change. Accessed March 29, 2022.
https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Canada%20First/Canada's%20Enhanced%20NDC%20Submission1_FINAL%20EN.pdf.
- Government of Ontario. "A Made-in-Ontario Environment Plan." ontario.ca. Accessed March 29, 2022. <https://www.ontario.ca/page/made-in-ontario-environment-plan>.
- Gretchen S. Sorin with Vagnone, Franklin D., Olivia B. Cothren, and Deborah E. Ryan. *Anarchist's Guide to Historic House Museums*. London: Routledge, 2016.
- Grimmer, Anne E. Tech. *A Glossary of Historic Masonry Deterioration Problems and Preservation Treatments*. Department of the Interior National Park Service Preservation Assistance Division, 1984.
- Heritage Lottery Fund. "Conservation Management Plans: A Guide." ICOMOS. Accessed March 29, 2022.
http://ip51.icomos.org/~fleblanc/documents/management/doc_ConsevationManagementPlans-Guide.pdf.
- "How to Protect Perennials for the Winter." WD. Better Homes and Gardens, October 22, 2020. <https://wd40.ca/seasonal-uses/how-to-protect-perennials-for-winter/>.
- ICCROM, ICOMOS, IUCN, and UNESCO World Heritage Centre. Tech. *Managing Disaster Risks for World Heritage*. United Nations Educational, Scientific and Cultural Organization, 2010.
- James Cook University. "Climate Vulnerability Index." Climate Vulnerability Index (CVI). Accessed March 29, 2022. <https://cvi-heritage.org/>.
- Jones, Danielle. "Maplelawn House and Garden." Heritage Ottawa. Ontario 150, March 27, 2020. <https://heritageottawa.org/50years/maplelawn>.
- Lucile, Smirnov. "ICOMOS Work on Climate Change." ICOMOS - International Council on Monuments and Sites. Accessed January 16, 2022.
<https://www.icomos.org/en/focus/climate-change/60669-icomos-work-on-climate-change>.

- "Maplelawn & Gardens National Historic Site of Canada." Directory of Federal Heritage Designations. Parks Canada. Accessed March 29, 2022. https://www.pc.gc.ca/apps/dfhd/page_nhs_eng.aspx?id=465.
- "Maplelawn - Ottawa, Ontario." Ontario Heritage Trust. Government of Ontario. Accessed March 29, 2022. https://www.waymarking.com/waymarks/WM14139_Maplelawn_Ottawa_Ontario.
- "Maplelawn." Canada's Historic Places. Parks Canada. Accessed January 16, 2022. <https://www.historicplaces.ca/en/rep-reg/place-lieu.aspx?id=15836&pid=0>.
- "Maplelawn." Directory of Federal Heritage Designations. Parks Canada. Accessed March 29, 2022. https://www.pc.gc.ca/apps/dfhd/page_fhbros_eng.aspx?id=2356.
- Merlino, Kathryn Rogers. *Building Reuse: Sustainability, Preservation, and the Value of Design*. Seattle: University of Washington Press, 2018.
- Pajot, Robert, Ewan Hyslop, Julianne Polanco, Mark Thompson Brandt, and Chris Wiebe. "COP26 And Climate Heritage Action - Seizing Momentum and the 'Heritage Reset.'" *Gathering of the Heritage Sector*. Lecture presented at the National Trust for Canada, December 8, 2021.
- "The Paris Agreement." United Nations Framework Convention on Climate Change. United Nations. Accessed January 16, 2022. <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>.
- Parks Canada Agency, Government of Canada. "Federal Heritage Buildings Review Office." Federal Heritage Buildings Review Office - History and culture, December 11, 2018. <https://www.pc.gc.ca/en/culture/beefp-fhbros>.
- Planning, Real Estate and Economic Development Dept. "Individual Designation." City of Ottawa, February 7, 2020. <https://ottawa.ca/en/planning-development-and-construction/heritage-conservation/heritage-properties/individual-designation>.
- "Preserving and Protecting Our Environment for Future Generations: A Made-in-Ontario Environment Plan - Commentary." Ontario Association of Architects, January 28, 2019. https://oaa.on.ca/oaa/assets/images/bloaags/text/2019_01_28_-_oaa_climate_submission.pdf.

- Quiggin, Daniel, Kris De Meyer, Lucy Hubble-Rose, and Antony Froggatt. "Climate Change Risk Assessment 2021." Chatham House – International Affairs Think Tank, November 4, 2021. <https://www.chathamhouse.org/2021/09/climate-change-risk-assessment-2021>.
- Region of Waterloo. *Practical Conservation Guide for Heritage Properties: Windows, Shutters and Doors*, n.d. <https://www.regionofwaterloo.ca/en/exploring-the-region/resources/Documents/PracticalGuideWindowsShuttersDoors-access.pdf>
- Roaf, Sue, David Crichton, and Fergus Nicol. *Adapting Buildings and Cities for Climate Change: A 21st Century Survival Guide*. Seconded. Amsterdam: Architectural Press, 2005.
- Standards and Guidelines for the Conservation of Historic Places in Canada*. Hull, Québec: Parks Canada, 2003.
- "Thematic Priorities." ICOMOS Canada, December 9, 2021. <https://canada.icomos.org/about-icomos-canada/priorities/#:~:text=ICOMOS%20Canada%20aims%20to%20develop,is%20impacted%20by%20climate%20change.&text=Climate%20change%20also%20impacts%20cultural%20heritage%20indirectly>.
- U.N.E.P. "Facts about the Climate Emergency." United Nations Environment Programme. United Nations. Accessed January 16, 2022. <https://www.unep.org/explore-topics/climate-action/facts-about-climate-emergency>.
- The Venice Charter §. International Congress of Architects and Technicians of Historic Monuments (1964).
- von Baeyer, Edwinna. *Maplelawn 1817- 1995 Landscape History*. Ottawa: National Capital Commission, 1995.
- Wallace-Wells, David. *The Uninhabitable Earth: Life after Warming*. New York: Tim Duggan Books, 2020.
- Whitley, Darrell, and Thomas S. Elias. "Patina in Viewing Stone Appreciation: Examination of Natural and Induced Patina in Viewing Stone Appreciation." Viewing Stone Association of North America. Accessed March 29, 2022. <https://www.vsana.org/ar-107-patina-in-viewing-stone-appreciation#:~:text=Patina%20is%20a%20natural%20or,elements%20present%20in%20the%20rocks>.

"Winter Tree Care – Wrapping Cedars, Boxwoods, and Other Evergreens." Greenhouse to Garden, October 21, 2020. <https://greenhousetogarden.ca/winter-tree-care-wrapping-cedars-boxwoods-and-other-evergreens/>.

Wright, Janet. *Building Report 83-42*, n.d. Accessed March 29, 2022.

Young, Robert A., and Carl Elefante. *Stewardship of the Built Environment: Sustainability, Preservation, and Reuse*. Washington: Island Press, 2015.

Åberg, Anna, Tim Benton, Antony Froggatt, Nina Jeffs, Daniel Quiggin, Ruth Townend, and Arpana Giritharan. "COP26: What Happened, What Does This Mean, and What Happens Next?" Chatham House – International Affairs Think Tank, November 17, 2021. <https://www.chathamhouse.org/2021/11/cop26-what-happened-what-does-mean-and-what-happens-next>.

