

**EXPLORING REUSE OR DERELICTION OF A COLD
WAR ERA NUCLEAR BUNKER: AN OBSERVATIONAL
STUDY OF CANADA'S DIEFENBUNKER**

BY

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**Exploring Reuse or Dereliction of a Cold War Era Nuclear Bunker:
An Observational Study of Canada's Diefenbunker**

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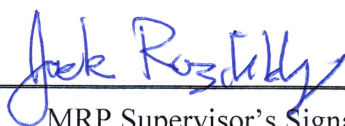
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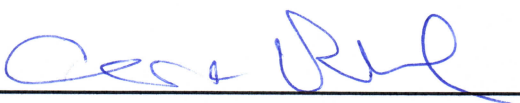
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Abstract

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Past civil defence efforts are the foundation for modern day disaster and emergency management. Today, approximately 60 years later, at a few locations in Canada remnants of Cold-War era civil defence efforts still exist. Located outside of Ottawa, the Diefenbunker is a large underground nuclear bunker complex that once served as the location for Canada's Federal government to continue operations in the event the national capitol was targeted in a nuclear attack.

While the existential threat of nuclear war was a national security priority that served as a catalyst for preparedness efforts during the mid-twentieth century, until recently awareness of the horrors of nuclear war has not been of the greatest concern or priority. During 2022, that began to change as the world watched with dread as Russia, one of the nine nations with a nuclear armed military, invaded Ukraine and on numerous occasions directly and indirectly threatened use of nuclear weapons. For 2023, it is in the range of possibilities that nuclear weapons may be used in warfare for the first time in 78 years. What was old is again becoming new. The once

obscure topic of nuclear war bunkers is increasingly becoming a subject area of more concern related to emergency preparedness.

The question asked in this study is “What are the lessons learned from Canada’s Diefenbunker that can help us to understand the opportunities leading to repurposing or the barriers leading to dereliction for large-scale Cold War era nuclear bunkers?”

The Background Chapter of this study provides information about the past and present uses of the Diefenbunker site. The literature review provides a context for civil defence and the risk of nuclear war. The methodology used in this study was qualitative, observational, unstructured, and participatory. The Findings Chapter addresses the data collected, which in this case was photographs, and the data were sorted according to themes derived from literature and observational fieldwork. Ten images from the Spring 2022 fieldwork at the Diefenbunker are highlighted and then discussed in the context of four key themes. ‘Upkeep and maintenance’ and ‘time travel’ are themes which represent barriers for adaptive reuse of former Cold War nuclear bunker sites. ‘Continuity of government and civil defence’ and ‘uncomfortable sites’ are themes offering opportunities for adaptive reuse. This study also considered the case of reuse of Vienna’s Flak Towers to highlight the importance of creativity in finding new and novel uses for former military structures. Due to the characteristics of large-scale devastation and human suffering associated with any use of nuclear weapons, sites supporting aspects of nuclear warfighting are deeply uncomfortable in nature. However, the fate of former Cold War nuclear bunkers can be addressed in positive ways by promoting their adaptive reuse through application of creativity.

Canada’s Diefenbunker is an example showing how creativity, planning, hard work, and perseverance were used to convert a nuclear bunker into a Cold War museum. The significance

of the Diefenbunker is that it provides a 'best in class' example of how adaptive reuse can repurpose a former nuclear war preparedness and response military site. It is also one of the few examples of a site that showcases historical aspects of the disaster and emergency management profession. In conclusion, it would be a shame if our disaster and emergency management Cold War heritage of nuclear war civil defence is lost through neglect and subsequent dereliction.

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Dedication

This MRP is dedicated to everyone in the world who takes a preparedness mindset even with regards to the most extreme and unthinkable disasters.

To my loved ones who supported me throughout this journey, I am grateful for your love and support.

Professor Perchal, I am grateful for the extraordinary steps that you took to ensure that this project materialized.

Dr. Rozdilsky, from the moment I met you at the start of the program, and we discussed writing an MRP, I knew I wanted to take the project on with you.

This project could not have finished without you.

Throughout the entire project I will never forget the leadership that you demonstrated; it remains an example I look up to and will follow.

Thank you for the extraordinary guidance and oversight that both made this project possible and ensured that we reached the point of mission accomplished. You were fundamental to this project.

Table of Contents

CHAPTER 1

Introduction 01

1.1	Introduction	01
1.2	Justification for this Study	04
1.3	Relation of this Study to Disaster & Emergency Management	10
1.4	Question on Which this Study is Based	13
1.5	Organization of this Study	13
1.6	Chapter Two Summary: Background	14
1.7	Chapter Three Summary: Literature Review	14
1.8	Chapter Four Summary: Methods	16
1.9	Chapter Five Summary: Findings	17
1.10	Chapter Six Summary: Discussion	17
1.11	Chapter Seven Summary: Creativity in Adaptive Reuse Addition	18
1.12	Chapter Eight Summary: Conclusion Chapter	19

CHAPTER 2

Background 21

2.1	Introduction	21
2.2	History of the Diefenbunker	24
2.3	On-Site Maintenance / Upgrades to Enable Adaptive Reuse	27
2.4	The Site's Fate: Repurposing as a Cold War Nuclear Bunker Museum	30
2.4.1	The Establishment of the Museum	30
2.4.2	Future of the Museum	32
2.5	Conclusion	33

CHAPTER 3

Literature Review 35

3.1	Introduction	35
3.2	Civil Defence Overview - History & Contemporary	35
3.3	Civil Defence in Canada Within Allied & 'Western' Civil Defence	39
3.4	U.S. Civil Defense	42
3.5	Nuclear Weapons Risk	43
3.5.1	Nuclear Posture Review	43
3.5.2	Nuclear Arsenal Numbers	44
3.5.3	Global Nuclear Arms Reduction Efforts	46
3.5.4	Tactical vs. Strategic Nuclear Weapons	48
3.5.5	Doomsday Clock	50

CHAPTER 3

Literature Review - Continued

3.6	Continuity of Government During Nuclear War	53
3.6.1	Greenbrier Bunker	55
3.6.2	Diefenbunker	58
3.7	Canada's Relation to Nuclear War	60
3.7.1	Canada's Nuclear Weapon Deployment During & Post World War II	60
3.7.2	Canada's Domestic Nuclear Weapons Capabilities	62
3.8	Conclusion	64

CHAPTER 4

Methods 68

4.1	Introduction	68
4.2	Qualitative Foundations	69
4.3	Observational Techniques	71
4.4	Data Analysis	73
4.5	Limitations	75
4.6	Bias	75
4.7	Conclusion	76

CHAPTER 5

Findings 78

5.1	Introduction	78
5.2	Representation of Findings by Photographic Data	78
5.3	Reflections on Findings and Collection of Photographic Data	88
5.4	Conclusion	92

END OF VOLUME I 93

VOLUME II 94

CHAPTER 6

Discussion 95

6.1	Introduction	95
6.2	Theme #1 – Uncomfortable Sites	97
6.2.1	Presence of 'Uncomfortable Sites' Theme in Diefenbunker	97
6.2.2	Peer Reviewed Literature Grounding for Theme	99
6.2.3	Discussion of Theme	100

CHAPTER 6

Discussion – Continued

6.3	Theme #2 Time Travel	104
6.3.1	Presence of ‘Time Travel’ Theme in Diefenbunker	105
6.3.2	Peer Reviewed Literature Grounding for Theme	107
6.3.3	Discussion of Theme	109
6.4	Theme #3 Upkeep and Maintenance	115
6.4.1	Presence of ‘Upkeep and Maintenance’ Theme in Diefenbunker	116
6.4.2	Peer Reviewed Literature Grounding for Theme	120
6.4.3	Discussion of Theme	121
6.5	Theme #4 Continuity of Government & Civil Defence	125
6.5.1	Presence of ‘Continuity of Government & Civil Defence’ Theme in Diefenbunker	126
6.5.2	Peer Reviewed Literature Grounding for Theme	127
6.5.3	Discussion of Theme	129
6.6	Conclusion	134

CHAPTER 7

Creativity in Adaptive Reuse Addition 137

7.1	Introduction	137
7.2	Vienna Flak Towers	138
7.3	The Concept of Adaptive Reuse	141
7.4	Opportunities Supporting Adaptive Reuse	142
7.4.1	Urban Regeneration	143
7.4.2	Remembering the Past Without Losing It	147
7.4.3	Specific Opportunities Represented by Esterhazy Park Haus des Meeres	150
7.5	Risks Detracting from Adaptive Reuse	153
7.5.1	Urban Regeneration	153
7.5.2	Remembering the Past Without Losing It	155
7.5.3	Specific Risks Represented by Adaptive Reuse of Esterhazy Vienna Flak Tower... ..	157
7.6	Conclusion	159

CHAPTER 8

Conclusion 162

8.1	Introduction to Conclusion	162
8.2	Four Primary Conclusions	162
8.3	Conclusion One	163
8.4	Conclusion Two	164
8.5	Conclusion Three	169
8.6	Conclusion Four	171

CHAPTER 8

Conclusion - Continued

8.7	Future Opportunities for Study	173
8.8	NORAD UGC Bunker	174
8.9	MEGHQ Freeport Kitchener Bunker	176
8.10	Significance of the Diefenbunker	179
8.11	The Challenge of Barriers that Need to be Overcome	181
8.12	The Significance of Imagination and Creativity	184
8.13	Conclusion The Last Word	189

Appendix	190
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Acronym Index	191
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Literature Cited	192
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Table of Contents For Figures

Fig. 1. Photograph JLR05228 – No Nuclear War in Toronto, 2022	11
Fig. 2. Photograph IMG 0253 – Entrance to Diefenbunker Complex, 2022	22
Fig. 3. Photograph IMG 0290 – Diefenbunker Blast Tunnel, 2022	23
Fig. 4. Photograph IMG 0368 Upgrades for Adaptive Reuse, 2022	28
Fig. 5. Estimated Global Nuclear Warhead Inventory, 2022 {Illustration}	45
Fig. 6. Doomsday Clock {Illustration}	52
Fig. 7. Data: Photograph 0183 – Atomic Bomb, 2022	79
Fig. 8. Data: Photograph 0229 Re-creation of Outdoor Nature (Pre-Impact), 2022	80
Fig. 9. Data: Photograph 0364 – Hallway of Sub-Level 400, 2022	81
Fig. 10. Data: Photograph 0381 – OSAX Computer Room, 2022	83
Fig. 11. Data: Photograph 0237 – Ventilation System in the Machine Room, 2022	84
Fig. 12. Data: Photograph 0249 – Industrial Boiler System in the Machine Room, 2022 ...	85
Fig. 13. Data: Photograph 0428 – Functional Reporting Structure of CEGHQ	86
Fig. 14. Data: Photograph 0230 Department of National Health and Welfare Poster	87
Fig. 15. Photograph JLR 0922 Arbeit Macht Frei Gates at Concentration Camp	90
Fig. 16. Photograph 0609 Photo Opportunity in Front of Atomic Bomb	91
Tab. 1. Table – Description of Photographic Data from Findings	96
Fig. 17. Photograph JLR092322 – Flakturm Gefechtsturm in Vienna	140
Fig. 18. Photograph JLR092422 – Adaptive Reuse of Flak Tower in Vienna	144
Fig. 19. Photograph JLR092422-2 – Vienna Flak Tower Converted for Bouldering	146
Fig. 20. Photograph JLR092422-3 – Vienna Flak Tower Converted into Aquarium	151
Fig. 21. Photograph JLR092422-4 – Vienna Flak Tower Converted into a Restaurant	158
Fig. 22. Photograph JLR092022 – Imagination in Nuclear Bunker Reuse in Prague	185
Fig. 23. Photograph JLR091722 Painting on Bunker Air Vents in Prague	186
Fig. 24. Photograph JLR092422-5 Vienna Flak Tower Exteriors used for Art	188

Chapter 1: Introduction

*“A nuclear war would affect everyone, and all have a stake in preventing this nightmare”
-Ban Ki Moon*

1.1 Introduction

An eye-opening quote made by Ban Ki Moon, the eighth Secretary-General of the United Nations. All have a stake in addressing the risk of a nuclear attack disaster. Nuclear weapons are destructive and fatal. They maintain the ability to change the trajectory of conflicts raging around the world. Yet their use does not necessarily spell the end of the world, nor the end of human civilization. Hiroshima and Nagasaki remain demonstrations of the colossal destruction and threat to humankind that nuclear weapons maintain. Yoshito Matsushige was a Hiroshima survivor and the only photographer who was able to capture both a first-hand and on-the-spot photographic account of the destruction of the nuclear attack disaster that struck the Japanese city of Hiroshima. He describes how immediately after the blast, it felt as though “hundreds of needles were stabbing him all at once” (Wargowski & del Tredici, 2022, para. 2).

It has been argued that the nuclear attack disaster that struck the Japanese cities of Hiroshima and Nagasaki ended a ruthless war that would have taken the lives of hundreds of thousands of young soldiers from the U.S. However, while the nuclear attack disasters arguably ended a war, it marked the beginning of a new era in international relations. As the current Russian invasion of the Eastern European nation of Ukraine continues, Russian President Vladimir Putin has invoked the nuclear attack disasters that struck Japan in insisting that the United States had created “a precedent” by using nuclear weapons against Japan at the end of World War II (“Putin”, 2022, para. 2). While stressing that he was “not bluffing”, Russian President Putin’s statements both foreshadow a permanent change in the modus operandi of

international relations, and specifically, new rules in the game of war that are powerful in foretelling how the risks that characterize disaster and emergency management will transform in the 21st century (“Putin”, 2022, para. 3).

The risk of a nuclear attack disaster was not globally recognized upon their creation, but instead, the use of nuclear weapons. The world came to understand the catastrophic risk emanating from nuclear weapons as they witnessed the horrors and suffering when nuclear attack disasters struck the Japanese cities of Hiroshima and Nagasaki. While talking about the current threat of nuclear weapons use, it is key to remember the entirety of the history of this disaster threat. The threat of nuclear weapons use, and a U.S. monopoly on the weapon changed international relations. Namely, it ensured Western Europe would be included within the U.S. “nuclear umbrella” and rely on the United States for security in facing the Soviet nuclear attack disaster threat (“Atomic Diplomacy”, n.d., para. 5).

While the current conflict and threat of nuclear war appear physically far from Canada, it is tenable that neither are distant threats. At the time of writing, in numerous ways, Canada and Canadians are already feeling the impact of the current conflict in Eastern Europe. For many, it begins with the economic impact, including higher inflation, which will affect household spending and the life choices of Canadians (Evans, 2022, para. 1, 27). However, the nuclear attack disaster threat emanating from the current conflict in Eastern Europe also carries consequential reverberations for Canada’s national security.

In recalling the Cold War from 1947 until 1991, and the Cuban Missile Crisis in 1962, Canada found itself in the middle of battling nuclear superpowers. In a great power conflict, Canada was forced to choose a side. Consequently, it became the front line of North American continental nuclear defence. The series of bunkers across the nation would enable the

Government of Canada to operate a continuity of government plan, whereby government operations would continue from the federal level down to municipal level in the event of a catastrophic disaster (Panneton, 2022).

Among the series of continuity of government bunkers built across the nation, the Diefenbunker would become a symbol of Canadian preparedness for the nuclear attack disaster threat, through its role as the Central Emergency Government Headquarters (CEGHQ Carp). To be clear, the threat of a nuclear attack was never exaggerated, and did not appear unexpectedly. For example, to reach U.S. targets, it was highly likely that Soviet nuclear bombers would have to “cross Canadian airspace” (Ricketts, 2014, para. 2). Consequently, the United States planned to shoot down Soviet nuclear missiles over Canadian airspace in the event of an impending nuclear attack (Ricketts, 2014, para. 2).

In addition, during a training mission, a U.S. B-36 bomber crashed over the province of British Columbia, as it was carrying a Mark IV atomic bomb (Roos, 2020). The Mark IV atomic bomb was a U.S. implosion-type nuclear bomb that was comparable to the nuclear bomb used in the Trinity Test and dropped on the Japanese city of Nagasaki (Roos, 2020, para. 1). Thus, the range of threats Canada faced from a nuclear bombing disaster evidently included unintentional threats. More specifically, the threat of a nuclear attack disaster to the nation conceivably did not begin with Soviet threats to hit the mainland United States. Evidently, it began the precise moment that the bomb itself was created.

Recalling Secretary-General Ban Ki Moon’s quote, all have a stake in preventing the nightmare that would emerge from a nuclear bomb disaster. It is important to recall this quote as it underscores that no one is immune to the nuclear attack disaster threat, or its consequences. Also, the bomb itself regardless of its carrier, possesses a threat to Canadians that needs to be

addressed. A nuclear bomb disaster, such as the attacks on Hiroshima and Nagasaki, have not occurred anytime in Canada's history. However, this does not mean nuclear weapons, given their vast range of size and destructive yield, do not pose a threat to Canada. While 'prevention' of this threat is impossible so long as even a single bomb exists, preparedness for the threat is possible. Preparedness for the nuclear bomb disaster threat requires pressure from the Canadian public on all levels of government. Correspondingly, steps ought to be taken by government, to both raise public awareness and to ensure that the safety and wellbeing of every person in Canada is accounted for. We must be aggressive in imagining, and persistent in addressing, one of the gravest disaster threats that faces us all.

1.2 Justification for this Study

At the time of writing, the international geopolitical situation continues to develop in a manner that it has not since World War II, and in many ways, it is entering a phase that is unprecedented in human history. On February 23rd, 2022, the Russian Federation under the leadership of President Vladimir Putin has commenced a military invasion of Ukraine. Moreover, on February 19th, 2022, Russian President Vladimir Putin oversaw military maneuvers that included the use of "strategic nuclear missile forces", which are developments that continue to intensify the "worst crisis since the Cold War" ("Guaranteed", 2022, para. 1).

In the article "Are We Facing Nuclear War?", published in the New York Times, Lauren Jackson notes how historian Mary Elise Sarotte has conducted analysis on the current global geopolitical situation. The article, which places focus on rising tensions among global nuclear powers that have resulted amidst the Russian invasion of Ukraine, identifies a "fear" that the historic era between the Cold War and the COVID-19 Pandemic will be a "halcyon period to future historians", in comparison to the era that has begun since the beginning of the global

pandemic (Jackson, 2022, para. 17). Lauren Jackson is a London-based New York Times reporter that covers international affairs and provides social and political science-based analysis. Furthermore, she notes that in light of the increasing potential for nuclear war, atomic experts have closely monitored the state of the Chernobyl nuclear facility, which recently came under Russian control during the country's invasion of Ukraine.

Additionally, as Chernobyl remains the site of the “worst nuclear disaster” at the time of writing in early 2022, she notes that atomic experts were “alarmed” when the Chernobyl plant lost power, which raised major concerns over the storage of radioactive nuclear waste at the site (Jackson, 2022, para. 12). On a broader note, she notes how the ongoing Russia-Ukraine conflict has also “halted efforts” to revive a nuclear agreement between global powers and Iran (Jackson, 2022, para. 16). Also, the current conflict in Eastern Europe, which risks becoming a global one, maintains the potential to destroy prospects for a nuclear agreement with Iran “entirely” (Jackson, 2022, para. 16).

Moreover, as Russia's President Vladimir Putin anticipated that the invasion of Ukraine would occur quickly and effectively, she identifies how Russia has faced growing international isolation whereby an increasingly aggressive policy posture implemented by Russian President Putin may potentially involve a pivot to nuclear weapons. She concludes by cautioning that the Russian government's pivot to nuclear weapons use represents the result of “dwindling options for military success” in Ukraine (Jackson, 2022, para. 5).

In the article “Video analysis reveals Russian attack on Ukrainian nuclear plant veered near disaster” published in the National Public Radio, it is noted that during the Russian invasion of Ukraine, a military attack that was previously carried out on the Zaporizhzhia Ukrainian nuclear power plant, now appears “far more dangerous” than initial reports and assessments

identified (Brumfiel et al., 2022, para. 1). Geoff Brumfiel is a senior editor and correspondent on NPR's science desk that has overseen research covering the Fukushima nuclear incident in Japan, has tracked the enriched uranium shipped out of Poland, and has undertaken reporting focused on the intersection of science and national security. He assesses a "thorough" four-hour review and a 21-minute security camera video that revealed an attack carried out by Russian armed forces that launched fire from "heavy weapons" in the direction of the plant's massive reactor buildings that housed dangerous nuclear fuel (Brumfiel et al., 2022, para. 2).

Moreover, he identifies how security camera footage showed soldiers belonging to Russian armed forces "haphazardly" firing RPGs into the main administrative building of the plant, while simultaneously preventing Ukrainian firefighters from stopping a fire that "ragged out of control" (Brumfiel et al., 2022, para. 3). He points out how security footage revealed damage at the Unit 1 reactor building, the transformer at the Unit 6 reactor, and the spent fuel pad used to store nuclear radioactive waste (Brumfiel et al., 2022, para. 6). Upon assessing such footage, he references Edwin Lyman, a director of nuclear power safety at the Union of Concerned Scientists, who identified the grave danger that the attack placed the safety of the nuclear plant in. Lyman determined that as it was "completely insane to subject a nuclear plant" to the kind of assault that was directed at the plant, as the incident maintained the potential to trigger a meltdown that would closely resemble the Fukushima Daiichi nuclear disaster incident of 2011 (Brumfiel et al., 2022, para. 7, 8).

Furthermore, Tannenwald (2022) identifies how the Russian government has utilized the threat of a powerful nuclear arsenal not to deter, but rather to assert hard power in Ukraine (Tannenwald, 2022, para. 2). She notes how the Russian government has made clear that should 'Western' allies intervene with military force during the current Russian invasion of the Eastern

European nation, the Russian government could assemble and launch “tactical, or non-strategic” nuclear weapons (Tannenwald, 2022, para. 3). In making those statements, she concludes by identifying the realization that tactical nuclear weapons can be launched on the same short-range missiles that the Russian government has used in its Ukraine military offensive, underscoring the heightened risk likelihood that the current conflict can escalate to a nuclear one.

Moreover, the Russian military has “successfully test-launched” hypersonic and cruise missiles at both land-based and sea targets during exercises overseen by the country’s political and military leadership (“Guaranteed”, 2022, para. 2, 8). Furthermore, in March of 2020, Canada’s top military general, General Jonathan Vance asserted based on Canadian military assessments that Russia poses the “most immediate military threat to this country and the international community today” (Carbert, 2020, para. 1, 2). Moreover, this MRP continues to be written as the end of the year 2022 approaches. At this time, United States National Security Advisor Jake Sullivan has stated that Russia will face “catastrophic consequences” if it uses nuclear weapons on the battlefield in Ukraine (Sanger & Tankersky, 2022, para. 1). These examples underscore the gravity of the nuclear attack disaster threat for global security.

In addition, the underlying meaning of events that precipitated the progression of international geopolitical affairs has all but appeared clearer in historical analysis undertaken after events unfold. However, it is key to note that the meaning and progression of international geopolitical affairs have largely been unpredictable before and during the occurrence of major events. In that regard, risk perception has often been ignored in history. Also, risk, in cases where people have maintained either “poor or no perception” of a particular risk, has been known to have resulted in “inappropriate and even harmful” reactions to disasters (Mañez, et al., 2016, p. 52).

The nuclear attack threat is unique among the gravest disaster threats facing humankind. David J. Hunter, an Australian epidemiologist once remarked that in terms of existential threats to humanity, “the asteroid, the pandemic, climate change, and nuclear war” are disaster threats that could cause human extinction, or “at minimum change life as we know it” (Hunter, 2022, para. 4). Hunter underscored that for the first three threats identified, humanity would have a degree of warning of the impending disaster. However, the only disaster type that could “kill all” humans in a “matter of hours or minutes, is nuclear war” (Hunter, 2022, para. 4).

In 2017, prior to the Ukraine crisis, a CBC report cited that rising global tensions resulted in both a review, and revisions of critical contingency plans for continuity of government planning in the event that the seat of Federal Government becomes unviable for government operations (Brewster, 2017). The report noted that the Prime Minister’s Privy Council Office drafted an agreement with the Department of National Defence to open two bunkers on military bases as a part of the Federal Government’s plan for “Continuity of Constitutional Government” (Brewster, 2017, para. 3, 5). The continuity of government plan would see the federal cabinet evacuated to a secure site outside of Ottawa (Brewster, 2017, para. 2).

The report cites the Diefenbunker in noting that civil preparedness in Canada is largely tied to a “Cold War defence mindset and planning” (Brewster, 2017, para. 11, 13). However, given that the Diefenbunker was the CEGHQ in a large nationwide network of continuity of government bunkers that spanned various regions and levels of government, the report does not mention contemporary continuity of government planning that extends to other levels of government, given Canada’s federalist government structure (Brewster, 2017). Also, the Diefenbunker was the center of Canadian Civil Defence during the Cold War era. Yet, the CBC report which cites the continuity of government plan as seeking to ensure “no interruption to

availability of critical services”, highlights that “questions” remain about a corresponding level of civil preparedness measures taken to address the nuclear attack disaster threat to the Canadian public (Brewster, 2017, para. 5, 19). Thus, as the international geopolitical situation intensifies and becomes increasingly unpredictable, invoking recollection of the Cold War, uncertainty remains regarding continuity of government planning, and civil defence procedures and policies that are currently set in place. Namely, policies to ensure continuity of all levels of government operations and civil preparedness measures to protect the Canadian public in the event that a man-made nuclear attack disaster impacts Canada.

While the threat of nuclear weapons use in the Ukraine domain is becoming a normalized risk within international relations, in 2022, the risk of a “nuclear Armageddon” is the highest it has been in 60 years, since the Cuban Missile Crisis in 1962 (“Biden”, 2022, para. 1). The justification of this MRP is based on current global affairs which have unfortunately brought societal discussion of nuclear war to the forefront. Namely, it is the contemporary “geo-political climate” that has increased the “relevancy of the Cold War” and has revived discussion about Cold War nuclear bunker sites and museums in Canada, such as the Diefenbunker (Szperling, 2022, para. 6).

Specifically, the war in Ukraine that started in February 2022, has catalysed new fears that an aspect of Russian aggression may involve the use of nuclear weapons. In the event nuclear weapons were used in the Ukraine War by Russia, the global consequences would be both unpredictable and dramatic. In addition, the consequences of a nuclear attack disaster occurring anywhere in the world are boundless and will impact Canada in innumerable ways. In fact, in June of 2022, such sentiments were expressed in signage used during protest in downtown Toronto to raise awareness of the fate of Ukraine in the current conflict. Signs reading

‘No nuclear war in Toronto’ (See Figure 1) were used to raise public awareness by the protestors that nuclear war is no longer just a theoretical topic to discuss, but it is a practical concern to prepare for.

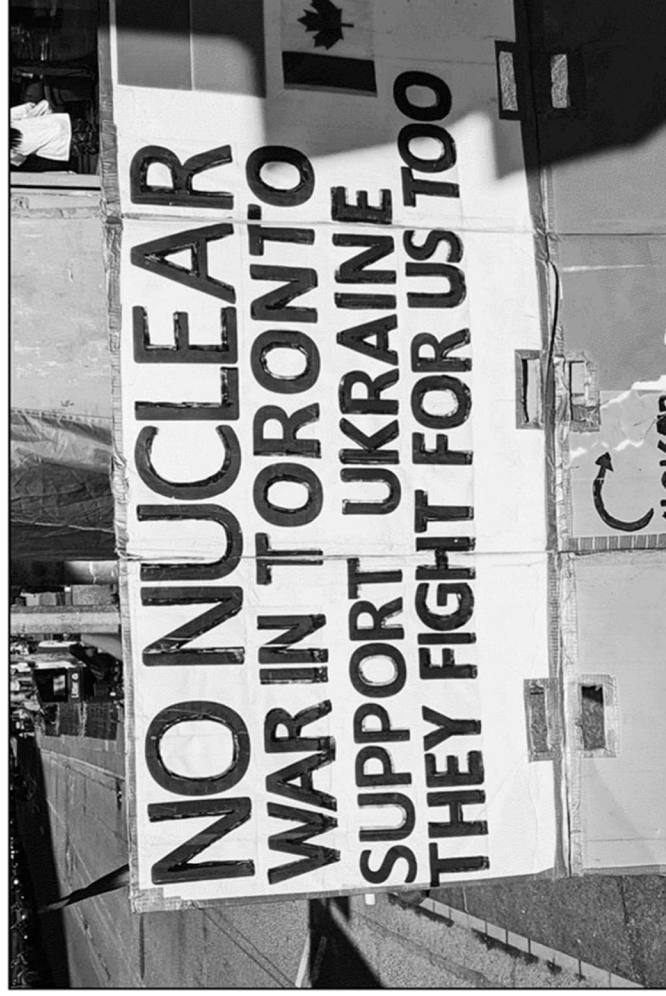
1.3 Relation of This Study to Disaster & Emergency Management

There are several connections between this study topic and the field of disaster and emergency management. In classifying the origins of this disaster, this work considers the realm of man-made disasters and emergencies. Man-made disasters are disasters which maintain the trademarks of “human intent, negligence, or error involving a failure of a man-made system”, in contrast with ‘natural disasters’, which are designated as resulting from ‘natural hazards’ (“Man-Made Disaster”, n.d., para. 1). Man-made disasters could include arson, crime, civil disorder, terrorism, and war (“Man-Made Disaster”, n.d., para. 1). This work focuses on preparedness measures, and specifically bunkers during the Cold War, in addressing the threat of state-directed nuclear attacks that could result from an accidental launch or an intentional act of war.

It is critical to understand this topic and its lens for disaster and emergency management. Namely, this is due to the fact that this study in part, will determine how nuclear bunkers and their repurposing or dereliction fit into the realm of public awareness actions within overall disaster risk reduction efforts that the Canadian government can support. The global context for disaster risk reduction is developed upon the basis of the Hyogo Framework of Action, which was adopted by 168 nations in 2005. It is important to note that priority #3 of the five-point Hyogo Framework of Action is to utilize “education, innovation, and knowledge, to build a culture of resilience and safety at all levels” (Robbins, 2020, para. 1).

Further, this study relates to disaster and emergency management by understanding the historical importance of the Canadian nuclear bunker network within NORAD, as a benchmark

Figure 1. Photograph JLR052228 – No Nuclear War in Toronto, 2022



- ***Caption:*** “No Nuclear War in Toronto” pro-Ukraine protest sign at Bloor and Yonge Intersection in Downtown Toronto.
- ***Source:*** Dr. Jack L. Rozdilsky, May 2022
- ***Note:*** Photograph used in MRP with Permission

for defence of the North American continent from a nuclear attack disaster (Ricketts, 2014, para. 6). It is fundamental to note that when this study began in early 2022, prior to the passing of Bill C-23 in Parliament on June 7, 2022, Canada was the only G8 country without laws to protect historic places owned by the Canadian government (“Canada”, n.d.). This is in part, due to the complex nature of Canadian civil rights and Canadian property laws.

Additionally, since its creation in 1973, the Canadian National Trust has worked with all levels of government to encourage the adoption and improvement of legislation to safeguard heritage property. The agency has also helped spearhead campaigns to protect heritage property within the federal jurisdiction. However, in recognizing the agency’s efforts to improve legislation to heritage property, Bill C-23 enacts the Historic Places of Canada Act, which ensures that the designation of persons, places, and events that are of national historic significance are “protected and conserved into the future” (“Bill C-23”, 2022, para. 3). In this regard, it is important to note that upon the passing of Bill C-23, heritage protection now comes under the administration of Parks Canada, an agency of the Government of Canada that manages national historic sites (“Bill C-23”, 2022, para. 3).

Neglecting these sites, given both their critical importance in Canada’s history of civil defence, and current geopolitical events that raise their relevance in facing the nuclear attack disaster threat, could result in these laws being overlooked and contravened. Also, an opportunity to utilize these sites to support education and awareness about this particular disaster threat amongst the Canadian public could be lost. Thus, in the realm of disaster and emergency management, reusing these Cold War era nuclear bunker sites for heritage tourism purposes is relevant as these efforts can bolster overall Canadian Civil Defence against this man-made disaster threat.

1.4 Question on Which This Study is Based On

The question being asked in this study is: “What are the lessons learned from Canada’s Diefenbunker that can help us to understand the opportunities leading to repurposing or the barriers leading to dereliction for large-scale Cold War-era nuclear bunkers?”.

Many Canadians have adopted the mindset that Canada remains ‘untouchable’, a safe and calm place, that remains far away from the world’s problems. Although this assessment is currently accurate, historically it hasn’t always been the case, especially when there have been conflicts raging in various regions of the world (Burtch, 2006; Ricketts, 2014). In this regard, many Canadians remain unaware of the country’s network of bunkers that were established during the Cold War, and the central role they maintained in nuclear defence efforts within overall North American and NATO nuclear defence. This study intends to address these issues.

1.5 Organization of This Study

This York University Major Research Paper was completed in December 2022, in partial fulfillment of the Master’s Degree in Disaster and Emergency Management. Dr. Jack L. Rozdilsky (Professor of Disaster and Emergency Management) was the Master’s Research Paper Supervisor and Professor Walter Perchal (Professor of Disaster and Emergency Management) was the Second Reader. This study will collect data in the region of Ottawa, Ontario.

Around the world, as the contemporary threat of nuclear weapons use intensifies, Cold War era civil defence measures, including nuclear bunkers are increasingly being reconsidered (Horowitz, 2022). In addition, the uncertain fates of many nuclear bunker sites around the world have come to the forefront of societal debates and have in turn, re-emerged in government policies of many countries (Gera, 2022). The study suggests that the Diefenbunker, which was

later converted into a museum in 1998, represents an example of a nuclear bunker site that has successfully overcome barriers to adaptive reuse.

This study has eight chapters. Following this chapter (Chapter One: Introduction) are the remaining seven chapters. The following is a brief description of each chapter.

1.6 Chapter Two Summary: Background

Chapter 2, The Background Chapter demonstrates the Diefenbunker's historic role as Canada's primary continuity of government shelter. The Background Chapter underlines how the Diefenbunker, which was designed in the 1950's to serve the purpose of continuity of government, underwent several upgrades and maintenance operations that paved the way for adaptive reuse of the site to materialize. It highlights how the site's massive popularity among tourists, and public interest in its central role in Canadian Civil Defence, remain a combination of characteristics that makes the Diefenbunker stand out as a nuclear bunker heritage site in ways that are unparalleled in Canada.

Namely, the Background Chapter demonstrates that the Diefenbunker is unique as a Cold War nuclear bunker in Canada, in the way it connects the history it preserves, with the Canadian public. The chapter also highlights that the future of the Diefenbunker as a Cold War era nuclear bunker museum is in large part, dependent upon funds that enable the site to function as a heritage museum in a manner that meets the challenges of modern public standards and regulations and enhances tourists' experiences.

1.7 Chapter Three Summary: Literature Review

Chapter 3, The Literature Review Chapter covers several areas of literature. These topics include an overview of the history of civil defence, and contemporary civil defence, civil defence in Canada within 'Allied' and 'Western' Civil Defence, U.S. Civil Defense, and an assessment of

the contemporary nuclear weapons risk. Also, topics including, continuity of government measures for nuclear war with a specific focus on bunkers, and Canada's relation to nuclear war are covered in the Literature Review Chapter.

The Literature Review Chapter underscores that contemporary geopolitical developments mark a new stage in global civil defence. More pointedly, a review of contemporary civil defence literature finds that the use of bunkers is once again increasingly being considered as a cornerstone of plans to ensure human survival should man-made nuclear attack disasters occur during this turbulent period in global geopolitics (Horowitz, 2022). In addition, assessment of literature on tactical vs. strategic weapons underlines that militaries are increasingly seeking deterrence through the use of non-strategic, or 'tactical' nuclear weapons (Tannenwald, 2022). Moreover, in covering literature on the contemporary threat of nuclear weapons use, the Literature Review Chapter references the Doomsday Clock, a "universally recognized indicator of the world's vulnerability to catastrophe from nuclear weapons" (Mecklin, 2022, para. 1). The section on nuclear weapons risk revealed that in addition to 2020, in the year 2022, the clock has been set at 100 seconds to midnight. Thus, assessment of the literature proved that the world is the closest it has ever been to facing a catastrophe that destroys humankind (Mecklin, 2022, para. 1).

In terms of assessing literature on civil defence in Canada, the literature review highlighted how during the Cold War, Canadian Civil Defence authorities took extensive measures to raise public awareness about civil defence and interlink it with the notion of "good citizenship" during the Cold War (Burtch, 2006, p. 736). Also, for literature covering Canada's domestic nuclear capabilities, the literature review found that instead of producing an atomic bomb of its own, Canada would conclude in time that the best way to strengthen Canadian

security was to continue to support the American atomic weapons program through exports of nuclear materials, such as uranium (Trudgen, 2009).

In addition, in assessing topics of Canadian and U.S. Civil Defense, the literature review highlighted how historically, Canadian Civil Defence modeled many of the measures it took after U.S. Civil Defense measures. Ultimately, the literature covered revealed how Canada was a crucial component of North American continental air defences against a potential Soviet nuclear attack. More pointedly, the literature reveals how Canada's network of continuity of government bunkers, with the Diefenbunker as the primary node, or CEGHQ, remained critical to upholding defence of the continent.

1.8 Chapter Four Summary: Methods

The Methods Chapter outlines the methods of observation in this study. They are qualitative, observational, unstructured, and participatory. These methods, and their use in this study, are explained further in the chapter. When applying a qualitative-observational-unstructured-participatory approach, the chapter underscores that the researcher did not interact with human subjects. Therefore, informed consent procedures did not apply to this work (Bustinza et al., 2021).

The chapter notes that prior to going on-site, the researcher conducted a literature review, and the literature review came up with a total of ten themes. The themes that emerged during the literature review ultimately aided in guiding the researcher's mind on what to observe. However, in the end, the researcher decided on a total of four themes, which is explained further in the Methods Chapter. This chapter concludes noting that an important reason for studying the Diefenbunker was the ability to gain access to the actual site of study.

1.9 Chapter Five Summary: Findings

The Findings Chapter provides an overview of the composition of the data that was collected in each photo taken at the Diefenbunker site. A total of approximately 500 photos of data that were compiled for this study, is provided in the Findings Chapter. Each photo in the chapter contains a title named in accordance with the main feature of the photo that the researcher sought to capture. Through careful choosing, a total of eight photos were determined to be used for the study.

The Findings Chapter begins with reflection on the meaning of the data collected. I determined the photos collected carry deep meaning, and that is in part why I determined that the use of photographs to collect data would be an effective means of data collection for the study. In addition, the chapter features the precise selection of photos, which also encouraged self reflection on the part of the researcher, on many levels. Furthermore, self reflection that resulted from my choice of photography as a medium provided me with mixed feelings, which are outlined further in the chapter.

1.10 Chapter Six Summary: Discussion

The Discussion Chapter provides analysis of the results of the data collected and outlined in the Findings Chapter. In the Discussion Chapter, the researcher analyzes a total of eight pictures. In each sub-section, themes are both analyzed and discussed based on the content of each photograph.

The four themes determined from the analysis of the photographic data are:

1. 'Uncomfortable Sites'
2. 'Time Travel'
3. 'Upkeep and Maintenance'
4. 'Continuity of Government and Civil Defence'

In the Discussion Chapter, focus is placed on the meaning of themes that are interpreted in their relation to the Diefenbunker, and the relevance that results have for this research study. The Discussion Chapter highlights how the Diefenbunker, a prime example of a Canadian nuclear bunker that has undergone adaptive reuse to serve the purpose of heritage tourism, faced key challenges and opportunities prior to its conversion to a heritage site.

Overall, the results in this section underscore that the themes of ‘time travel’ and ‘upkeep and maintenance’, represented key challenges in the process of adaptive reuse. In contrast, themes of ‘uncomfortable sites’ and ‘continuity of government and civil defence’, contrastingly presented opportunities for adaptive reuse.

1.11 Chapter Seven Summary: Creativity in Adaptive Reuse Addition

The Creativity in Adaptive Reuse Addition Chapter begins with recalling a Mitzvah’s message that we do not consider often enough as we pass by homes, buildings, and ruins that constitute historic sites. That is, historic sites are very delicate and precious in nature. Ultimately, the chapter opens stressing that every site has a story to tell. The chapter investigates the various ways in which post-war Flak Towers exemplify creativity in adaptive reuse.

In the chapter, the concept of adaptive reuse is explained. Also, the opportunities and risks facing sites that undergo adaptive reuse are outlined and discussed. The Creativity in Adaptive Reuse Chapter focuses on a specific example of Flakturm Stiftskaserne located in Vienna, Austria. Additionally, the chapter proves that by creatively applying adaptive reuse, the worst of sites could be remodeled to provide hope for the future. Namely, the Vienna Flak Tower Aquarium remains a primary example of that creativity in action.

The chapter closes with a quote from Albert Einstein, who once remarked that imagination is more important than knowledge. Also, the chapter cites the quote to stress that

while knowledge has limits, imagination does not. Moreover, it underscores that for disaster and emergency management, in the age of disruption, the value of imagination is crucial. In the chapter, as evidenced by the case of the Haus des Meeres, with regard to solving many of the problems facing the recovery phase in disaster and emergency management, imagination is a key ingredient.

This is especially the case with uncertain fates of uncomfortable and dark heritage sites, whereby it will be our imaginative capabilities that guide discussion to solving complex problems, like the uncertain fate of the Vienna Flak Towers. The story of the Flakturm Stiftskaserne outlined in the Creativity in Adaptive Reuse Addition Chapter, proves that we can learn from and benefit from a site, without forgetting its past, or compromising its physical or historic integrity.

1.12 Chapter Eight Summary: Conclusion Chapter

This study draws four main conclusions in answering the research question, “What are the lessons learned from Canada’s Diefenbunker that can help us to understand the opportunities leading to repurposing or the barriers leading to dereliction for large-scale Cold War-era nuclear bunkers?”. The Conclusion Chapter explains how the Diefenbunker faced key challenges and opportunities prior to its conversion into a heritage site.

The first two conclusions underline how the themes of ‘time travel’ and ‘upkeep and maintenance’ present in the Diefenbunker, represent barriers for repurposing that lead to site dereliction. The second set of conclusions assess how the themes of ‘uncomfortable sites’ and ‘continuity of government and civil defence’ largely present opportunities leading to site repurposing. Moreover, the third part of this Conclusion Chapter highlights opportunities generated by this study for future research based on further exploration of the research topic,

“Many successful schemes were led by the individuals with vision: Do not wait for deus ex machina”, featuring focus on North Bay and Waterloo (Laraia, 2019, p. 344).

Ultimately, a clearer primary conclusion emerges in the Conclusion Chapter. The dilemma is not only that nuclear bunkers sites such as, the Diefenbunker site, present both opportunities and barriers to reuse. The key dilemma and lesson learned in the example of the Diefenbunker, is that barriers need to be overcome in order for adaptive reuse to materialize. Lastly, the Conclusion Chapter closes with final words on the relevance of the results of this research study, and how this study’s relevance can extend to other nuclear bunker sites that face either prospects of reuse or dereliction.

Chapter 2: Background

2.1 Introduction

The Diefenbunker is located outside of Ottawa, in a rural region known as Carp, Ontario. Also, the site is located 35 kilometers northwest of the Parliament, Canada's seat of federal government. The site consists of a massive four-story underground reinforced concrete bunker and nuclear fallout shelter. The entrance to the bunker itself is inside an above ground metal building (See Figure 2). Once inside the metal building one must walk down the blast tunnel before reaching the entry point to the sprawling underground complex (See Figure 3).

The purpose of this chapter is to provide information on the Diefenbunker site, which was constructed between 1959 and 1961 for the specific purpose of maintaining continuity of government. Around the world, as the contemporary threat of nuclear weapons use intensifies, Cold War era civil defence measures, including nuclear bunkers are increasingly being reconsidered (Horowitz, 2022). In addition, the uncertain fates of many nuclear bunker sites around the world have come to the forefront of societal debates and have in turn, re-emerged in government policies of many countries (Gera, 2022). The Diefenbunker, which was later converted into a museum in 1998, represents an example of a nuclear bunker site that has successfully overcome barriers to adaptive reuse. This chapter following the introduction, includes an assessment of the site's history. Then, a description of on-site maintenance and upgrades that make the site's reuse as a museum possible, are provided. Also, information about the bunker's current state, and the future of the bunker as a Cold War nuclear bunker heritage site, is outlined in this chapter.

Figure 2. Photograph IMG#0253 – Entrance to Diefenbunker Complex, May 2022



- **Caption:** Main entrance to Diefenbunker underground complex
- **Source:** Christian Faize Canaan, May 2022
- **Note:** Author Provided

Figure 3. Photograph INIG#0290 – Diefenbunker Blast Tunnel, May 2022



- ***Caption:*** View of the Diefenbunker Blast Tunnel
- ***Source:*** Christian Faize Canaan, May 2022
- ***Note:*** Author Provided

2.2 History of the Diefenbunker

The Diefenbunker has been described as a powerful symbol of Canadian preparedness for the nuclear attack disaster threat that loomed over the nation during the Cold War. In that regard, the 1950s were marked by increased tensions between the American-led ‘Western Block’ and the Soviet-led ‘Communist Bloc’. The Canadian public had begun to experience the effects of the Suez Crisis of 1956, in addition to the nuclear sabre rattling of the new Secretary of the Communist Party of the Soviet Union, Nikita Khrushchev (Panneton, 2022). Also, the Canadian public was exposed to the danger of the nuclear attack disaster threat that became increasingly evident with the proliferation of intercontinental ballistic missiles (ICBMs), in both ‘Western Block’ as well as ‘Communist Block’ countries (Manning, 2003). In 1957, tensions intensified when Soviet Leader Khrushchev challenged the United States to a “missile shooting match”, and demanded that the West leave Berlin entirely, a year later (“Nikita Khrushchev Challenges”, 2009/2020). Canada’s geographic position located “directly between” the world’s primary nuclear weapons powers, the Soviet Union and the United States, put the nation at serious risk (Panneton, 2022, para. 2).

In 1958, in response to the growing international crisis, Canadian Prime Minister John Diefenbaker declared the establishment of a “decentralised federal system of emergency government” that would encompass “central, regional, as well as zonal elements” (Taylor-Vaisey, 2020, para. 4). For instance, underground bunkers built on military bases to ensure continuity of government at the provincial level in Canada, spanned across six provinces (Panneton, 2022). Moreover, Prime Minister Diefenbaker authorized construction of a network of nearly 50 nuclear fallout shelters across Canada to protect select members of government in the event that a nuclear attack struck the nation. The program was named Project EASE, or

Experimental Army Signals Establishment, which worked to form a cover for the project's true purpose. In time, a Toronto Telegram reporter discovered the nuclear defence objectives behind the project, when he flew over a shelter construction site, and later published the findings (Taylor-Vaisey, 2020).

The bunker was designed and engineered by the Foundation Company of Canada, and was overseen by Lieutenant Colonel Ed Churchill ("About the Diefenbunker", 2022). It is important to note that the entire construction process of the Diefenbunker was completed within a period of approximately 18 months. Also, the construction process represented the "first recorded use of critical path construction methodology" in Canada ("About the Diefenbunker", 2022, para. 4). Additionally, the Diefenbunker's size exceeds 100,000 square feet. The bunker maintained 350 rooms that served various continuity of government functions throughout its four-underground-story structure. For instance, the site housed medical and dental facilities, a decontamination chamber in the event of a nuclear strike, a Machine Room for upkeep and maintenance, a War Room for continuity of government operations, private dormitories, dining facilities, and dormitories for the personnel that would station on-site in the event of a nuclear attack disaster or emergency.

Furthermore, the safety provided by the Diefenbunker was encapsulated in its nuclear roof structure. Throughout the Cold War, working 24 hour shifts on-site, a collection of 100 to 150 personnel facilitated secret communications for Canada's Department of National Defence (Panneton, 2022). The disaster protection measures taken in the Diefenbunker, sought to enable approximately 535 personnel of the Government of Canada to operate safely underground for 30 days, in order to facilitate emergency governance during a nuclear attack disaster. The measures included ensuring construction of the shelter to withstand a five-megaton nuclear blast, which

necessitated the utilization of approximately 5,000 tons of steel and 32,000 cubic yards of concrete (Panneton, 2022, para. 5).

Moreover, construction of the Diefenbunker begun in 1959. The top-secret operation undertaken by the Government of Canada under the code name Project EASE, took place at the site, which was previously a farm in the town of Carp, Ontario. The operation to build the site is estimated to have costed at least \$20 million (Panneton, 2022). Consequently, Prime Minister Diefenbaker sought to defend the high costs associated with the project by invoking “worst-case scenario” consequences (Taylor-Vaisey, 2020, para. 4). More pointedly, Prime Minister Diefenbaker stressed that at all costs, regardless of the project’s price, the reality of the nuclear attack disaster threat necessitated the implementation of measures that would provide assurance that government operations could be “carried on” (Taylor-Vaisey, 2020, para. 4).

The bunker site, which was constructed to a depth of 75 feet underground, was selected for several reasons. First, it was within evacuation distance of downtown Ottawa. In addition, the site is situated in a natural valley. Also, the site maintains favourable geological conditions for protection from nuclear strikes. Above all, the site was within evacuation distance of the capital. Moreover, by the end of its time in operation in 1994, the bunker was in service for a total of 32 years (“About the Diefenbunker”, 2022). During the Cold War era of bunker operations, the site became a key strategic communications center for Canadian Forces. As a series of Emergency Government Headquarters bunkers were built across Canada, the Diefenbunker would be the largest federal government bunker. Lastly, the site would also come to be known for its role as the Central Emergency Government Headquarters, or CEGHQ Carp.

2.3 On-Site Maintenance / Upgrades to Enable Adaptive Reuse

The Diefenbunker, which was designed in the 1950's to serve the purpose of continuity of government, underwent several upgrades and maintenance operations that paved the way for adaptive reuse of the site to materialize (See Figure 4). The upgrades and maintenance operations are outlined in this section of the Background Chapter. For example, the bunker's entrance/blast tunnel was altered to ensure two fire-separated exits at Sub-Level 400 (Fawcett, 2011, p. 22). These changes were identified within a series of site inspections that determined which maintenance operations and upgrades were needed to take place for adaptive reuse of the site to occur. For example, an on-site inspection determined that the fire rating of the exit corridors on Sub-Level 400 needed to meet a minimum one-hour fire resistance rating. Also, given that there was previously a lack of details on the material composition of the site's prefabricated wall panels, in addition to the site maintaining a historic designation, the walls evidently could not be replaced (Fawcett, 2011, p. 20).

This resulted in the need for sections of the site's wall panels to be inspected and thereafter taken for analysis at a testing laboratory. Upon determining the composition of the wall panels, and their structural supports, it was determined that walls provided the "equivalent of a one-hour rating", as was required for the site to be repurposed (Fawcett, 2011, p. 20). Additionally, given that the state of certain corridor doors in the bunker had deteriorated over time, transoms and doors were also replaced to ensure that the site could be reopened and repurposed safely (Fawcett, 2011). This chapter cites a list from Fawcett (2011) in identifying upgrades that were necessary for site repurposing (p. 22).

Figure 4. Photograph INIG#0368 – Upgrades for Adaptive Reuse, May 2022



- **Caption:** Corridor displaying lit emergency exit signage, fire alarm, and ceiling sprinkler system
- **Source:** Christian Faize Canaan, May 2022
- **Note:** Author Provided

List of Upgrades Made to the Diefenbunker to Ensure Maintenance:

- A new electric fire pump was placed on-site
- Relining of three concrete water tanks
- Installation of emergency power generator: which was thereafter connected to exit signs, emergency lights, and the fire pump on-site
- On-site inspection discovers asbestos, determines that repair requires type 3 removal operations
- Asbestos removal required sealing off and ventilating certain affected areas of the bunker
- Asbestos was removed in two locations on-site: the War Cabinet Room and the bunker's Main Lobby
- Showers were provided to decontaminate workers during asbestos removal process
- A new Fire Safety Plan was assembled
- Replacement and Improvement of existing fire alarm system on-site including placement of smoke detectors along the bunker's primary corridors
- A sprinkler system was installed in the site's blast tunnel and all through the bunker

In assessing the changes that needed to be made, included within the list cited from Fawcett (2011), it becomes evident that changes are both extensive and diverse. For example, they range from fire hazards to health hazards, that are pertinent to both the site's interior and the site's exterior surroundings, such as in the case of the need for exit corridors to reach the bunker's exterior. Also, assessment of upgrades and maintenance operations on-site to ensure adaptive reuse, reveal the extent of operations that were necessary, including changes to the

site's interior structure, such as the removal of asbestos from wall panels. More pointedly, such maintenance operations were uniquely challenging, in that they were implemented amid few existing details about many of the site's features, such as the material composition of the bunker's wall panels. In addition, such operations were undertaken in corresponding adherence to regulations that protected the site's historic designation, whereby the bunker's walls could not be replaced.

2.4 The Site's Fate: Repurposing as a Cold War Nuclear Bunker Museum

2.4.1 The Establishment of the Museum

In 1991, the Soviet Union collapsed. In 1994, Canada's Defence Department decommissioned the Canadian Forces Station (CFS) Carp. Upon its decommissioning, the Federal Government of Canada withdrew its operations from the site. Also, in 1994, the Diefenbunker was designated a National Historic Site. Due to extensive interest that was expressed among the Canadian and especially, the local public, in touring the former continuity of government nuclear bunker, a private development group purchased the site and officially opened the Diefenbunker museum in 1998 (Panneton, 2022). It is key to note that the Diefenbunker museum was also originally operated by volunteers from Carp. In that regard, it was local volunteers who took the initiative to establish the Diefenbunker Development Group after the public responded with enthusiasm to their tours. These examples demonstrate the key and unique role that the public maintained in the Diefenbunker's transformation and reuse as a Cold War museum.

Moreover, the museum has become one of the most popular tourist destinations in Ontario. For example, the site attracts an average 88,000 visitors annually ("Diefenbunker",

2022, para. 3). Also, the site's museum, which contains both rotating and permanent exhibitions, has more than 3,000 books in its library and archives (Panneton, 2022). It is important to identify that the Diefenbunker operates as a non-profit organization. In addition, the site's museum is funded through a combination of private donations, ticket sales, and public grants (Panneton, 2022, para. 8).

At the time of writing, the Diefenbunker remains one of the only modernist national historic sites in Canada (Fawcett, 2011, p. 18). It stands alone in Canada as a nuclear bunker site that has successfully undergone adaptive reuse and a transformation into a museum. However, it is important to underscore that the journey of the site to repurposing was not always certain. It faced several challenges on its way to becoming a protected national historic site. For example, evidence in this chapter proves that among the biggest challenges to repurposing was the site's distinct and massive layout. For example, the Diefenbunker maintained only a single entrance and exit to ground level.

Thus, it is important to point out that a series of steps were taken to secure the viability of the museum's existence. For instance, in 1994, the Canadian Government sold the site to the local township of West Carleton, which is currently included within the city of Ottawa. After the sale of the site, the local community rallied the municipality to enable locals to run tours of the bunker, which brought fascination to many members of the public (Fawcett, 2011). Also, the "application of the Ontario Building Code through an Alternative Solution" made it possible to enable the occupant loading to be increased from 60 to 420 persons (Fawcett, 2011, p. 18).

Additionally, it is important to identify that the site was repurposed as a museum, whereby the repurposing approach faced both challenges and opportunities from the site's features. For instance, examples in this chapter demonstrate that while the repurposing approach

faced construction difficulties, it was contrastingly bolstered by the unique heritage features that the Diefenbunker site maintains. It is also important to note that the initial design phase of the Diefenbunker was set at \$2 million, whereby nearly the entirety of the cost was “raised from 10 government ministers, in addition to private foundations” (Fawcett, 2011, p. 22). Thus, it is difficult to conceive how the Diefenbunker’s path to adaptive reuse as a museum could have commenced without the diverse financial backing the project received (Fawcett, 2011, p. 22).

2.4.2 Future of the Museum

In a 2022 press release, Kanata-Carleton Liberal MP Jenna Suds made an announcement on behalf of Helena Jaczek, the Minister responsible for the Federal Economic Development Agency for Southern Ontario. The press release announced that the Diefenbunker was to receive \$412,500 through the Tourism Relief Fund. In addition, it is important to note that in total, the Federal Government of Canada would provide \$600,000 for museum upgrades (Szperling, 2022). Thus, it is important to underscore that through the stream of funds, the Diefenbunker’s future as a Cold War museum is being cemented. More specifically, the site is being provided with a chance to enhance its tourism services which will in turn, enhance visitor experiences. This will be done in a multitude of ways. For instance, for persons with disabilities, measures to enhance lighting and glare control will make the tourism experience on-site more enjoyable. This also includes the use of funds to enhance tourism services through exhibition development and an increased amount of space that highlights the Indigenous experience during the Cold War (Szperling, 2022, para. 4).

Moreover, in terms of enhancing visitors’ knowledge and awareness of Indigenous experiences during the Cold War, funding will be used to produce the tour’s audio guide in the Algonquin language. In addition, as a result of recent funding provided, an augmented reality

emergency preparedness gamified simulation will be included in the tourism services provided by the Diefenbunker (Szperling, 2022, para. 4). In addition, with \$187,500 provided to the site through the Canada Community Revitalization Fund, the Diefenbunker will improve both its accessibility and energy efficiency through enhancement of its controls and lighting (Szperling, 2022, para. 10). These examples demonstrate that steps are being taken to enhance the Cold War museum site that the Diefenbunker has become. However, these examples also underscore that funding is critical to ensuring such steps can be taken.

2.5 Conclusion

This Background Chapter concludes underscoring the Diefenbunker's role as Canada's primary continuity of government shelter. The Diefenbunker, which was designed in the 1950's to serve the purpose of continuity of government, underwent several upgrades and maintenance operations that paved the way for adaptive reuse of the site to materialize. The site's popularity among tourists, and public interest in its central role in Canadian Civil Defence, remain a combination of characteristics that makes the Diefenbunker stand out as a nuclear bunker heritage site in ways that are unparalleled in Canada.

Namely, the Diefenbunker is unique as a Cold War nuclear bunker in Canada, in the way it connects the history it preserves, with the Canadian public. This Background Chapter highlights that the future of the Diefenbunker as a Cold War era nuclear bunker museum in large part, is dependant upon funds that enable the site to function as a heritage museum in a manner that both meets the challenges of modern public standards and regulations, and enhances tourists' experiences. This includes funds that are used to implement measures on-site that increase both accessibility and energy efficiency, support programs to maintain awareness of Canada's Cold

War Indigenous history, and to support the use of technology in demonstrating emergency and disaster preparedness measures to visitors.

Chapter 3: Literature Review

3.1 Introduction

This Literature Review Chapter covers a range of topics that are relevant to this study. These topics include historical and contemporary civil defence, Canadian Civil Defence within Allied and ‘Western’ Civil Defence, U.S. Civil Defense, the contemporary risk of nuclear weapons use, continuity of government bunkers within overall COG protocol in Canada and the U.S., and Canada’s relation to nuclear war. These topics are covered to outline the existing research, and their overall significance for this MRP. Thus, by way of opening context, civil defence broadly consists of activities that mitigate the impacts of man-made disasters, ‘natural’ disasters, and war on a civilian population (“Civil Defense”, n.d., para. 1). In addition, civil preparedness represents the ability to “sustain the functions that are vital to society” (“Resilience”, n.d., p. 1). Moreover, civil preparedness, a “central pillar” of a society’s resilience, represents a state’s capacity to provide basic government functions for the population during peacetime, emergencies, and disasters (“Resilience”, n.d., p. 1).

3.2 Civil Defence Overview – History & Contemporary

This section of the thematic literature review covers the topic of historical and contemporary civil defence which the researcher defines as civil defence in Canada between World War II and the present time of writing, in 2022. Historical and contemporary civil defence informs this work because providing an overview of historical and contemporary civil defence in Canada provides additional context for this master’s research paper. While introducing these topics, I acknowledge the importance of the closely related topic of the history of U.S. civil

defense which has been covered briefly in this section, as my research scope places focus on Canada's preparedness for a nuclear attack disaster.

Monteyne (2011) identifies civil defence as being interconnected, but not completely consistent with a set of practices, protocols, and theories created by "bureaucrats, political officials, and supporters of government agencies" (p. xiii). David Monteyne, an Associate Professor at the University of Calgary's School of Architecture, Planning, and Landscape, specializes in architectural history and has undertaken various studies of public spaces, monuments, buildings, and urban sites. It is important to note that Monteyne (2011) highlights how civil defence contrasts with military defence, which is largely conducted by a country's armed forces.

In addition, within the history of civil defence, the scholarly book identifies how city-states evolved into nation-states, an evolution that was associated with the emergence of "responsibility" among political entities and officials to ensure citizenry were protected from the possibility of an attack (p. xiii). In the book "Fallout Shelter Designing for Civil Defence in the Cold War", published in 2011, by David Monteyne, he describes how the process of demarcating a border and defending a specific defined area of territory, are actions that historically produced a "national identity" among citizens within that "space" (p. xiii). In this regard, he points out how the scale of architecture enabled the ability of bureaucratic control over a territory, and its integration into day-to-day settings. He stresses this point by noting that civil defence architecture worked to create individual identification with civil defence, and "centralized" the power of government, as well as the "meaning" of civil defence itself (p. xiii).

Historically, civil defence plans took into consideration how people would cope when confined to shelters (Broadwater, 2009). In the book review written by Jeff Broadwater of

Tracy C. Davis's "Stages of Emergency: Cold War Nuclear Civil Defence", he identifies how civil defence research drew on exercises and sociological research focused more on "modest" disasters and emergencies, such as motorists being stranded in a major blizzard for instance (p. 239). Jeff Broadwater is an Associate Professor of history at Barton college.

Moreover, he identifies clear reasoning for the establishment of civil preparedness measures. In his explanation he describes how civil preparedness measures originated with a belief held by government officials in the United States that public opinion would ultimately "determine the outcome of a nuclear war" (p. 239). In this regard, he notes how the implementation of 'home readiness' programs within broader civil defense education was largely intended to maintain civilian morale both before and after a [nuclear] attack. In addition, he notes that planners within the United States Department of Defense premised their assessments on determinations that people would be better positioned to cope with a nuclear catastrophe where "community social networks were maintained" (p. 239).

Furthermore, he points out that in time, computer simulations emerged as a means of predicting the human and economic impacts of a nuclear attack, as well as to assist in planning for evacuations before nuclear bombs would begin to fall. In addition, he identifies how civil defence exercises continually "invoked acting, rehearsal, and theater as operating terminology" (p. 238). In this regard, Broadwater (2009) notes that Cold War civil defence in Canada, the United States, and Great Britain often relied upon both techniques and traditions of the "stage" (p. 238). He identifies that at its very origins, while civil defence began with the idea of providing shelter just before a nuclear attack, the shelter movement ultimately faced "insurmountable problems" (p. 238).

Historically, he notes that blast protection within civil defence measures was exorbitant although it was practicable from an engineering standpoint, so Cold War civil defence efforts were largely focused on providing shelter from fallout (p. 238). However, he underscores that it is important to point out that the demands of adequate fallout protection “far exceeded” the resources available (p. 238). Also, civil defence planning historically largely sought to mitigate the threat into more “manageable dimensions” (p. 239). In this regard, he identifies how civil defence plans often sought to minimize the extent of fallout in addition to the presence of radioactive materials, while overlooking long-term effects, such as ecological and genetic damage (p. 239).

In contemporary time, civil defence and preparedness around the world is obtaining new meaning with both citizens taking proactive measures to defend themselves, and governments reinstituting civil defence measures, amid an increasing threat of nuclear war. For example, as the world attempts to shift into a new post-COVID 19 normal, global anxiety and specifically, European anxiety is shifting from pandemic fears towards a fear of “nuclear annihilation” (Horowitz, 2022, para. 1). In the article “Pandemic Fears Give Way to a Rush for Bomb Shelters”, published in 2022, in the New York Times, by Jason Horowitz, he identifies how with regards to civil defense and preparedness measures in contemporary time, bunkers are being constructed, and survival guides are being sold in massive numbers (Horowitz, 2022, para. 1, 2, 6). Jason Horowitz is the Rome bureau chief of the Times covering Europe, the Obama Administration and U.S. Congress, with his work focusing on political profiles and features.

With regard to contemporary civil defence and preparedness measures being implemented in Finland for instance, he notes that in the nation on Russia’s western border, civil preparedness measures are ongoing whereby alarms are undergoing regular testing, and the

military is maintaining a high level of readiness for a nuclear attack (para. 13). Also, he points out that in Sweden, the country's Civil Contingencies Agency is testing an air-raid warning system (Horowitz, 2022, para. 16). In addition, he identifies how the Swedish government has begun distributing a "Cold-war-era-style precautionary pamphlet" referencing a guide with a checklist for basic supplies to be obtained from supermarkets and kept in order to survive, should non-combatant civilians either flee or take shelter in a bunker (para. 16). In concluding this subsection, it is key to note that he underscores that these developments mark a new stage in global civil defence, whereby the use of bunkers are once again increasingly being considered as a cornerstone of plans to ensure human survival should man-made nuclear attack disasters occur during this turbulent period in global geopolitics.

3.3 Civil Defence in Canada Within Allied & 'Western' Civil Defence

This section of the thematic literature review assesses civil defence in Canada within broader Allied and 'Western' civil defence plans. The researcher has excluded the important, related topic of assessing specific instances of Canadian civil defence operations as the research scope places focus on the state of civil defence plans more broadly. The challenge of protecting civilian populations in wartime became more difficult with the occurrence of mass air raids in WWII (Harris, 2015, para. 2). In the article titled "Civil Defence", last updated in 2015, in the Canadian Encyclopedia, by Stephen Harris, he notes that although the threat to North America was widely considered to be "negligible", Canada introduced air-raid precautions that assisted with blackouts, early warning radar, active fighter defence, and rescue and emergency relief organizations (para. 2). He points out that the first peacetime civil defence co-ordinator in Canada was appointed in October 1948 to manage the work of federal, provincial, and municipal authorities in planning for public air-raid shelters, and emergency food and medical supplies. In

addition, he notes how the work of Canada's first peacetime civil defence co-ordinator included oversight of the evacuation of areas that maintained a higher probability of being targeted (Harris, 2015, para. 2).

On Guard Canada was a civil defence convoy that travelled to major cities across Canada. In the journal article titled "Armageddon on Tour: The "On Guard, Canada!" Civil Defence Convoy and Responsible Citizenship in the Early Cold War", published in 2006, in the *International Journal*, by Andrew Burtch, he notes that the exhibit demonstrated by the On Guard convoy, was at first designed in the United States, and constituted Canada's first countrywide publicity campaign launched by the federal government (Burtch, 2006, p. 735, 736). He describes how the campaign sought to persuade the Canadian public of the need for Canada to adopt civil defence measures (Burtch, 2006, p. 735, 736). Andrew Burtch, an Adjunct Research Professor, is a post-1945 Historian at the Canadian War Museum, whose work has focused on the Korean War and the Afghanistan War, among other conflicts around the world that range in occurrence from the Cold War era to contemporary time. Moreover, Burtch (2006) notes how Canada's Federal Civil Defence Agency initiated collaboration with its provincial and municipal counterparts to implement civil preparedness measures. Also, he points out that Canada's Federal Civil Defence Agency utilized the civil preparedness exhibit to ultimately make the case that the long and vast distance separating Canadians from Cold War conflicts in both Europe and Asia ultimately "no longer protected them", due to the increasing capabilities of nuclear weapons (p. 736).

In Canada, he notes, civil defence authorities sought to take civil defence beyond the implementation of protective measures. For example, Canadian civil defence authorities also initiated "advertisement" of civil defence as being both a "permanent and vital component of

good citizenship” during the Cold War (p. 736). In the immediate postwar years, he describes how the Canadian government sought to emphasize the rights enjoyed by Canadians as citizens, through cultivation of a citizenship education program within the broader Canadian civil preparedness strategy. As civil defence is assessed in the context of citizenship in Canada, he underscores that it is important to recognize that citizenship through participation in the nation’s overall civil defence strategy, maintained differing features of both “attraction and application” within a Canadian society that historically was naturally defined by numerous linguistic, ethnic, and cultural communities (p. 737).

Moreover, he explains how the Federal Government of Canada increasingly considered the diversity of Canadian society and its implications for support of the war effort. In this regard, he points out that officials in the Canadian Department of National War Services sought steps that would advocate “loyalty to a single Canadian identity through adult education” about the fundamental importance of Canada’s civil defence program in supporting the chances for individual survival and protection of national Canadian identity (p. 737, 745). Furthermore, he describes how citizenship during wartime was often defined in terms of Canadian judicial institutions and was underscored by contrasting the comparative freedoms that were maintained by Canadian society, as opposed to the dictatorship of Adolf Hitler and other dictatorships. Also, he points out that Canada, in correspondence with the United States, sought the establishment of civil defence agencies that were created to meet the threat of the Cold War. These civil defence agencies he notes, interconnected publicity programs with the citizenship “project” by stressing that participation in civil defence was a fundamental component of citizenship (p. 736, 737).

Canadian participation in the development of nuclear weapons, as well as the commencement of the Cold War in the late 1940s, forced the Canadian government and

subsequently, the public to contemplate strategies to enhance overall civil defence (Harris, 2015, para. 1, 3). In the article “Civil Defence”, Stephen Harris identifies how in 1959, the Diefenbaker government reassigned responsibility for civil defence to the Emergency Measures Organization, which became Emergency Planning Canada from 1974-86, and then became Emergency Preparedness Canada in 1986 (para. 3). Thereafter, he describes how the Canadian government, under Prime Minister Diefenbaker assigned army units in Canada to training for post-atomic attack survival and evacuation operations.

Contemporarily, he notes that the Federal Government of Canada continues to have an attack warning system. Also, he identifies how federal civil emergency planning for peace as well as war, was once co-ordinated by the Office of Critical Infrastructure Protection and Emergency Preparedness which succeeded Emergency Preparedness Canada on February 5, 2001 (para. 5). In concluding this sub-section, it is key to note that the contemporary structure of Canadian civil defence, which emerged through OCIPPEP, is now administered by Public Safety Canada (Mellon, 2022).

3.4 U.S. Civil Defense

Prior to assessing the topic of Canada’s civil preparedness for the threat of a man-made nuclear attack disaster, it is important to evaluate civil defence in Canada, in regard to its role among other allied and NATO nations, especially the United States. U.S. Civil Defense is relevant to this MRP because Canadian Civil Defence developed alongside U.S. Civil Defense. Monteyne (2011) notes that historically, civil defense preparations occurred in countries other than the United States. In his work, he points out that during the Cold War, the U.S. and other countries around the world required buildings to “include shelters” (Monteyne, 2011, p. xiv). In comparing Canada and the United States in terms of civil defence, he describes how historically,

United States officials pursued greater efforts to ensure that civil preparedness measures were established, whereby “persuasion was a central strategy” (p. xiv).

In that regard, the scholarly book highlights how U.S. officials also took greater steps to ensure that citizens and professional designers of buildings and architects themselves, were “convinced” of the importance of fulfilling their role in overall civil defense (p. xiv). Additionally, he assesses the role of architects and architecture in civil defense, and in doing so, identifies the “seriousness and significance” of the U.S. government’s agenda with regards to implementing civil preparedness measures (p. xv). In closing this sub-section, it is important to note however, that he stresses that in Canada, the seriousness of civil defence measures differed (p. xiv).

3.5 Nuclear Weapons Risk

3.5.1 Nuclear Posture Review

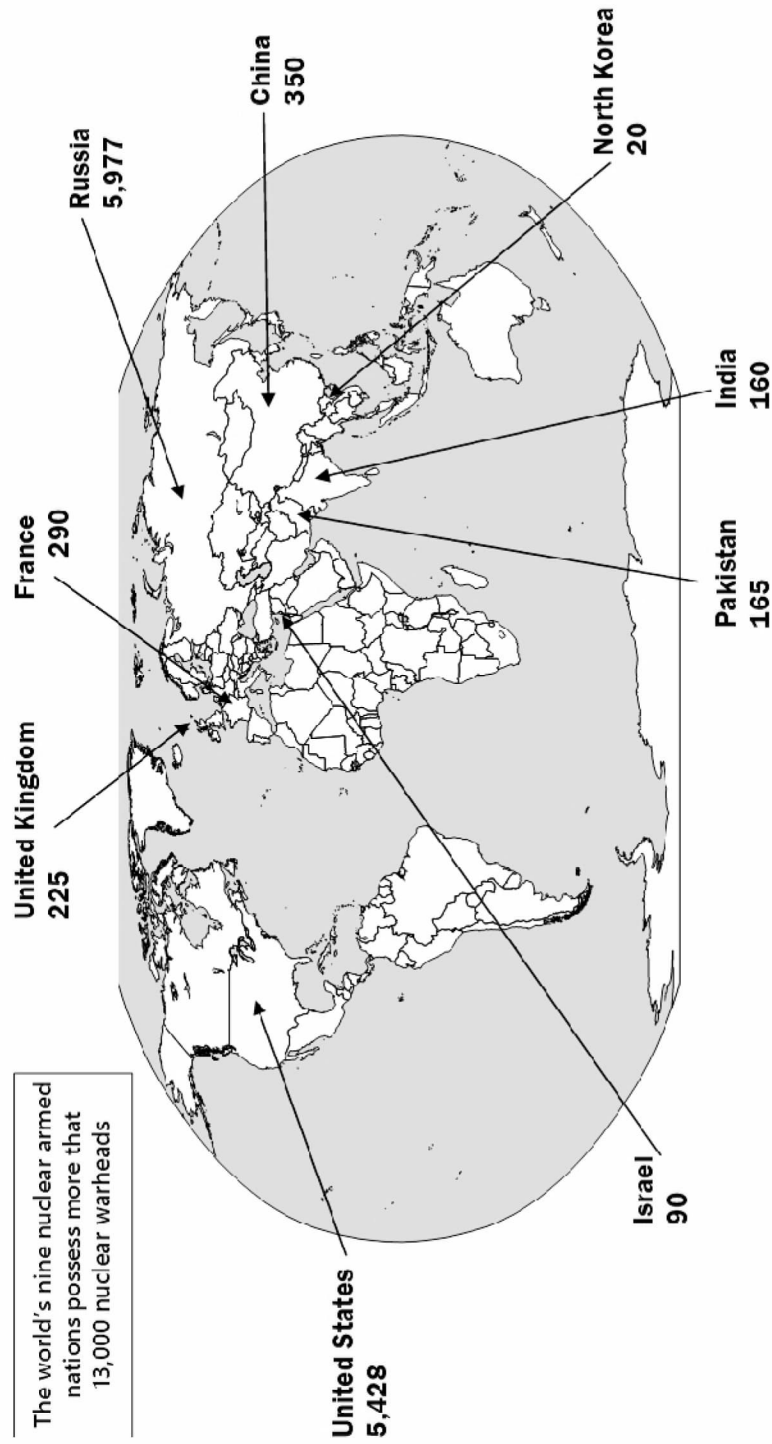
This section of the thematic literature review covers the topic of nuclear posture review, which the researcher defines as looking at nuclear weapons arsenal numbers, the Strategic Arms Reduction Treaty, and a discussion of the differences between tactical non-strategic, and strategic nuclear weapons as a means of nuclear deterrence. Nuclear arsenal numbers inform this work because providing an overview of the nuclear capabilities of various powers provides additional context on the force posture of nuclear powers. While including these topics, I have excluded the related topic of the explanation of the development of nuclear weapons by nation-states, as my research scope is limited to information regarding the contemporary status of nuclear weapons, as opposed to explanation of their historical development by scientists that propelled the Allied race to the nuclear bomb.

By way of opening context, as of early 2022, there are approximately 12,700 known nuclear warheads around the world. In this regard, the known global combined inventory of nuclear warheads stands at a “very high level” (Kristensen & Korda, 2022, para. 1). It is estimated that 90% of all nuclear warheads are possessed by the Russian Federation and the United States. Both the Russian Federation and the United States maintain over 4,000 known warheads in their military stockpiles. While nuclear weapons arsenals around the world have been reduced since the Cold War era, it is important to recognize that the “pace of reductions” in the overall global inventory of nuclear weapons is “slowing in comparison” with the past three decades (para. 3).

3.5.2 Nuclear Arsenal Numbers

In the article “Status of World Nuclear Forces”, published in 2022, in the Federation of American Scientists, by Fred Kristensen and Sally Korda, they provide an estimate of the total number of nuclear weapons on the planet (Kristensen & Korda, 2022). Both of them are employed as senior defence analysts at the RAND Corporation. This paragraph is based on paraphrasing their data from that article. The post-Cold War era in human history was marked by a reduction in nuclear weapons arsenals. For instance, in 1986, there were 70,300 known nuclear weapons in the world. They said, most of the reduction of nuclear weapons occurred in the 1990s (para. 7). Moreover, in early 2022, they estimated that a total of nine countries possess approximately 12,700 nuclear warheads. The nations owning nuclear weapons that they identify, include the United States, the Russian Federation, India, Israel, France, China, North Korea, Pakistan, and the United Kingdom, which all remain nuclear weapons powers (See Figure 5). In terms of precise estimates, they note the Russian Federation possesses 5,977 nuclear warheads, followed by the United States, which possesses 5,428 nuclear warheads.

Figure 5. Estimated Global Nuclear War-head Inventory, 2022



- Figure derived from : "Estimated Global Nuclear War-head Inventories 2022", By Hans M. Kristensen and Matt Korda. American Federation of Scientists. Available at <https://fas.org/issues/nuclear-weapons/status-world-nuclear-forces/>
- Map Source: Base Map is Licensed as Public Domain "Blank Political Map of the World with Oceans" Author Pet Dlouhy Wikimedia Commons Available at https://commons.wikimedia.org/wiki/File:World_Map_Blank_-_with_blue_sea.svg

Also, the People's Republic of China possesses 350 nuclear warheads, followed by France: 290, and the U.K.: 225, in addition to Pakistan: 165, and India: 160, as well as Israel: 90, and North Korea: which possesses 20 nuclear warheads respectively. They conclude that such numbers exclusively remain estimates, since the exact number of nuclear weapons held by any nation is a closely guarded nuclear secret.

Furthermore, they point out that while the “overall inventory” of nuclear weapons has reduced, the number of warheads within global military stockpiles, and more specifically, warheads that are “assigned to operational forces”, is now on the rise (para. 4). In addition, while many estimates of the overall number of nuclear weapons globally point to a drop in the number of nuclear weapons in the world since a peak of 70,300 in 1986, they identify the importance of placing current estimates in context. To this point, they assert that a comparison of current numbers of nuclear weapons to previous numbers of nuclear weapons cannot be relied on to make accurate determinations about the trajectory of nuclear weapons use, as today's nuclear weaponry technology is “vastly more capable” than the weapons that were deployed and operated during the Cold War era (para. 7). In concluding this sub-section, they demonstrate that rapidly advancing technology disproves previous notions that decreasing numbers of nuclear weapons is an effective method of reducing their destructive power, as reduction of the quantity of weapons will not reduce the destructive nuclear capabilities of nuclear states, as the destructive abilities of nuclear weapons continue to be improved overtime.

3.5.3 Global Nuclear Arms Reduction Efforts

Moreover, the Strategic Arms Reduction Treaty informs my work because it remains the legal basis for regulating nuclear arms production among the two countries with the largest known nuclear arsenals in the world. The Strategic Arms Reduction Treaty, or START, was

signed in 2010 in Prague by the United States and Russia, and officially entered into force on February 5th, 2011 (Bugos, 2022, para. 1). In the article, “U.S., Russia Extend New START for Five Years” dated March 2021, in the Arms Control Association, by Kingston Reif and Shannon Bugos, they note that on February 3rd, 2021, the United States and Russia agreed to extend START by five years, maintaining in place the treaty’s “verifiable limits on the deployed strategic nuclear arsenals” of the world’s primary nuclear powers (para. 1). Kingston Reif was the Director for Disarmament and Threat Reduction Policy at the Arms Control Association and left to become the Deputy Assistant Secretary for Defence for Threat Reduction and Arms Control at the Pentagon. Shannon Bugos is a senior policy analyst providing research and analysis at the Arms Control Association. They identify that New START limits in effect have “capped” accountable “deployed strategic nuclear warheads” to 1,550 and deployed heavy bombers and missiles to 700 (para. 35). Additionally, under the New START treaty, the United States and Russia will continue to rely on National Technical Means (NTM), which is a database on the types, numbers, and locations of treaty-limited items to monitor each country’s strategic nuclear forces.

Furthermore, in the article “New START at a Glance”, dated April 2022, in the Arms Control Association by Shannon Bugos, she points out that to monitor Russian mobile ICBMs, the New START ensures that all new missiles are “subject to the treaty” as soon as they leave a production facility (para. 14). She identifies that the previous START treaty did “not directly limit warheads” but did determine a number of warheads allowed for each launcher (para. 12). Bugos notes that the New START does “not limit the number” of non-deployed ICBMs and SLBMs (para. 7). However, she points out that the New START does monitor their numbers and undertakes on-site inspections while providing “continuous information” on their locations in

attempting to confirm that ICBMs and SLBMs are “not added” to the deployed force (para. 7). Also, she describes how the New START treaty allows ten on-site inspections of deployed warheads and deployed and non-deployed delivery systems at ICBM bases, as well as submarine bases and air bases. Verification of treaty limits and conversion or elimination of delivery systems is carried out by NTM with 18 annual short-notice, on-site inspections. However, she asserts that current and planned U.S. missile defense programs are not constrained by New START. Bugos (2022) underscores that while the New START acknowledges the “interrelationship between strategic offensive arms and strategic defensive arms”, current strategic defensive arms “do not undermine” the effectiveness or viability of the strategic offensive arms of the signatories (para. 16). In closing this sub-section, it is important to identify that Bugos (2022) demonstrates that while although the New START treaty has been effective in ensuring continuous information on the numbers of nuclear weapons deployed by both U.S. and Russian forces, it does not limit the ICBMs and SLBMs that are stockpiled by the world’s two primary nuclear powers. Subsequently, this means that the New START treaty does not entirely restrict the respective nuclear capabilities of each of the primary nuclear powers.

3.5.4 Tactical vs. Strategic Nuclear Weapons

Examining differences between tactical and strategic nuclear weapons informs my work because it provides context on how the type of nuclear weapon used for attack purposes ultimately influences discussion of nuclear deterrence all together. Regarding nuclear war, deterrence represents the notion that the possession of nuclear weapons can protect a nation from military attack (Tannenwald, 2022, para. 2). Nina Tannenwald is the Director of the International Relations Program at Brown University’s Watson Institute, and has conducted extensive research on efforts to control weapons of mass destruction, ethics, and the use of force, as well as nuclear

weapons. In the article “‘Limited’ Tactical Nuclear Weapons Would Be Catastrophic”, published in 2022, in the *Scientific American*, she notes how the notion of deterrence is primarily rooted in the threat of “overwhelming” nuclear retaliation in the event of a military attack on a nation-state (para. 2). She identifies how militaries are increasingly seeking deterrence through the use of non-strategic, or ‘tactical’ nuclear weapons. She clarifies that tactical nuclear weapons contain an “exceedingly large amount” of explosive energy, whereas strategic nuclear weapons maintain “even larger” amounts of explosive energy (para. 4).

Moreover, she notes how in contrast to strategic nuclear weapons, ‘tactical’, non-strategic nuclear weapons exist as a means of deploying and using nuclear weapons that will not necessarily result in large-scale and city-raiding destruction. Also, she notes how their purpose is specific; to make nuclear weapons small enough, and precise enough to make their use “more thinkable” (para. 6). However, she notes that a thermonuclear explosion of any size possesses overwhelming destructive power, whereby even a small-yield nuclear weapon would produce damage far beyond the level of damage that would result due to a conventional explosive being detonated.

In addition, in comparing tactical and strategic nuclear weapons, she points out no global consensus exists on the definition of non-strategic, tactical nuclear weapons. She concludes that nuclear deterrence comes with tremendous risks and stresses the need to recognize that nuclear deterrence could ultimately fail. In referencing the ‘paradox of deterrence’, she underscores that tactical nuclear weapons use has made nuclear weapons use “more thinkable” and smaller ‘tactical’ nuclear weapons with a higher level of precision conclusively make the arms “more tempting to use first”, as opposed to being kept solely for retaliatory use (para. 6). In concluding this sub-section, it is key to note that Tannenwald (2022) demonstrates how tactical nuclear

weapons only makes nuclear weapons use more probable, contradicting deterrence theory. In that regard, analysis of Tannenwald's work demonstrates that tactical nuclear weapons represent the type of weapon that maintains a higher risk likelihood of being used, given that their use will not result in the colossal destruction that strategic nuclear weapons would induce.

3.5.5 Doomsday Clock

This section of the thematic literature review covers the topic of the risk of nuclear war which the researcher makes determinations about through analysis of the Doomsday Clock and the current conflict in Eastern Europe. While including these topics, the topic of the Cold War has been excluded, as the research scope is limited to information about the current risk of nuclear war, rather than the historical risk of nuclear war. Prior to assessing the risk of nuclear war in 2022, it is crucial to provide context about the turbulent time in which this MRP is being completed. This project is being undertaken in 2022. In 1947, the Bulletin of the Atomic Scientists created a doomsday clock two years after the first atomic weapons were created in the Manhattan project (Mecklin, 2022, para. 1).

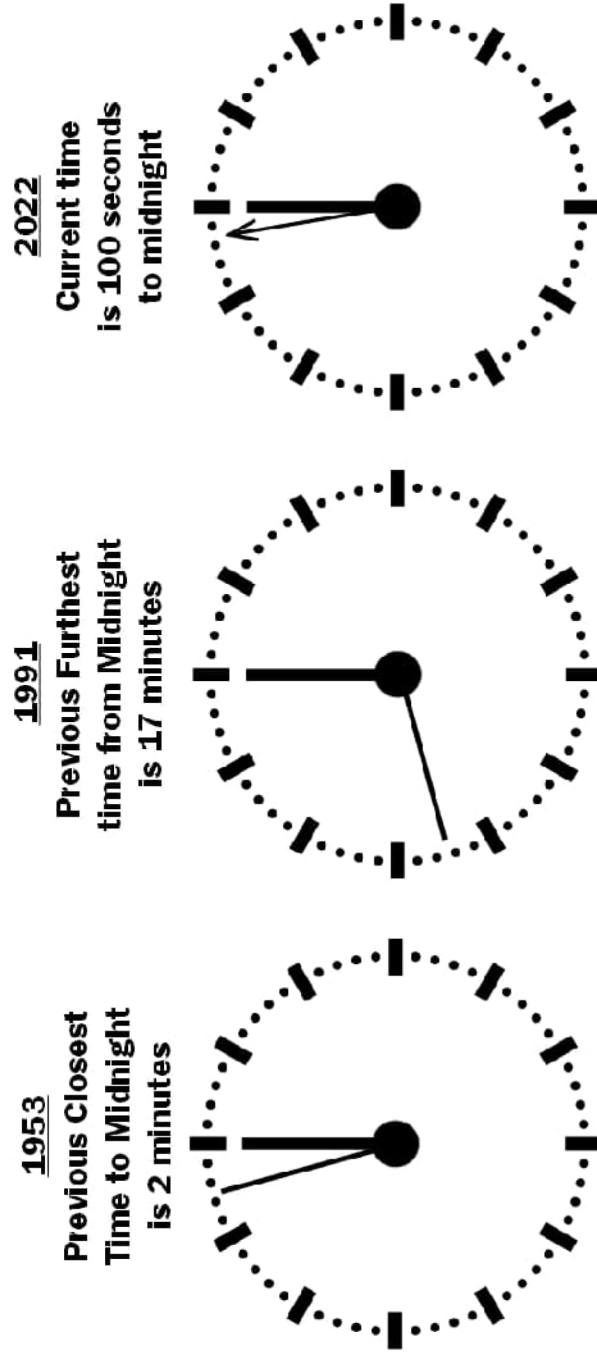
In the article "At doom's doorstep: It is 100 seconds to midnight: 2022 Doomsday Clock Statement", published in 2022, in the "Bulletin of Atomic Scientists" by John Mecklin, it utilizes imagery of apocalypse, or midnight, as well as the contemporary idiom of nuclear explosion, which is marked by a countdown to zero. John Mecklin is the editor-in-chief of the *Bulletin of Atomic Scientists*. As the Doomsday Clock is set every year, he notes that it is important to recognize that the doomsday clock is a "universally recognized indicator of the world's vulnerability to catastrophe from nuclear weapons" (para. 1). In its essence, he explains that the countdown represents threats to both the planet and ultimately, humanity. In addition to 2020, in the year 2022, the article highlights that the clock has been set at 100 seconds to midnight,

indicating that the world is the closest it has ever been to facing a catastrophe that destroys humankind (Mecklin, 2022) (See Figure 6).

Furthermore, Mecklin (2022) identifies that U.S. relations with other global nuclear powers, Russia and China, are increasingly tense at the time of writing, in 2022. He explains that the tensions are due to all three global powers remaining “engaged in an array of nuclear modernization and expansion efforts” (para. 4). He notes this includes an evidently “large-scale program” to increase deployment of silo-based long-range nuclear missiles by the government of the People’s Republic of China (para. 4). As the Chinese government has started to build new ICBM silos on a large scale, he points out that such developments have led to concerns that China may be considering an alteration of its nuclear doctrine (para. 16). In addition, China and Russia have both tested anti-satellite weapons, increasing concerns about rapid escalation in any conventional conflict with the United States (Mecklin, 2022).

Regarding the Near East, he notes that the Islamic Republic of Iran’s government continues to develop an “enriched uranium stockpile” (para. 15) While the country’s government has asserted that all sanctions should be removed before returning to talks with the United States on the JCPOA, he makes clear that the “window of opportunity” for an agreement to be reached appears “to be closing” (para. 15). These developments subsequently increase the possibility that the Iranian government will either reach or reveal possession of a nuclear weapon, thereby expanding nuclear weapons possession in the Near East region. Additionally, as the Iranian government’s nuclear program continues to develop, it remains clear that Near Eastern regional countries, such as Saudi Arabia, are indicating that should Iran acquire nuclear weapons, they may seek to correspondingly acquire “similar [nuclear] capabilities” (para. 15). These developments he points out, represent the basis that foreshadows the potential for a Middle East

Figure 6. Domsday Clock Illustration



The Domsday Clock is a metaphor that warns the public about how close we are to destroying our world with dangerous technologies of our own making. Created by the Bulletin of Atomic Scientists in 1947, in 2022 the clock indicates that humanity is closer to midnight (or doomsday) than at any time since the advent of atomic weapons in 1945.

- Figure derived from: "2022 Domsday Clock Announcement: 100 Seconds to Midnight", by The Bulletin of Atomic Scientists. Available at <https://thebulletin.org/doomsday-clock/>
- Clock Image Source from: Clock image is licensed as public domain by Mitchev, CC BY-SA 3.0 via Wikimedia Commons Available at <https://creativecommons.org/licenses/by-sa/3.0>

conflict to occur between multiple countries with both “increasing expertise and material” to assemble nuclear weapons (para. 15).

In closing this sub-section, it is important to note that he identifies how the United States is not immune to a nuclear attack disaster that could emerge from both external and internal threat origins. Regarding the internal threat of nuclear attack, Mecklin (2022) points out that the insurrectionists which overran the U.S. Capitol in Washington D.C. “came close to capturing” U.S. Vice President Mike Pence, in addition to the “nuclear football” that accompanies the U.S. vice president as the “backup system for nuclear launch commands” (para. 18). These examples highlight that the risk of nuclear weapons use by a nuclear power emanates from both domestic and foreign threat origins.

3.6 Continuity of Government During Nuclear War

By way of opening context, continuity of government represents the “continued functioning of constitutional government under all circumstances” (Relyea, 2005, p. 1). Continuity of government informs this work, as it has often been described as constituting the ‘heart’ of civil defense operations. Harold C. Relyea is a specialist in U.S. national government, and in particular, the government and finance division. In the CRS Report for Congress prepared by Harold C. Relyea, he notes that in many countries, arrangement for the continued operation of the federal government in the event of a national disaster or emergency are identified within plans, policies, and laws. He points out that continuity of government also rests upon the principle of establishing defined procedures that allow a government to continue its essential operations in case of a catastrophic event, such as nuclear war. Furthermore, he identifies that continuity of government programs are not released to the general public due to the sensitivity of

such information (p. 1). Yet, in many countries, the public maintains a general notion of the fundamental protocol and procedures for succession planning.

For example, in the United States, the President swears or affirms a pledge to “preserve, protect, and defend the constitution” (p. 1). Members of the U.S. House of Representatives, Senate, and individual state legislatures, judicial and executive officers, are also bound by the same pledge to defend the constitution at all costs. Such provisions constitute the fundamental basis for principal government officials, in their distinct “capacities” to contribute to planning and policies that will secure the continued functioning of constitutional government within “all circumstances” (p. 1). Regarding these examples of continuity of government planning for nuclear war in the United States, a lack of equivalent clarity remains regarding continuity of government plans that are publicly available in Canada.

Disasters, emergencies, and catastrophes become “defining events” in which primary agencies, such as, city planners, law enforcement, national armed forces, and government more broadly, seek to “decrease vulnerability” by taking measures to both “reduce casualties and exposure to damage” that will result from disaster impact (Penuel et al., 2013, p. 1). In the book “Encyclopedia of Crisis Management” by Bradley Penuel, Matt Statler, and Ryan Hagen, they note that governments must maintain plans to govern in the event of a large-scale disaster, in order to ensure the “safety of communities at risk” (p. 2). Bradley Penuel is the Director of the New York University Center for Catastrophe Preparedness and Response.

Also, Broadwater (2009) in his work identifies how policymakers in western governments opposed to the rising power of the Soviet Union, focused on “‘continuity of government’” planning, in which protecting populations would become less important than “trying to govern whatever survived” (Broadwater, 2009, p. 240). In this regard, he points out

that continuity of government planning within broader civil defence measures would see officials in various allied governments head out to regional bunkers. For example, he describes how in the event that a nuclear attack on the American seat of Federal Government would occur, the U.S. president would go to Mt. Weather, Virginia. Also, he points out how in the past, U.S. Congress members would immediately seek shelter in the Greenbrier bunker in West Virginia (p. 240).

3.6.1 Greenbrier Bunker

In this regard, the survival of United States government personnel depended on the Greenbrier bunker located in White Sulphur Springs, West Virginia. In the journal article titled “The Graceland of Cold War Tourism: The Greenbrier Bunker”, published in 2012, in *Dissent*, a quarterly publication of politics within Project Muse, Jon Wiener describes how underneath the Greenbrier Resort, within five hours of Washington D.C., a continuity of government plan was implemented by the United States Federal Government to shelter 100 senators and 435 representatives of government in the event of a nuclear attack (Wiener, 2012, p. 66).

He points out that the U.S. continuity of government plan was ultimately premised upon a fundamental belief held by the U.S. government that the United States as a country could “survive a nuclear war” (p. 66). In considering the importance of government before, during, and after a nuclear disaster, Wiener (2012) underscores that U.S. leaders remained committed to keep representative democracy functioning. He points out that in order for such plans to be made practicable, planning at the time of the establishment of the bunker ensured that Congress members could get to the bunker in either days, or up to three hours from the point of launching of any nuclear missiles (p. 69).

The Greenbrier bunker is built 720 feet underground. In the article titled “Greenbrier Bunker”, published in 2018, in the Atomic Heritage Foundation, the article points out that unlike the Diefenbunker, the Greenbrier Bunker was not built to survive a direct nuclear strike. It notes that the Greenbrier Bunker however is capable of withstanding a blast from approximately 15-30 miles away, and “protecting its occupants from fallout” (“Greenbrier”, 2018, para. 6). It describes how the two-level bunker consists of an area that is approximately 112,544 square feet, or comparative to the size of two football fields on top of one another.

Moreover, the article points out that the Greenbrier bunker has four doors, all of which were made by the Ohio-based Mosler Safe Company, which were transported to Greenbrier by railway. The two largest doors, known as GH 1 and GH 3, measure at 28 and 20 tons respectively, whereby both doors require 50 pounds of force to open (para. 7). Upon being sealed, the bunker would already maintain enough air to last 72 hours, after which a ventilation system would filter air from the bunker’s exterior. While extensive efforts were made to ensure that the bunker itself was kept a secret, its largest halls that were to be used for sessions of U.S. Congress, were actually part of the Greenbrier hotel. The article notes that these halls would have been sealed off solely in the event of a nuclear attack disaster (para. 8). Also, the article points out that the Greenbrier’s adjoining hotel had a door with a statement on it reading, “Danger: High Voltage Keep Out”, which was really a hidden passage that connected to the rest of the site’s bunker, where government personnel would take shelter to ensure continuity of government operations (para. 9).

In the article, it is noted that in the event of an attack, congressmen would have first been directed to the decontamination room, where they would remove all clothing, then be showered, and thereafter be provided with uncontaminated clothes (para. 9). In addition, the site maintained

18 rooms, that were built to serve the function of habitation for 60 people in metal bunk beds. The article points out that there remains uncertainty about the ability of congressmen to bring their families with them to the bunker (para. 15). Also, the article describes a case whereby a U.S. congressman noted a loss of interest in the COG planning that encompassed the Greenbrier when he learned that his “wife would not be going with [him]” (para. 15). In concluding assessment of the article, it is key to point out that there were plans to expand the Greenbrier’s bunker facilities in order to accommodate families, although it identifies that there remains a lack of certainty regarding if or when the bunker expansion project occurred (“Greenbrier”, 2018, para. 15).

In 1979, U.S. President Jimmy Carter signed Executive Order 12127, and established the Federal Emergency Management Agency, or FEMA (“History of FEMA”, 2021, para. 3). The U.S. Government in creating FEMA, combined responsibility for natural disasters with civil defense including the implementation of continuity of government preparedness measures (Broadwater, 2009, p. 240). In concluding this sub-section, however, it is key to point out that Broadwater (2009) identifies that the United States was not alone in ensuring continuity of government planning in the event of a nuclear attack. He underscores that while it was widely believed that the U.S. would have been the main target of an attack, Canada continued to implement plans for protecting its critical personnel and government operations at the Diefenbunker site in Carp, Ontario. He concludes this point by underscoring how Canada’s Federal Government implemented continuity of government preparedness measures within broader civil defence plans from the nation’s nuclear war command post, the Diefenbunker.

3.6.2 Diefenbunker

Moreover, Burtch (2006) asserts that Canadian defence expenditures in part, sought to address the danger emanating from the nuclear attack disaster threat that could intensify in the event of an outbreak of “nuclear war” (Burtch, 2006, p. 735). For example, he points out that in the sixth year of the Cold War, major global players competed over the division of post-war Germany, as war raged on the Korean peninsula. The scholarly book describes the dangers that emerged as Canadian soldiers were fighting, patrolling, and dying in a war with the Chinese army, that fought in support of North Korea. Namely, he stresses that during conflicts in both Germany and Korea, the thought of the “stunning power” of the atomic bomb, as well as rising fears that both conflicts could descend into a “suicidal nuclear war”, loomed over Canadian defence considerations (Burtch, 2006, p. 735). He notes that these looming threats influenced the civil defence programs of several countries.

In the article titled “Diefenbunker Resurrected”, published in 2011, in the Canadian Consulting Engineer, George Fawcett describes the Diefenbunker’s historical importance within Canada’s civil defence plans to ensure continuity of government (Fawcett, 2011, p. 19). Built between 1959 and 1961, he notes that the Diefenbunker’s purpose was clear: to maintain “Canada’s critical [government] functions” in the event that the country came under a nuclear attack during the Cold War era (p. 19).

He points out that the Diefenbunker was comprised of hundreds of rooms. Ultimately, he underscores that the purpose of these rooms was to ensure that all “necessities of life” could continue in a “highly sophisticated” working environment (p. 19). He clarifies that, the Diefenbunker was not a show of force for the adversaries of Canada and its allies, nor a political stunt at home to lower Cold War era public concerns about the possibility of a nuclear attack and

Canada's overall preparedness for it. He supports this argument by noting that for 33 years, the Diefenbunker ensured that in the event of a nuclear attack, and more pointedly, a "close-range nuclear missile attack", 525 occupants could effectively maintain continuity of government operations (p. 19). He concludes noting that the site encompassed operation of a command center, medical operating rooms to ensure the physical health and wellbeing of both government personnel and other critical persons, in addition to food storage facilities that would feed critical personnel, enabling them to "provide the thin thread of continuity of government" (p. 19).

Moreover, critical personnel that ensured continuity of government, included members of the Canadian military. In the article titled "The Diefenbunker wasn't obsolete. It was ahead of its time", published in 2020, in Maclean's by Nick Taylor-Vaisey, he describes how the Canadian military undertook serious efforts to secure preparedness measures that would ensure Canada could face the threat of a nuclear attack if and when it would occur. For example, he notes that Garry Dowd, who served in the Diefenbunker beginning in 1963, and remains one the Diefenbunker alumni, explained how his first commanding officer, "Jig" Macdougall, "forced men [soldiers]" to reside underground for "at least a year" before he would let them settle in a residence elsewhere, above ground (Taylor-Vaisey, 2020, para. 11). In making this point, he references Ed Gauthier, an enlisted soldier and one of the Diefenbunker alumni, that identified a time in which enlisted soldiers like himself, would remain "weeks beneath the surface" (para. 11). He points out that during the Cuban Missile Crisis for instance, enlisted soldiers like Ed Gauthier were effectively placed under "subterranean lockdown" (para. 11).

Furthermore, a great extent of secrecy surrounded the Diefenbunker. In the article titled "An eerie tour of Canada's past", published in 1997, in Maclean's by John DeMont, he notes that the high level of secrecy associated with the Diefenbunker was largely associated with public

and government fears that arose following a series of Cold-War era events (para. 5). For example, he references the case of Igor Gouzenko, a coding clerk at the Soviet Embassy in Ottawa who announced his defection and correspondingly exposed the existence of a Soviet spying ring in Canada. In highlighting the importance of these events, DeMont (1997) points out that Federal Authorities prepared to shield government personnel in the Diefenbunker within a plan that would evacuate 14 Canadian cities in the event that Soviet missiles were fired in retaliation for the defection and likely transfer of key intelligence information. In concluding this sub-section, these examples underscore the extent of continuity of government measures taken by the Government of Canada during the Cold War to address the nuclear attack disaster threat. More pointedly, these examples reveal the importance of the Diefenbunker in supporting continuity of government planning for this particular disaster threat in Canada.

3.7 Canada's Relation to Nuclear War

3.7.1 Canada's Nuclear Weapon Deployment During & Post World War II

This section of the thematic literature review covers the topic of Canada's relation to nuclear war, which the researcher defines as Canada's nuclear weapon deployment during and after World War II, and Canada's domestic nuclear weapons capabilities. While including these topics, I have excluded related debate about topics of nuclear disarmament, as the research scope focuses on information regarding Canada's relation to nuclear war marked by deployment of weapons and the development of domestic nuclear weapons capabilities rather than their relinquishment. In the article "Canada and Nuclear Weapons", published in 2021, in The Canadian Encyclopedia, by Taylor C. Noakes, he discusses how Canada maintained a role in assisting nuclear weapons development during World War II. Also, during the Cold War, he notes that Canada "operated" nuclear weapons (para. 1). Taylor Noakes is a journalist affiliated

with the CBC and is a public historian. For instance, he notes that Canada's Armed forces were armed with nuclear warheads from 1964 to 1984 (para. 1). To that point, he references the first nuclear weapons deployed in Canada, which were 11 and 15 Mark IV atomic bombs (para. 5).

Moreover, he describes how both nuclear bombs were "upgraded versions of the Fat Man bomb" that was used in the U.S. military attack that destroyed the Japanese city of Nagasaki in 1945 (para. 5). He points out that these nuclear bombs were deployed with 43 American long-range bombers in the summer of 1950 at the Goose Air Base in Labrador, the mainland region of the province of Newfoundland and Labrador (para. 5). In addition, he describes how the nation's RCAF's CF-104 Starfighters, a modified version of the Lockheed F-104 Starfighter supersonic fighter aircraft that were built by Canada, were equipped with Canada's "most destructive and numerous" nuclear weapons (para. 18). He cites the example of a period of time between 1964 and 1972, whereby Canadian Starfighters maintained access to various types of nuclear bombs, that encompassed different explosive yields (para. 18). Also, he notes how overall, Canadian Forces in Europe maintained access to at least 90 nuclear bombs, with some estimates identifying access by Canadian Forces to 210 nuclear bombs on the European continent, during the period of time between 1964 to 1972 (para. 18).

During and throughout the Cold War, he identifies how Canada also maintained a "large permanent" military force in Western Europe (para. 16). While this force included significant ground and air force deployments, it also included Canadian deployment of nuclear weapons in part, within Canada's contribution to NATO, and its mission to secure Western Europe, more broadly (para. 16). The sole nuclear weapon deployed and operated by Canada in Western Europe was the Honest John short-range nuclear artillery rocket, whereby he describes how

Canada maintained access to 16 W31 variable-yield warheads set to the 2-kiloton explosive yield (para. 17).

In closing this sub-section, it is important to point out that Noakes (2021) identifies that NORAD, a joint Canada- U.S. aerospace defense command, was established in 1957, whereby Canada deployed Bomarc missiles within a broad and joint continental defense strategy with the United States (para. 12). The Bomarc was a surface-to-air missile that was guided to its target by ground-based radars. Also, he explains that the Bomarc missiles had nuclear warheads that maintained an explosive yield of 10 kilotons, or approximately two-thirds of the strength of the bomb that destroyed the Japanese city of Hiroshima (para. 12). Finally, in assessing Canada's nuclear weapons deployment, it is important to underscore that he identifies that at least 56 Bomarc missiles were deployed to Canada in operation between 1960 and 1972.

3.7.2 Canada's Domestic Nuclear Weapons Capabilities

As Noakes (2021) highlights Canada's domestic nuclear weapons capabilities, he explains how during World War II, the British nuclear program was transferred to Canada, amidst threats of invasion of the European island nation by German Dictator, Adolf Hitler's armies (Noakes, 2021, para. 2). By the time of the nuclear program's transfer, he notes how Canada was already a crucial "leader" in the study of nuclear physics (para. 2). Also, at the Quebec Conference of August 1943, he points out how the British-Canadian nuclear research program merged with its U.S. counterpart, the Manhattan Project. In addition, he identifies that Canada's contribution to the Manhattan Project included a domestic program to supply and process uranium, as well as domestic research of the production of plutonium. He points out that Canada also provided scientists to the joint Allied study of nuclear physics, for assistance in research projects abroad, and for the creation of nuclear production facilities in other Allied

states (para. 3). Canada's involvement in the Manhattan Project he demonstrates, led to the development of the Canadian nuclear energy sector itself (para. 4).

Furthermore, he stresses that while Canada maintained such involvement in the development of nuclear weapons, Canadian Prime Minister John Diefenbaker demonstrated "contradictory positions" on nuclear weapons (para. 14). John Diefenbaker was Canada's Prime Minister from 1957 until 1963. He makes this conclusion based on statements issued by Canadian Prime Minister Diefenbaker that publicly opposed the use of nuclear weapons. However, he notes that despite statements of public opposition, Prime Minister Diefenbaker's government also commenced the nuclear weapons acquisition process (para. 14). For example, he points out that the Diefenbaker government purchased rockets and missiles with nuclear warheads while debate about the issue of nuclear warheads amongst the Canadian public was still ongoing. However, he describes how Prime Minister Diefenbaker was also discontented that the Canadian Armed Forces went on high alert during the Cuban Missile Crisis of 1962, a decision which Prime Minister Diefenbaker believed was "essentially made by the American military" (para. 14). He concludes that amidst the contrasting statements and policies, Prime Minister Diefenbaker often demonstrated concern that Canada was being "dragged into a nuclear conflict" against its will (para. 14).

In the journal article titled "Do We Want Buckets of Instant Sunshine – Canada and Nuclear Weapons 1945-1984", published in 2009, in the *Canadian Military Journal*, by Matthew Trudgen, he points out that while Canada maintained a robust economy and was a middle power, states with these characteristics do not always seek to develop nuclear weapons (Trudgen, 2009, p. 47). Matthew Trudgen is a historian of the U.S.-Canada defence relationship and is a research and policy analyst for the Federal Government of Canada. Instead, he describes the nuclear

umbrella of protection provided by the United States that Canada alternatively enjoyed in return for cooperation with its southern neighbour, and how it remained a key pillar of Canadian defence planning, including nuclear weapons policies. By the late 1940s, he notes that Canada had begun to build up its air defences to counter the nuclear attack disaster threat posed by Soviet intercontinental-range nuclear bombers. In addition, he remarks how the Royal Canadian Air Force had developed close ties with the United States Air Force (USAF), whereby both countries jointly constructed a continental air defence system to jointly secure the North American continent (p. 48).

By the end of the 1950s, as Canada sought to strengthen its commitment to North American air defences that guarded the continent from the threat of nuclear attack, he points out that this commitment was marked by the acquisition of nuclear-tipped air-to-air missiles, as well the surface-to-air missiles (SAMs) that were introduced into service in the United States (p. 48). Also, he notes that in addition to acquiring nuclear missiles, instead of producing its own atomic bomb, Canada would in time conclude that the best way to strengthen Canadian security was to continue to support the American atomic weapons program through exports of nuclear materials, such as uranium. In concluding this sub-section that assesses Canada's domestic nuclear capabilities, it is important to identify that Trudgen (2009) stresses that Canada's eventual recognition of a U.S. monopoly on atomic weapons led the Canadian government to avoid production of an atomic bomb and coincided with its to support for the American atomic weapons program, through exports of nuclear materials, such as uranium.

3.8 Conclusion

In summary, Kristensen & Korda (2022) is important to my research as they produce nuclear weapons estimates within their work at the Federation of American Scientists, that has

helped to address the high level of uncertainty regarding the number of nuclear weapons held by each country, and the nuclear force postures and capabilities of major nuclear powers. In relation to the topic of the Strategic Arms Reduction Treaty, key authors were Reif & Bugos because Reif's work as the director for disarmament and threat reduction policy, and Bugos's policy analysis helped to provide a clearer understanding of the underpinnings of the START Treaty, as it relates to arms reduction efforts by the two primary global nuclear powers. For the topic of "Tactical versus Strategic Nuclear Weapons", this Literature Review Chapter indicated that Tannenwald's 2022 article, "'Limited' Tactical Nuclear Weapons Would Be Catastrophic", is important in informing this study because it provides differing perspectives in the debate on the various differences between tactical and strategic nuclear weapons, and the impact of those differences on overall nuclear deterrence.

Regarding literature that assesses historical and contemporary civil defence, Monteyne (2011) is important to my research as it identifies the civil defence practices and theories that have been created historically by political officials, many of which continue to be utilized in contemporary time. Also, Broadwater (2009) is important to my research, as this particular piece of literature assesses how civil defence operations historically maintained certain techniques and traditions in theory, yet encountered difficulties with regards to the practicality of their implementation. In addition, Horowitz (2022) informs this work as this article provides very recent context on the contemporary state of civil preparedness around the world, and particularly in Europe, as the continent faces the threat of Russian military offensives, and the potential use of nuclear weapons.

In assessing literature that covers the topic "Civil Defence in Canada within Allied and Western Civil Defence", this work utilized Harris (2015) as a source, given the wealth of

information it contains on civil defence operations in Canada since WWII, and how the nation's civil defence plans were incorporated within broader Allied and thereafter, 'Western Block' civil defence. Also, Penuel et al. (2013) informs this work as it contains extensive relevant information on the various ways in which governments have devised plans that stressed governing at all costs after a large-scale disaster occurs. To conclude, the author found that tactical nuclear weapons use is more probable than strategic nuclear weapons use. This literature review therefore provides an important context for interpreting the contemporary risk of nuclear war, and what Canada's relation to it would be should such a situation develop.

Regarding the risk of nuclear war in 2022, Mecklin's work, "At doom's doorstep: It is 100 seconds to midnight 2022 Doomsday Clock Statement", is critical to informing this literature review as it provides relevant insight into how the risk of nuclear war in 2022 is calculated. This literature review takes a thematic perspective based on contemporary debate of the topics listed. Regarding Canada's nuclear weapons deployment and Canada's domestic nuclear capabilities, Noakes's "Canada and Nuclear Weapons" was chosen as it provides a detailed illustration of the weapons that Canada deployed during and post-World War II, and policies that guided development of Canada's nuclear weapons capabilities. To review debate of the history of nuclear posturing by global powers and nuclear war risk throughout history is too large a task for this work, therefore specific points were identified to be scrutinized.

In addition, the author finds that Canadian civil defence and continuity of government plans are not only closely based on equivalent U.S. plans, but civil defence overall is undertaken in close co-operation with the U.S. Lastly, this Literature Review Chapter highlights that in present time, as the threat of nuclear war increases alongside rising global nuclear tensions, these developments are not met with corresponding, heightened civil preparedness measures that

reflect the placement of civil defence at the forefront of government policies at all levels of government in Canada.

Chapter 4 - Methods

4.1 Introduction

The method of observation in this study is qualitative, observational, unstructured, and participatory. These methods, and their use in this study, are explained further in this Methods Chapter.

Moreover, this study employs observational, unstructured, participatory research methods, whereby the researcher sought to “immerse” himself in the observation venue, without “clearly defining the specific elements to be observed” before the study (Bustinza et al., 2021, p. 190).

Prior to going on-site, the researcher conducted a literature review, and the literature review came up with a total of ten themes. The themes that emerged during the literature review aided in guiding the researcher’s mind on what to observe. However, in the end, the researcher decided on a total of four themes and discourses including: ‘uncomfortable sites’, ‘time travel’, ‘upkeep and maintenance’, and ‘continuity of government and civil defence’. The four themes are explained further in this study’s Discussion Chapter.

When I applied a qualitative-observational-unstructured-participatory approach, I did not interact with human subjects. Therefore, informed consent procedures did not apply to this work.

Conclusively, King, Keohane, and Verba (1994) maintain that there are key facets that define all quality social science research, whereby inference is the goal. Among them, the notion that procedures are public refers to a researcher’s practice of “explicitly detailing the method and logic of one’s observations and inferences”, a primary aim of this Methods Chapter (Rivera, 2021, p. 3). This is because without explicitly detailing what was done in a study, there is no way to judge the scholarship’s validity, the way observations were processed or recorded, or the logic

by which conclusions were drawn. In that regard, it would not be possible to learn from this study's methods, or to "replicate its results" (King et al., 1994, p. 8).

Ultimately, this study adheres to the notion that understanding how methods are applied, and the process through which a scholar employs respective approaches within the field of disaster and emergency management, are fundamental for enhancing scholarship in DEM (Rivera, 2021).

4.2 Qualitative Foundations

There are countless definitions of qualitative research, and the term could take a different meaning depending on which historical moment the research is undertaken. In defining qualitative research, this Methods Chapter cites Denzin & Lincoln (2011), in noting that qualitative research is a separate and distinct field of inquiry. Moreover, in North America, qualitative research functions in a complicated historical field that encounters at least eight known "historical moments" (Denzin & Lincoln, 2011, p. 3). This begins with the traditional moment from 1900 until 1950, and progresses until the future moment or eighth moment, which began in 2010, and continued onward until the present.

It is key to note that the contemporary eighth moment necessitates that the social sciences and humanities become places for undertaking critical conversations about issues ranging from gender and class to community, globalization, nation-states, and governance. In that regard, qualitative research in this study facilitates and features critical conversations about topics ranging from community and public safety, to aspects of globalization including the inner workings of Cold War military alliances, and civil defence policies in governance.

Above all, this study demonstrates that qualitative research is a "situated activity" that locates the observer in the world (Denzin & Lincoln, 2021, p. 3). In that regard, qualitative

research methods employed in this study feature the researcher's attempt to study things in their natural setting, and make sense of and interpret phenomena observed, and specifically in terms of the manner in which the settings observed bring meaning to the researcher.

In this study, qualitative research involved the studied use and collection of empirical materials including an on-site case study featuring observations of site infrastructure and artifacts. Qualitative observational research methods in this study were used to describe "routine and difficult moments and meanings" in the bunker setting observed (Denzin & Lincoln, 2011, p. 4).

Furthermore, this Methods Chapter discusses several underlying assumptions and basic characteristics of the study's qualitative mode of research inquiry.

In doing so, the researcher references Merriam (1988) in noting several key assumptions and characteristics of the qualitative mode of inquiry employed in this study (Creswell, 1994):

- *Qualitative Researcher as Primary Instrument*- This study features the collection of data through the qualitative researcher, which is the primary instrument for data collection and analysis. Furthermore, in this study, the data collected is mediated through the researcher, as opposed to studies where data is mediated through machines, questionnaires, other mediums.
- *Qualitative Research Through Fieldwork*- Additionally, this study utilizes field work in conducting qualitative research, whereby the researcher physically went to the site to make observations about the setting and its various components, including the site's structure, artifacts, and traces of people who once operated on-site, but are no longer there.
- *Descriptive Qualitative Research*- Moreover, this study employs qualitative research methods that are descriptive, which refers to the researcher's interest in the process, meaning, and understanding in this study, gained through pictures.
- *Inductive Qualitative Approach*- Also, this study features a process of qualitative research that is inductive, whereby the researcher constructs concepts, hypotheses, and theories from details observed.

4.3 Observational Techniques

This section of the Methods Chapter highlights and provides description of the experience of the researcher in conducting observations. Furthermore, the researcher sought to learn about patterns of interaction and behavior that occurred in nuclear bunkers. In order to do that I did thorough research and went to the bunker to undertake observations.

Moreover, despite conducting a literature review, which gave the researcher a degree of indication of what to look for, civil defence installations are primarily relics of the past. Therefore, the researcher had no prior experience of being in a bunker. To reach the site, the researcher travelled a total of 419 kilometers to reach the Diefenbunker site from York University.

Upon arriving on-site at the bunker, the researcher spent approximately six hours on-site. The time spent by the researcher on-site consisted of a two-hour guided tour with the Diefenbunker's Research Director. The result of the tour was that the researcher took notes on both the physical nature of the bunker and the bunker's infrastructural components. After the two-hour guided tour, the researcher spent 4 hours on-site conducting additional observations. The additional observations made were primarily compiled through the collection of photographic data.

In addition, one hour of reflection was undertaken by the researcher on the same day observations were taken. Reflection was undertaken by the researcher shortly after visiting the site in order to capture any thoughts and to reflect on any observations that the researcher was able, and unable to collect at the bunker site. Also, the researcher and the MRP Supervisor reflected on the importance of various observations made, and how observations made would influence the sorting out and careful selection from approximately 500 pictures.

In disaster and emergency management, observation has consistently been utilized at events or organizations, such as emergency operations centers, or EOCs (Bustinza et al., 2021). Since data collection in this study occurred in a natural setting, the researcher maintains the potential to understand not only the setting itself, but also its components.

Comprehension of the site's components in its natural setting would arguably not have been possible in a synthetic environment, such as the virtual tour of the site provided by means of computer simulation. In contrast, through utilizing the participatory observation method, the researcher could directly participate in the natural setting and experience the site's components directly (Bustinza et al., 2021).

Furthermore, in this study, the researcher conducted observation and was able to engage senses simultaneously to collect valuable data (Bustinza et al., 2021). In that regard, the observation method's potential for data collection on the physical setting maintains critical importance for disaster researchers. This is because the method of data collection enabled the researcher to take a deeper dive in data collection, which provided a clearer picture of the setting under observation.

Moreover, thick description encompasses the researcher's task of both describing and interpreting observations made within a specific context. The context can be within a "smaller unit", which could be a family, a couple, or a work environment, or within a "larger unit", such as a community, a city, a town, or a culture (Ponterotto, 2006, p. 543). In seeking to explain as much as possible about a subject, a researcher's field notes become "thick" not just with description, but also with underlying implications and inferences (Thompson, 2001, p. 66). Thus, with thick description, it is important to identify that analysis subsequently becomes the determination of what is important, and what the basis for that importance is.

Also, thick description leads to thick interpretation, which subsequently leads to thick meaning of the research findings for the researchers, the participants, in addition to the study's readership. Thick meaning of findings provides readers with a sense of "verisimilitude", in which they can cognitively and emotively place themselves within the research context (Ponterotto, 2006, p. 543). In citing Geertz (1973), a key strength of this study is the publishing of observations through "thick description", which enabled the researcher to assist readers in "visualizing" the disaster setting under observation (Bustinza et al., 2021, p. 192).

4.4 Data Analysis

This study utilized photography as the data. For more information on data obtained, see the Findings Chapter. In addition, see the Findings Chapter for comments on the reflective nature of the research.

Furthermore, Pink (2001) proposes that any system of organizing and storing images should situate them in relation to multiple meanings and themes of the research, a strategy for data analysis which this study employs. In this study, the focus of the analysis was not solely just on the content of the photograph. Instead, this study's analysis focuses on how the photographic content provided "meanings" that are relevant to the study (Pink, 2001, p. 109).

For example, in the Findings Chapter, the photo of the stripes and designs of the Diefenbunker's hallways could be fitted into the theme of 'continuity of government and civil defence', because the designs reflect continuity of government policies that took into account psychological responses of personnel sheltering underground. In this study however, I used it to represent knowledge about the theme of 'time travel', and how features of the bunker's infrastructure and design were carefully preserved during heritage conservation efforts. The preservation worked to support adaptive reuse on-site, enabling visitors to 'travel' in time to the

Cold War era of the bunker's operations where the seriousness of the nuclear attack disaster threat was met with correspondingly significant preparedness measures. This example demonstrates how analysis of the photograph chosen was informed by my comprehension of various "visual, cultural, and individual narratives, discourses, and practices" (Pink, 2001, p. 109).

Moreover, Pink (2001) notes that contrary to certain projects that employ a system of codifying images, some studies images can be managed more "intuitively" (Pink, 2001, p. 109). In that regard, data collection in this study begun with approximately 500 photos. The photos comprising data collection were managed intuitively by the researcher. In addition, in this study during fieldwork, particular images became the focus of the researcher's attention. In turn, these particular images tended to additionally become the primary images in my analysis (Pink, 2001).

Also, the themes in this study were derived from the literature review. In this regard, the researcher assessed the data with respect to the field notes he took. From the data compiled, four themes stood out to the researcher. Moreover, these four themes were conspicuous to make a connection with written and visual material collected during observation on-site. Therefore, the photographs of the Diefenbunker would come to be linked to themes and discourses on: 'uncomfortable sites', 'time travel', 'upkeep and maintenance', and 'continuity of government and civil defence', the four themes of this study.

Then in the Findings Chapter, the raw data of eight images are dissected and used as a catalyst to allow for new interpretations of four key themes that represent content relevant to the question: What are the lessons learned from Canada's Diefenbunker that can help us to understand the opportunities leading to repurposing or the barriers leading to dereliction for large-scale Cold War-era nuclear bunkers?

4.5 Limitations

A primary limitation of this study is that there are not too many bunkers to look at in Canada. For example, the Diefenbunker, which this study focuses on, is one of just a few sites in Ontario that are available for public access. In addition, there are not many similar nuclear bunker sites in Canada that are available and deemed safe for public access. More pointedly, a lack of nuclear bunker sites across the country to assess limited the scope of my research. Thus, in conclusion, I mention two other nuclear bunker sites that can be utilized for potential research if public access is enabled.

Another limitation of this study relates to the recording and management of data. When on-site, the researcher did not have extensive time to take notes. Regarding this limitation, the researcher often felt a feeling of being rushed considering what needed to be recorded in field notes taken on-site. To counteract this limitation, the researcher attempted to reflect on what he saw immediately after the visit, to mitigate losses or discrepancies in data collection.

4.6 Bias

To be clear, this study acknowledges potential bias. Namely, the researcher, as a Canadian, undertook this study on the Diefenbunker, which was established as Canada's defence shelter for government. It is implicit that the researcher would want the Government of Canada to survive if a nuclear attack disaster targeted any site in Canada, including its seat of government. The researcher is also implicitly accepting the military-industrial complex of Canada. In addition, in this study, I accept the premise that Canada needs these shelters.

However, the researcher's questions operate not to persuade any individual on merits or demerits of Cold War era civil defence measures. Instead, questions operate to persuade people

about the need for civil defence and disaster and emergency management measures to be once again taken into serious consideration.

In considering bias, the approach taken by the researcher to this topic is to look at defensive measures and aspects of solutions related to civil defence and disaster and emergency management, and in particular, shelters. The researcher sees the defensive approach as being well grounded. This focused approach maintains clear differences with assessment of weapons that are used in an offensive capacity and may or may not achieve solutions to this particular disaster threat.

In addition, the researcher as a student of disaster and emergency management will evidently notice certain things. Civil defence remains the foundation of DEM. In that regard, the researcher's observations placed focus on continuity of government and civil defence aspects of the bunker assessed in this study. Thus, the immediate observations and focus of the researcher would naturally differ from a student of architecture for instance, which may tend to immediately observe and place focus on architectural aspects of the site that is under observation.

Moreover, in terms of selection of pictures for this study, bias potentially came from the researcher's background in disaster and emergency management. If the researcher had a background in tourism or finance for instance, he would likely have made different observations, potentially concentrating photos on different aspects of the bunker, or potentially may have selected a different set of photos for conducting analysis.

4.7 Conclusion

In conclusion to this Methods Chapter, an important reason of studying the Diefenbunker was the ability to gain access to the actual site of study. In addition, entry into the field of the Diefenbunker was enabled due to the fact that the site maintains a museum.

The researcher did initial research into the “NORAD UGC” site in North Bay, Ontario. A key limitation was the ability to access the North Bay site. Correspondingly, the researcher did initial research into the “MEGHQ” Kitchener-Freeport site in Kitchener, Ontario. Likewise, a key limitation was the ability to access the Kitchener site. Consequently, a key conclusion of this study is that when assessment of bunkers is undertaken, access to bunkers is very important in enabling thorough research to take place on-site.

The reason why this study was able to be completed was due to the fact that access to the bunker, and access to all floors of the bunker, was provided to the researcher. Ultimately, access is not a given when looking at this topic.

Finally, in this study, the raw data of eight images serve as a catalyst to allow for new interpretations of four key themes that represent content relevant to the question: What are the lessons learned from Canada’s Diefenbunker that can help us to understand the opportunities leading to repurposing or the barriers leading to dereliction for large-scale Cold War-era nuclear bunkers?

The Findings Chapter encompasses reflection on the findings data compiled for this study, which begun with approximately five hundred photos, whereby a total of eight photos were determined to be used for the study. See the Findings Chapter for the data compiled, as well as additional information about data obtained. In addition, see the Findings Chapter for comments on the reflective nature of the research.

Chapter 5: Findings

5.1 Introduction

The purpose of the Findings Chapter is to provide an overview of the composition of the data that was collected in each photograph taken at the Diefenbunker site. This Findings Chapter following this introduction, is comprised of two main parts and a conclusion. In the first part, a representation and depiction of the data is provided. In the second part, reflections are undertaken on the use of photographs as data during participant-observation research.

5.2 Representation of Findings by Photographic Data

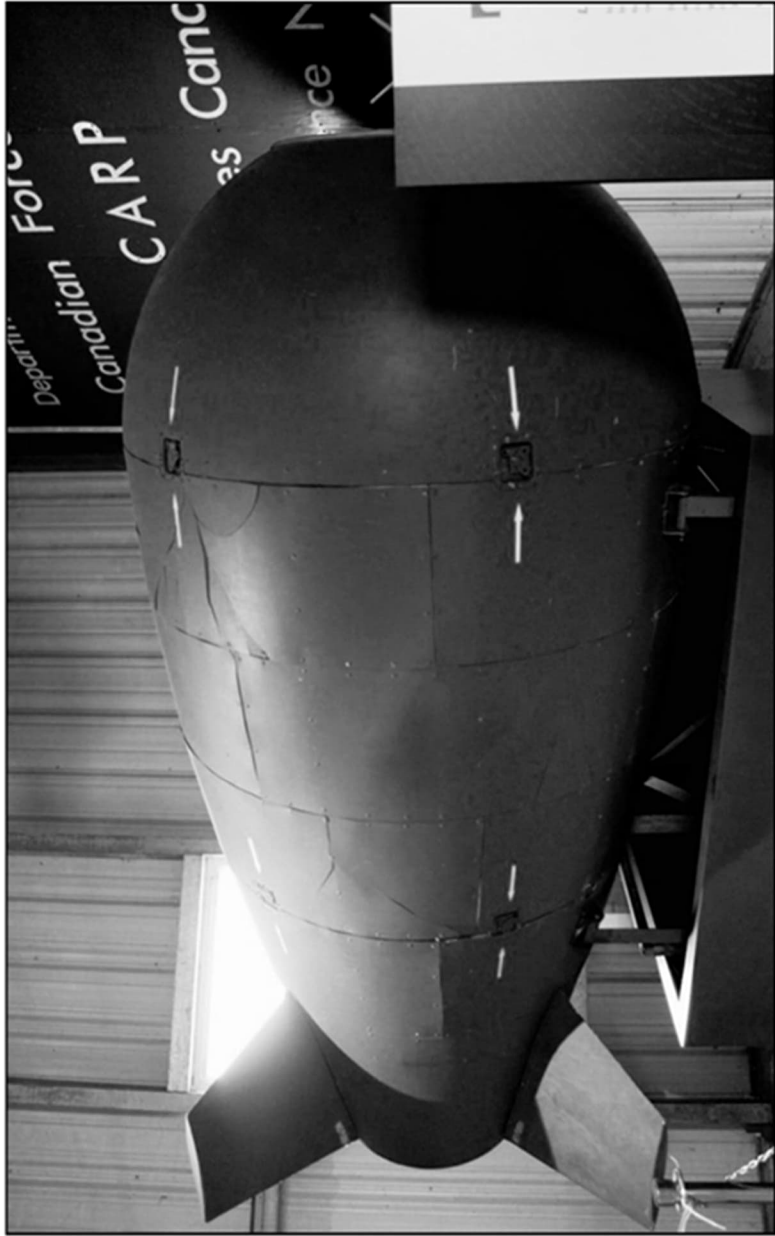
This section represents eight figures of photographic data. In addition, a short description of each of the eight photographs is represented in the text below. In compiling and shorting the data for this section from approximately 500 photos, eight of them are represented here.

Figure 7 – Image No. 0183 – depicting the atomic bomb displays the sight of an atomic bomb. The bomb observed in the photograph is similar in size and shape to the ‘Fat Man’ bomb dropped on the Japanese city of Nagasaki on August 9, 1945. (See Fig. 7)

Figure 8 – Image No. 0229 – depicting re-creation of outdoor nature (pre-impact) displays a sight of outdoor nature. The nature observed in the photo is comparable to outdoor nature that can be viewed in a forest setting in various regions of Canada. (See Fig. 8)

Figure 9 -- Image No. 0364 depicting a hallway of Sub-Level 400 displays the hallway in Sub-Level 400 of the Diefenbunker. In the photo, various stripes, including both vertical stripes on walls and horizontal stripes on flooring, as well as contrasting colours on floors and walls are observable. (See Fig. 9)

Figure 7. Data: Photograph #0183 – Atomic Bomb, 2022



• Source: Christian Faize Canaan, May 2022, Author Provided Image

Figure No.	Image No.	Name	Theme	Description
7	0183	Atomic Bomb	Uncomfortable Sites	This picture displays the sight of an atomic bomb. The bomb observed in the photograph is similar in size and shape to the 'Fat Man' bomb dropped on the Japanese city of Nagasaki on August 9, 1945.

Figure 8. Data: Photograph 0229 – Re-creation of Outdoor Nature (Pre-Impact), 2022



- **Source:** Christian Faize Canaan, May 2022, Author Provided Image

<i>Figure No.</i>	<i>Image No.</i>	<i>Name</i>	<i>Theme</i>	<i>Description</i>
8	0229	Re-creation of Outdoor Nature (Pre-Impact)	Uncomfortable Sites	This picture displays a sight of outdoor nature. The nature observed in the photo is comparable to outdoor nature that can be viewed in a forest setting in various regions of Canada.

Figure 9. Data: Photograph 0364 – Hallway of Sub-Level 400, 2022



• Source: Christian Faize Canaan, May 2022, Author Provided Image

Figure No.	Image No.	Name	Theme	Description
9	0364	Hallway of Sub-Level 400	Time Travel	This photo displays a hallway in Sub-Level 400 of the Diefenbunker. In the photo, various stripes, including both vertical stripes on wall and horizontal stripes on flooring as well as contrasting colours on floors and walls are observable.

Figure 10 Image No. 0381- depicting a computer room shows computers from the mid to late 20th century that are observable in a specially designed room. These mainframe computers provided information relevant to North American aerospace defence. (See Fig. 10)

Figure 11 – Image No. 0237 – depicting a ventilation system in the Machine Room located in Sub-Level number 100 of the Diefenbunker shows the vents of the site’s ventilation system, and it also displays the importance of operation and maintenance for any nuclear bunker site. (See Fig. 11)

Figure 12 Image No. 0249 depicting the industrial boiler system in the Machine Room located in Sub-Level number 100 of the Diefenbunker shows an industrial boiler system that is illustrative of the intricacy of the process of ‘upkeep and maintenance’ for any nuclear bunker site. (See Fig. 12)

Figure 13 – Image No. 0428 – depicting a poster showing the functional reporting structure of the CEGHQ. In the photo, a description entails how the Diefenbunker functioned as the Central Emergency Government Headquarters in Carp, Ontario. (See Fig. 13)

Figure 14 – Image No. 0230 – depicting a 1950s era Canadian Civil Defence poster which states that “Civil defence relies on you” and “Disaster may never occur but . . . Bea Alerte.” On the poster a woman holds red flowers and picks up more flowers as a red-eyed bull lurks behind her. (See Fig. 14)

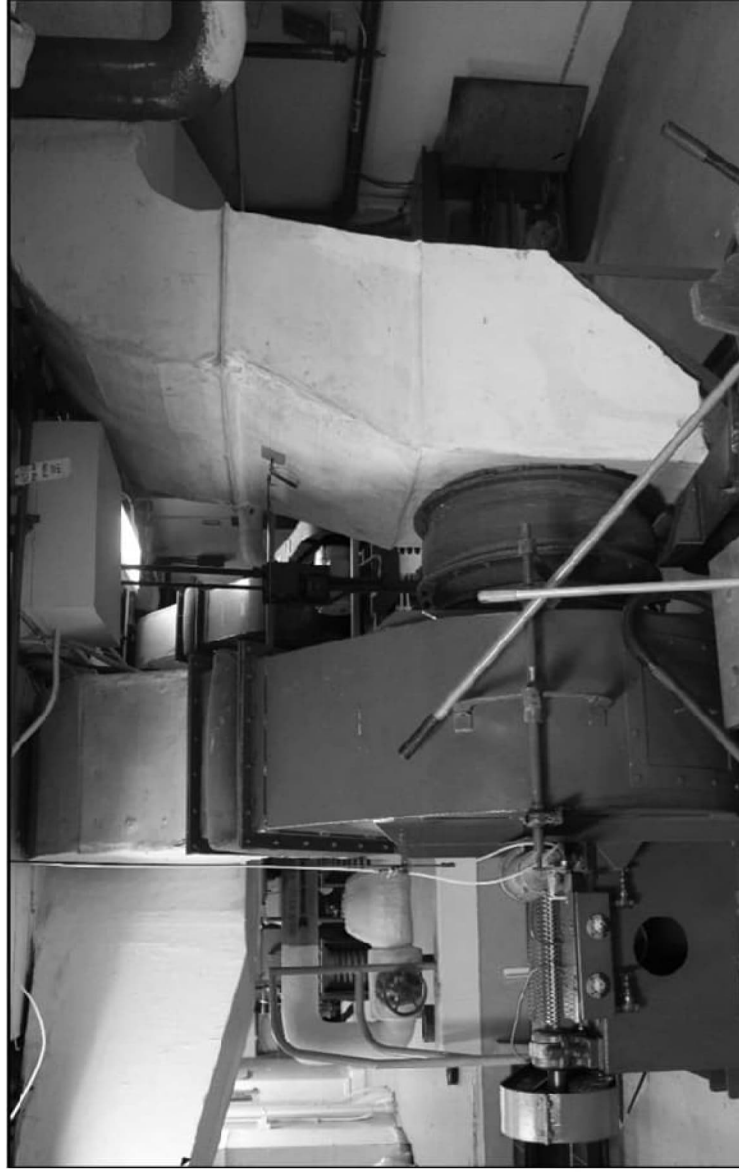
Figure 10. Data: Photograph 0381 – OSAX Computer Room, 2022



• Source: Christian Faize Canaan, May 2022, Author Provided Image

Figure No.	Image No.	Name	Theme	Description
10	0381	OSAX Computer Room	Time Travel	In the photo, computers from the mid to late twentieth century are observable. These mainframe computers provided information relevant to North American aerospace defense.

Figure 11. Data: Photograph 0237 – Ventilation System in the Machine Room, 2022



- **Source:** Christian Faize Canaan, May 2022, Author Provided Image

<i>Figure No.</i>	<i>Image No.</i>	<i>Name</i>	<i>Theme</i>	<i>Description</i>
11	0237	Ventilation System in the Machine Room	Upkeep and Maintenance	This picture is from Sub-Level number 100 of the Diefenbunker. The picture, which features the vents of the site's ventilation system, displays the importance of 'upkeep and maintenance' for the any nuclear bunker site.

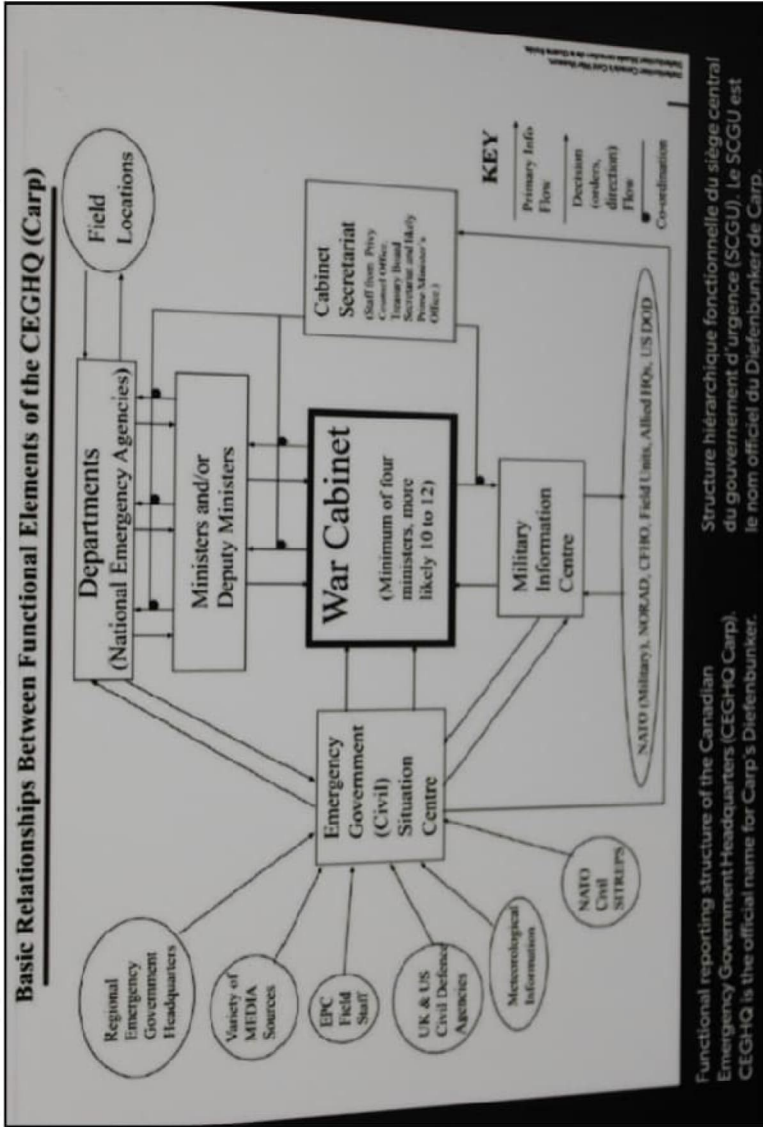
Figure 12. Data: Photograph 0249 – Industrial Boiler System in the Machine Room, 2022



• Source: Christian Faize Canaan, May 2022, Author Provided Image

Figure No.	Image No.	Name	Theme	Description
12	0249	Industrial Boiler System in the Machine Room	Upkeep and Maintenance	This picture is from Sub-Level number 100 of the Diefenbunker. In the picture, an industrial boiler system is observable, demonstrating the intricacy of the process of 'upkeep and maintenance' for any nuclear bunker site.

Figure 13. Data: Photograph 0428 – Functional Reporting Structure of CEGHQ, 2022



- **Source:** Christian Faize Canaan, May 2022, Author Provided Image

<i>Figure No.</i>	<i>Image No.</i>	<i>Name</i>	<i>Theme</i>	<i>Description</i>
13	0428	Functional Reporting Structure of CEGHQ	Continuity of Government & Civil Defence	This picture taken of a poster in the Diefenbunker, features the functional elements of the Diefenbunker. In the photo, a description entails how the Diefenbunker functioned as the Central Emergency Government Headquarters in Carp, Ontario.

Figure 14. Data: Photograph 0230 – Department of National Health and Welfare Poster (Circa 1950s), 2022



• Source: Christian Faize Canaan, May 2022, Author Provided Image

Figure No.	Image No.	Name	Theme	Description
14	0230	Department of National Health and Welfare Poster (Circa 1950s)	Continuity of Government & Civil Defence	This picture taken in the Diefenbunker, features a Canadian Civil Defence poster from the 1950's made by the Canadian Federal Government's Department of National Health and Welfare. The poster states that "Civil defence relies on you" and "Disaster may never occur but . . . Bea Alerte." In the photo a woman holds red flowers and picks up more flowers as a re-eyed bull lurks behind her.

5.3 Reflections on Findings and Collection of Photographic Data

This section of the Findings Chapter begins with reflection on the meaning of the data. I determined the photos carry deep meaning and that is why I determined it would be an effective means of data collection. Lennon (2018) describes how:

In these cases, the site itself becomes for many the visual record and data source. (Lennon, 2018, p. 598)

Moreover, I made the choice to utilize the medium of photography. However, my choice of photography as a medium also prompted questions of self-reflection. For instance, my experience was a divided experience of both fascination and horror. This experience was consistent with a reflection by Lennon (2018) that:

Dark sites appear to encourage some self-reflection and photographic representation additionally appears to work in a similar way. (Lennon, 2018, p. 586)

Furthermore, self-reflection that resulted from my choice of photography as a medium provided me with mixed feelings. One interpretation on the findings is the quality of how the Diefenbunker represented both the Cold War era and also encouraged time travel. This correlates with the argument that:

In such a context, images are used to convey a perspective of the past as separate from the present, which one travels to and visits via a combination of recreation and semi-authentic/authentic elements. (Lennon, 2018, p. 598)

In the Discussion Chapter, I will further elaborate on the concept of ‘time travel’. In addition, positive self-reflection resulted from the curation choices at the Diefenbunker, which worked to transport one to a different era which ultimately enhances the learning experience.

The trip to the Diefenbunker also prompted negative self-reflection on my behalf. In Lennon (2018) it was stated that:

The importance of image in informing an appreciation of the historical ‘reality’ is discussed elsewhere... For example, the ‘Arbeit Macht Frei’ gates at Auschwitz are a globally recognized imaged associated with the Holocaust and the Nazi Regime. (Lennon, 2018, p. 593)

For example, the photograph in Figure 15 shows the Arbeit Macht Frei (translated to ‘Work sets one free’) gates at the Auschwitz concentration camp – A depiction of a historical reality of dark, negative self-reflection reinforced through messaging. (See Fig. 15)

At the Diefenbunker, over reproduction of the site of the bomb diminished interpretation of the harsh reality of the bomb’s properties.

However, the frequency of viewing and the global circulation has served to develop a familiarity that could diminish their impact overtime. (Lennon, 2018, p. 593)

The way the bomb was displayed at the entrance creates a photo opportunity for the visitor on-site. Figure 16 shows an example of the author at a photo opportunity located near the entrance to Diefenbunker. (See Fig. 16)

As both self-reflection and mild criticism of the curation choices made at the Diefenbunker, perhaps the choice of locating the bomb at the entrance works to diminish the bomb’s impact and sanitize the horror of nuclear war. Despite that challenge, it does also create a photo opportunity for visitors.

Further discussion of this concept is in the Chapter 5 Discussion Section of ‘Uncomfortable Sites’.

Figure 15. Photograph JLR0922 – Arbeit Macht Frei Gates at Concentration Camp



- **Caption:** Photograph of gates at Auschwitz Concentration Camp as an example of a globally recognized image associated with the Holocaust prompting dark, negative self-reflection.
- **Source:** Dr. Jack L. Rozdilsky, September 2022
- **Note:** Photograph used in MRP with Permission

Figure 16. Photograph 0609 – Photo Opportunity in Front of Atomic Bomb



- **Caption:** Author as participant in a photo opportunity next to the atomic bomb.
- **Source:** Christian Faize Canaan, May 2022
- **Note:** Author Provided

5.4 Conclusion

This section of the Findings Chapter consists of a final reflection on the findings compiled for this study. Namely, this study began with approximately five hundred photos. Through careful choosing, a total of eight photos were determined to be used for the study. The precise selection of photos also encouraged self-reflection on many levels.

*** End of Volume One ***

**Exploring Reuse or Dereliction of a Cold War Era Nuclear Bunker:
An Observational Study of Canada's Diefenbunker**

By

C.F. Canaan

A MAJOR RESEARCH PAPER (MRP)

Volume II

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Chapter 6: Discussion

6.1 Introduction

In this Discussion Chapter, the researcher identifies a total of four themes of classification from the findings. The themes include: ‘uncomfortable sites’, ‘time travel’, ‘upkeep and maintenance’, and ‘civil defence and continuity of government’.

Moreover, in this Discussion Chapter, the researcher analyzes a total of 8 pictures. In each sub-section, themes are analyzed and discussed based on the content of each photograph. The photographs referred to here are depicted as figures seven through 14 in the Findings Chapter.

Focus is placed on the meaning of themes that are interpreted in their relation to the Diefenbunker, and the relevance that results have for this research study. The Diefenbunker, a prime example of a Canadian nuclear bunker that has undergone adaptive reuse to serve the purpose of heritage tourism, faced key challenges and opportunities prior to its conversion to a heritage site. Overall, the results in this section underscore that the themes of ‘time travel’ and ‘upkeep and maintenance’ represented key challenges in the process of adaptive reuse, whereas themes of ‘uncomfortable sites’, and ‘continuity of government and civil defence’ presented opportunities for adaptive reuse.

Table 1 provides the name and number of the images used in the discussion. In the table, the theme under which each photograph is classified and a paragraph describing the image is provided. See Chapter 5 Findings, for a representation of the photographic images listed in Table 1.

Table 1. Description of Photographic Data from Findings				
<i>Figure No.</i>	<i>Image No.</i>	<i>Name</i>	<i>Theme</i>	<i>Description</i>
7	0183	Atomic Bomb	Uncomfortable Sites	This picture displays the sight of an atomic bomb. The bomb observed in the photograph is similar in size and shape to the 'Fat Man' bomb dropped on the Japanese city of Nagasaki on August 9, 1945.
8	0229	Re-creation of Outdoor Nature (Pre-Impact)	Uncomfortable Sites	This picture displays a sight of outdoor nature. The nature observed in the photo is comparable to outdoor nature that can be viewed in a forest setting in various regions of Canada.
9	0364	Hallway of Sub-Level 400	Time Travel	This photo displays a hallway in Sub-Level 400 of the Diefenbunker. In the photo, various stripes, including both vertical stripes on wall and horizontal stripes on flooring as well as contrasting colours on floors and walls are observable.
10	0381	OSAX Computer Room	Time Travel	In the photo, computers from the mid to late twentieth century are observable. These mainframe computers provided information relevant to North American aerospace defense.
11	0237	Ventilation System in the Machine Room	Upkeep and Maintenance	This picture is from Sub-Level number 100 of the Diefenbunker. The picture, which features the vents of the site's ventilation system, displays the importance of 'upkeep and maintenance' for the any nuclear bunker site.
12	0249	Industrial Boiler System in the Machine Room	Upkeep and Maintenance	This picture is from Sub-Level number 100 of the Diefenbunker. In the picture, an industrial boiler system is observable, demonstrating the intricacy of the process of 'upkeep and maintenance' for any nuclear bunker site.
13	0428	Functional Reporting Structure of CEGHQ	Continuity of Government & Civil Defence	This picture taken of a poster in the Diefenbunker, features the functional elements of the Diefenbunker. In the photo, a description entails how the Diefenbunker functioned as the Central Emergency Government Headquarters in Carp, Ontario.
14	0230	Department of National Health and Welfare Poster	Continuity of Government & Civil Defence	This picture taken in the Diefenbunker, features a Canadian Civil Defence poster from the 1950's made by the Canadian Federal Government's Department of National Health and Welfare. The poster states that "Civil defence relies on you" and "Disaster may never occur but . . . Be a Alerte." In the photo a woman holds red flowers and picks up more flowers as a re-eyed bull lurks behind her.

6.2 Theme #1- Uncomfortable Sites

The first of four themes of classification that are included in this Discussion Chapter is, ‘uncomfortable sites’. The researcher identifies an ‘uncomfortable site’ as constituting a site which makes an observer feel discomfort, or uneasy. For instance, this could be a site associated directly with, or indirectly with death. Also, an example of an ‘uncomfortable site’ could be a site where dead bodies are observed next to stored food, such as the freezer morgue in the Diefenbunker. In addition, an ‘uncomfortable site’ could for instance, constitute a site containing weapons that cause injury or death. For example, this could constitute a site with a weapon, such as a nuclear bomb, that is used to kill.

6.2.1 Presence of ‘Uncomfortable Sites’ Theme in Diefenbunker

The ‘uncomfortable sites’ theme is represented by figures 7 and 8. Rows from table one are extracted to organize the discussion of the two photographic images, or the data, that represent this theme.

<i>Figure No.</i>	<i>Image No.</i>	<i>Name</i>	<i>Theme</i>	<i>Description</i>
7	0183	Atomic Bomb	Uncomfortable Sites	This picture displays the sight of an atomic bomb. The bomb observed in the photograph is similar in size and shape to the ‘Fat Man’ bomb dropped on the Japanese city of Nagasaki on August 9, 1945.

Namely, in drawing from figure 7 (see Chapter 5), observers become aware of the fact that the weapon observed in this photo is used for mass-murder. Moreover, the weapons observed in this photo are comparable in size and shape to the ‘Fat Man’ bomb dropped on the Japanese city of Nagasaki on August 9, 1945. The nuclear attack disaster that occurred in the Japanese city of Nagasaki led to the mass killing of at least 40,000 persons (Wallerstein, 2020).

Furthermore, observing the bomb at the very entrance of the Diefenbunker signifies its importance in relation to the site it inhabits. The uncomfortable reality is that the nuclear weapon

remains the original reason that the Diefenbunker site was created. The bomb's position at the front entrance of the Diefenbunker signifies its leading significance for the bunker site, given the lethal threat to humanity posed by these weapons, that the bunker's construction itself addressed. In that regard, the safety of the site's nuclear roof enabled selected members of the Canadian government to operate underground safely for a minimum period of 30 days. Also, the site's four levels, made of 32,000 cubic yards of hand-poured concrete, as well as 5,000 tons of steel, underscores the extent of preparedness measures that are necessary to protect persons from a five-megaton blast yield produced by certain types of nuclear bombs from a distance of 1.8 kilometres ("About the Diefenbunker", 2022, para. 4).

<i>Figure No.</i>	<i>Image No.</i>	<i>Name</i>	<i>Theme</i>	<i>Description</i>
8	0229	Re-creation of Outdoor Nature (Pre-Impact)	Uncomfortable Sites	This picture displays a sight of outdoor nature. The nature observed in the photo is comparable to outdoor nature that can be viewed in a forest setting in various regions of Canada.

Namely, in drawing from figure 8 (see Chapter 5), observers become aware of the fact that this photo would merely remain a memory of what once was, at ground level. More pointedly, the picture encapsulates a memory of nature that is uncontaminated and not radioactive. In considering the purpose of the Diefenbunker, and the catastrophic disaster scenarios that the site was designed to face, the bleak reality is that by the time personnel take shelter in the bunker, much of the outside world above ground would be contaminated and radioactive. Thus, the outdoor environment could present both long-term and lethal dangers to human health ("Humanitarian Impacts", 2020).

Furthermore, the observer naturally begins with questioning the purpose and significance of choosing this sight for this particular setting in the Diefenbunker. Namely, the sight of a waterfall, and beautiful nature that humans can come to enjoy for their psychological wellbeing,

is situated in the Diefenbunker's cafeteria. The cafeteria is a room where workers and personnel from various professions who collectively work to serve the function of continuity of government, can rest and replenish their bodies with food. However, upon further consideration, the uncomfortable truth is that the photo constitutes the only sight of nature that these workers will come into contact with for days, and in the worst-case scenario, potentially even longer durations of time.

6.2.2 Peer Reviewed Literature Grounding for Theme

In finding a precise definition of the term 'dark tourism', it is critical to delineate the relationship between thanatourism and dark tourism. For defining the term dark tourism, this work draws on a definition from Light (2017) that defines dark tourism as representing visits to sites that are associated with human suffering, death, and disaster. There are various ways of defining dark tourism, including dark tourism definitions based on heritage, forms of experience, and particular sites. This work also utilizes the definition of dark tourism that is based on practices which encourage education, remembrance, or entertainment for visitors (Light, 2017). In addition, the scholarly work describes thanatourism, as a distinct and specific concept that defines the practice of visiting sites, that is driven by the precise "desire for an encounter with death" (Light, 2017, p. 277).

Moreover, this work in assessing the theme of dark tourism of 'uncomfortable sites', draws on an assessment by Stone (2006) to highlight the broad spectrum of classification that exists within dark tourism. The scholarly work notes that attractions and exhibitions related to death and disasters is growing in contemporary time, in societies around the world. In providing clarification on the concept, Stone (2006) describes how in similarity to the meaning of the term, the spectrum of 'dark tourism' is correspondingly broad. In addition, the scholarly work notes

that dark tourism can range from visits to Ground Zero in New York city at its centre, visits to the battlefields of Western Europe, and sightseeing of ruins in New Orleans post-Katrina, to touring sites of mass murder and tragedy in Auschwitz, Poland, and the mass death fields of Cambodia.

Furthermore, this work draws on the definition of atomic tourism provided by Petroman & Iancu (2021) to highlight the connection between dark tourism and the Diefenbunker. In that regard, the scholars cite atomic tourism as constituting a sub-type of dark tourism that is represented by visits to places of disaster, where visitors seek to relive events associated with suffering and death. In addition, atomic tourists travel to places where nuclear tests and nuclear disasters have occurred. For example, this could include a visit to Las Vegas, in the U.S. state of Nevada, at a site named the Desert Inn Hotel, where “bomb parties” were held in the Panoramic room (Petroman & Iancu, 2021, p. 226). From the site’s Panoramic room, atomic tourists could view detonations in the Nevada Desert.

Moreover, the Diefenbunker represents an example of a site that is used for atomic or nuclear tourism objectives. In addition, the Diefenbunker maintains similarity with other sites used for atomic or nuclear tourism objectives. These sites include the Greenbrier nuclear bunker in the U.S. state of West Virginia, and the Kelvedon Hatch Secret Nuclear Bunker in the county of Essex, England (Petroman & Iancu, 2021).

6.2.3 Discussion of Theme

This section concludes discussion on ‘uncomfortable sites’, the first of four themes of classification that are included in this Discussion Chapter. The researcher identifies an ‘uncomfortable site’ as constituting a site which makes an observer feel discomfort, or uneasy.

In assessing the connection between dark tourism and the Diefenbunker, it is evident that dark tourism was able to transform the ‘uncomfortable site’ from a site with an uncertain future into a site that commemorates the past. In doing so, dark tourism prompted a transformation of the site in a manner that generates economic revenues. The Diefenbunker site, which is located approximately 38 kilometers from Parliament Hill in Canada’s capital, Ottawa, is largely isolated in a small town named Carp, Ontario. Without a clear vision to modernize the ‘uncomfortable site’s’ bunker structure to serve the function of continuity of government in a manner that could protect the site from the impacts of modern nuclear weapons, an opportunity was seized upon to implement a solution for the uninhabited site, that ultimately encouraged its revival.

In our discussion of ‘uncomfortable sites’, it is critical to determine where the Diefenbunker stands on the dark tourism spectrum. In doing so, it is key to recognize the distinction between ‘dark’ and ‘darker’ tourism. In referencing other scholars, Stone (2006) identifies the argument that a darker-lighter tourism paradigm exists. Furthermore, Stone cites a six-level scale that includes classifications of dark tourism, that begins with the classification ‘lightest’, and proceeds to ‘lighter’, ‘light’, ‘dark’, ‘darker’, and ‘darkest’ on the other end of the spectrum. The distinction between various levels of the dark tourism spectrum is in part, based on a greater number of negative feelings, such as depression and horror, being prompted within the visitor (Bauer, 2021, p. 8; Stone, 2006, p. 151).

Moreover, the key to understanding where the Diefenbunker lies on the dark tourism spectrum also rests in the difference between sites that are associated with death and suffering, and sites that have been the location where suffering and death have occurred. Thus, considering that the Diefenbunker does remain an ‘uncomfortable site’ that is indirectly associated with mass death and profound human suffering, based on these considerations, the site on a six-level dark

tourism site scale would arguably be situated on the fourth level, or classified as a “dark” site (Stone, 2006, p. 151). The reason for classifying the Diefenbunker at the fourth level, or a “dark site”, is because the Diefenbunker remains an ‘uncomfortable site’ that is associated with death and suffering. However, preparedness measures, exemplified in the site’s design, were taken for a potential nuclear strike that did not occur on-site.

Yet at the same time, the Diefenbunker prioritizes education over entertainment. Also, the site is still history centric, in terms of emphasizing conservation of artifacts and infrastructure to protect the site’s historic integrity (Stone, 2006, p. 156). In that regard, its tourism efforts prompt commemoration of Canada’s role in nuclear defence of the North American continent during the tense era of the Cold War. As an ‘uncomfortable site’, the Diefenbunker leaves visitors with a sense of dread due to its authenticity in facing a colossal disaster threat, especially through its locational authenticity (“Authenticity and Integrity”, n.d.; Stone, 2006, p. 152). As the Diefenbunker is heritage centric, it becomes evident to visitors that the site represents a legitimate cornerstone of Cold War-era Canadian Civil Defence. Namely, the site is not merely focused on commercial purposes, as is the case with many other heritage sites that have undergone adaptive reuse. Thus, the Diefenbunker contrasts cases of heritage sites that have been “overshadowed by commercial and entertainment values” (Stone, 2006, p. 150).

Furthermore, in discussion of the theme of ‘uncomfortable sites’, this chapter cites Light (2017), which assesses dark tourism and thanatourism over a period of two decades. In assessing the topics, Light provides background on the history of both classifications of tourism. Thus, it is important to identify that in this discussion of the theme of ‘uncomfortable sites’ present in the Diefenbunker, through both tourism concepts, tourism research of such sites can be extended in breadth and depth (Light, 2017, p. 293). For example, while the concept of dark tourism emerged

in the 1990's as maintaining origins in the "circumstances of the late 20th century", thanatourism was often presented as a "contemporary form of a much older phenomenon" (Light, 2017, p. 293). It is important to note that there remains a lack of agreement about various components including "places, matter, and experiences" that constitute dark tourism (Light, 2017, p. 293). In that regard, visits to sites, such as the Diefenbunker, fall within Light's classification of sites that are associated with war and conflict (Light, 2017, p. 280).

To conclude this section, it is key to recognize the unique position of the Diefenbunker as a type of 'uncomfortable site' that is associated with war and conflict. However, while tourism of the site prompts commemoration of its Cold War history, its purpose and relevance cannot be limited to the past, especially given the contemporary state of global geopolitics and international relations. In fact, visitors that are exposed to the Diefenbunker's original purpose and history are informed of the uncomfortable fact that the site's operations, that once served the function of continuity of government within national civil defence, were transferred above ground in 2006. More pointedly, visitors to the site learn that the transfer of operations to North Bay and then above ground occurred due to an assessment that modern nuclear bombs are far more powerful than they once were, and designate the protection that was once provided by both the CFS North Bay and Diefenbunker site's nuclear roofs as, inadequate.

Finally, visits to the Diefenbunker that are undertaken for education purposes may prompt more questions than answers. For example, as tourists visit the Diefenbunker and come to understand the history and purpose of the 'uncomfortable site', even more profound questions stemming from aspects of the site emerge. For example, with regard to the degree of protection that the site's nuclear roof once provided, the uncomfortable reality looms that nuclear bombs and the ICBM's that deploy them, continue to exist (Shin, 2022). Moreover, tourists to the

Diefenbunker learn that nuclear weapons, which were the central reason for the establishment of the site, are being enhanced by nuclear powers around the world. Above all, nuclear weapons continue to be improved without a corresponding level of civil preparedness measures taken in many countries to address the risk posed to civilian populations (Lucie, 2019, para. 1, 2).

6.3 Theme #2: Time Travel

The second theme of four themes of classification that are included in this Discussion Chapter is, ‘time travel’. The researcher identifies the theme of ‘time travel’ as constituting measures taken in the Diefenbunker site to ensure that visitors are provided with an authentic experience that accurately reflects the site’s history. In addition, ‘time travel’ enables visitors to encounter the site’s physical aspects and artifacts that are unique to the Cold War era in which the Diefenbunker operated. For instance, this could be steps taken to ensure conservation of the site’s historic integrity. For example, throughout the Diefenbunker, vertical and horizontal stripes on walls and floors accurately reflect for visitors what daily life in the bunker would have been like during its time in operation.

In addition, the theme of ‘time travel’ in the Diefenbunker could also for instance, embody displays of physical artifacts on-site to present an accurate representation of the site’s era of operations. For example, this could be a display of the technology that maintained a critical role in supporting the bunker’s operations. Computers placed in Room 398, the Ottawa Semi-Automatic Exchange (OSAX) area on Sub-Level 300 of the Diefenbunker, enable visitors to ‘time travel’ back to the era of bunker operations (Eyamie, 2022). The computers in the OSAX room, the Diefenbunker’s primary message and communications control room, once acted as a communications nerve centre within the Canadian Forces communications network. Also, they administered over 100,000 messages per month, maintaining the Diefenbunker’s connection to

other Canadian and Allied military bases in both Canada and around the world (“Diefenbunker-300 Level”, 2022, p. 6). The display room provides an opportunity for visitors to encounter both historic artifacts that are no longer operated, and a preparedness environment which is no longer in operation, both of which are unique to the Cold War era in which the bunker operated.

6.3.1 Presence of ‘Time Travel’ Theme in Diefenbunker

The ‘time travel’ theme is represented by figures 9 and 10. Rows from table 1 are extracted to organize the discussion of the two photographic images, or the data, that represent this theme.

<i>Figure No.</i>	<i>Image No.</i>	<i>Name</i>	<i>Theme</i>	<i>Description</i>
9	0364	Hallway of Sub-Level 400	Time Travel	This photo displays a hallway in Sub-Level 400 of the Diefenbunker. In the photo, various stripes, including both vertical stripes on wall and horizontal stripes on flooring as well as contrasting colours on floors and walls are observable.

In analysis of figure 9 (see Chapter 5), while the benefits of maintaining stripes for the site’s contemporary uses are clear, it is important to stress that the use of such designs are not a new feature of the bunker. Namely, the conservation of the site’s built environment during the process of adaptive reuse, including the protection of the site’s striped walls and floors, enabling visitors to ‘time travel’ to the Cold War era. Namely, during the Cold War, such measures observed in the photograph underline that the Government of Canada evidently considered the mental wellbeing of Canadian government personnel as being pivotal to their ability to carry out their functions on-site, below ground level. For example, the implementation of measures to support the mental orientation of the personnel on-site included measures that support awareness in three different dimensions including, place, time, and person.

In addition, this photograph represents an example of the manner in which visitors are able to ‘travel’ through time to witness more broadly, the disaster and emergency management

planning of the era of bunker operations. Namely, visitors in noticing the intricate design considerations observable can identify the extent to which measures that addressed the nuclear attack disaster threat once took psychological and social responses to their forefront.

<i>Figure No.</i>	<i>Image No.</i>	<i>Name</i>	<i>Theme</i>	<i>Description</i>
10	0381	OSAX Computer Room	Time Travel	In the photo, computers from the mid to late twentieth century are observable. These mainframe computers provided information relevant to North American aerospace defense.

In consideration of figure 10 (see Chapter 5), the computers in the Diefenbunker’s Ottawa Semi-Automatic Exchange, or OSAX Room were shielded by a great amount of secrecy when there were operational (“Diefenbunker-300 Level”, 2022).

Also, the computers in the OSAX room spearheaded the nation’s “cutting edge” technology of the early 1980’s (“Diefenbunker-300 Level”, 2022, p. 6). The computers observable in the photo are close to the site’s original Burroughs 4800 mainframe computers, which were also known as Burroughs Medium Systems. The computers on-site are massive, both in terms of their size and processing power (“Diefenbunker-300 Level”, 2022).

Furthermore, advanced computer systems came to eventually replace the older model of Burroughs 4800 mainframe computers, that were utilized for site operations. Visitors to the site could observe how the OSAX Room maintains an intricate ventilation system that cools the room’s equipment, which is powered by cables underneath the floors of the room’s “raised platform” (“Diefenbunker-300 Level”, 2022, p. 6). The OSAX Room, was also known by the Canadian military as a “TEMPEST room” (“Diefenbunker-300 Level”, 2022, p. 6). Moreover, the TEMPEST shielding in the room protected sensitive equipment, that held classified information, from “emanating electromagnetic radiation” that could carry classified information (“Diefenbunker-300 Level”, 2022, p. 6; “TEMPEST Shielding”, 2022, para. 1).

Namely, the TEMPEST room sought to prevent the interception of classified information by entities outside of the bunker. It would do so upon the closing of its doors, which could then “shield” the OSAX Room from “floor to ceiling in metal”, to avert electronic eavesdropping (“Diefenbunker-300 Level”, 2022, p. 6). These examples highlight the intricacy of Cold War era operations facilitated by the bunker that sought to ensure continuity of government operations at all costs, in the event of a nuclear attack disaster. Also, the computer room’s structure, design, and the equipment that supported the function of continuity of government was carefully preserved throughout the site’s transition into a heritage museum through adaptive reuse. It remains certain that this combination of characteristics of the OSAX room on-site enables a unique ‘time travel’ experience. Namely, visitors to the Diefenbunker come into contact with distinct Cold War era technology and infrastructure that are specific to the site, and particular to the functions they once served.

6.3.2 Peer Reviewed Literature Grounding for Theme

Furthermore, in understanding the theme of ‘time travel’, it is critical to underline the measures which were taken at the Diefenbunker site to ensure that visitors are provided with an authentic experience that accurately reflects the site’s history. The measures identified in this section of the Discussion Chapter enable visitors to encounter the site’s physical aspects and artifacts, that are unique to the era in which the bunker operated. Finding a precise definition of these key components of ‘time travel’, is critical to attain an enhanced understanding of the term.

To do so, establishing a clear delineation between concepts of built heritage preservation and built heritage conservation, is necessary. In delineating between the terms, this work cites Ashworth (1997) in noting that conservation of a site broadly encompasses practical activity that is a part of site management to conserve the site’s distinctiveness. In contrast, heritage

preservation is defined by efforts to protect a site from physical harm. In citing these differences, this section of the Discussion Chapter in explaining the theme of ‘time travel’, primarily utilizes the notion of heritage conservation, but also makes references to the importance of heritage preservation.

Moreover, Stone (2019) assesses the great challenges for many cities in the 21st century that are posed by adaptive reuse. The scholarly work also identifies opportunities generated for populations that reside nearby sites undergoing adaptive reuse. For defining the term historic conservation, this work draws on a definition from Stone (2019). The scholarly work defines historic conservation as representing a complex process in which a balance is obtained between the productive adaptation of a site, and active conservation of its historic integrity, including its physical integrity (Stone, 2019, p. 102).

This Discussion Chapter highlights that it is necessary to assess how heritage conservation practices in the Diefenbunker are critical to providing an authentic experience for visitors and ensuring the carefully chosen display of the site’s distinctive history enables visitors to ‘time travel’. This discussion additionally draws on D’Agostino (2021) which features various case studies that assess strategies for adaptive reuse, including conservation of built heritage sites, preservation of built heritage sites, and how those strategies have evolved overtime. This work draws on a portion of the scholarly work, that defines “conservation”, to note that since the Middle Ages, a distinctive feature that conservation has maintained is the reuse of elements or parts of a site (D’Agostino, 2021, p. 6). In addition, the scholarly work underlines that conservation was largely a response throughout history to a need perceived by societies to ensure a site’s historical continuity, which embodied many processes including maintenance and reuse.

Furthermore, in discussing the key components of heritage conservation that enable ‘time travel’ at the Diefenbunker, this work draws on Plevoets & Van Cleempoel (2019), which identifies adaptive reuse as a new discipline. Also, the scholarly work assesses the solutions provided by adaptive reuse of sites, and the challenges that can emerge and limit opportunities for new construction of heritage sites. The scholarly work, in defining adaptive reuse, notes that the process broadly encompasses the alteration of an existing site for “new or continuous use” (Plevoets & Van Cleempoel, 2019, p. 1). In addition, the manner by which adaptive reuse is undertaken remains critical to maintaining a site’s historic authenticity, especially in the era of digital disruption, and false news. Plevoets & Van Cleempoel (2019) also note that due to the intricacy and the specificity it requires, which involves considerations of interior design, planning, architecture, conservation and engineering, the practice of adaptive reuse is largely a discipline in its own right.

Moreover, the Diefenbunker represents an example of a site that, in contemporary time, is operated for the purpose of adaptive reuse. In addition, the Diefenbunker maintains similarity with other nuclear bunker heritage sites that have also undergone the process of adaptive reuse by transforming into museums that serve heritage tourism purposes. These sites include the Greenbrier nuclear bunker in the U.S. state of West Virginia, and the Kelvedon Hatch Secret Nuclear Bunker in the county of Essex, England.

6.3.3 Discussion of Theme

This section concludes discussion on ‘time travel’, the second of four themes of classification that are included in this Discussion Chapter. The researcher identifies ‘time travel’ as constituting measures taken in the Diefenbunker site to ensure that visitors are provided with an authentic experience that accurately reflects history. Namely, ‘time travel’ enables visitors to

encounter the site's physical aspects and artifacts that are unique to the site's Cold War era of operations.

In assessing the connection between historic conservation and adaptive reuse at the Diefenbunker, it is evident that adaptive reuse, did not interfere with heritage conservation on-site. Namely, due to careful measures taken to conserve historic integrity, the site was able to adapt to serve new purposes in a manner that enabled visitors to 'time travel' to authentically experience the site's former uses. These measures provide visitors with the opportunity to understand the site's original purpose, in modern time. Namely, key to its heritage conservation, the Diefenbunker site required several changes to ensure that the adaptive reuse of the bunker structure, to serve its current heritage tourism use, could enable visitors to safely visit the site, without compromising the site's historic integrity.

Moreover, in interpreting the theme of 'time travel' represented in the Diefenbunker, it is essential to understand the role of carefully preserved rooms, such as the OSAX computer room. The Diefenbunker OSAX room was critical in the bunker's era of operations, where it connected the site with a broader network of nuclear bunkers that were established to ensure the defence of the North American continent from the nuclear attack disaster threat posed by adversarial states. Additionally, in assessing the theme of 'time travel' in the Diefenbunker, visitors could view the Signals Transmission Receiving and Distribution (STRAD) computer system on-site. The careful preservation of such technology, allowed visitors to 'time travel' to comprehend its once critical importance to the purpose it served through bunker operations, at that particular era in history (Manning, 2003).

Furthermore, visitors to the Diefenbunker 'travel' in time as they see how communication with NATO and NORAD headquarters, in addition to air surveillance, tracking stations, and

communications with air defence units, once all took place on-site. In addition, observers at the site experience how during the time of the bunker's operations, each Regional Emergency Government Headquarters, or REGHQ the Diefenbunker communicated with, was a center point for their own surrounding regional communications maintaining a pivotal role in the overall public emergency broadcasting network (Manning, 2003, p. 80).

Also, visitors to the site witness how, in support of these disaster preparedness efforts, the site's equipment, including the Diefenbunker computer system used by the 1st Army Signals Squadron of the Canadian Army at the time of operations, was utilized to operate the Diefenbunker's communications systems (Manning, 2003). These examples demonstrate how heritage conservation enabled visitors to 'travel' in time through viewing historical artifacts distinct to the site, such as its vast and distinctly advanced computer network. The network on display for visitors was once unparalleled in Canada, in terms of its preparedness capabilities. It was also once crucial to the Canadian government's Cold War era efforts to address the nuclear attack disaster threat that faced the North American continent.

It is important to note that while these examples highlight the theme of 'time travel' in the Diefenbunker, the efforts of heritage preservation prior to adaptive reuse, also protected the site's authenticity and was critical to making 'time travel' possible for visitors. In that regard, it is important to note that authenticity in contemporary time exists within the objects, structure, and the environment of a historic site, such as the Diefenbunker (Plevoets & Van Cleempoel, 2019). Authenticity cannot be created by computer-generated artistic remodelling, or digital manufacturing that recreates objects, and design plans for structures and a site's environment (Plevoets & Van Cleempoel, 2019, p. xvii).

Instead, authenticity of all aspects of a historic site, as exemplified in the Diefenbunker, remain within its physical infrastructure, objects, and the environment (Plevoets & Van Cleempoel, 2019, p. xvii). These components of the site, which are all key to the aesthetics of the site's historic integrity, are encapsulated in the age of these components (p. xvii). More pointedly, authenticity is reflected in the manner by which these site components have been preserved to accurately reflect a distinctive, particular time frame in history.

For instance, as observed within photographic evidence compiled in the computer room in the Diefenbunker, the computers themselves, and the room they once operated in, have been protected from harm well enough to enable their survival amidst the “patina of wear, the discolouration of time, and the tarnish” that continual human contact can generate (Ashworth, 1997; Plevoets & Van Cleempoel, 2019, p. xvii). In our discussion of ‘time travel’, it is critical to stress the importance of the process of adaptive reuse in transforming the Diefenbunker site into a Cold War museum that served heritage tourism purposes in an accurate manner. More pointedly, it was specific steps taken within the process of adaptive reuse which ensured that the seriousness of the disaster threat that the site was designed to face was accurately displayed for viewers. Namely, this process was undertaken through the conservation of distinct critical infrastructure on site that was crucial to the site's role within broad spanning operations that secured the nuclear defence of the North American continent.

In discussing aspects of ‘time travel’ with respect to the Diefenbunker, it is key to recognize the importance of the historical conservation of disaster preparedness measures that remain on display at the site. Namely, the Diefenbunker through its transition into a Cold War museum maintains on-site, distinctive preparedness measures that were once taken during the bunker's Cold War era of operations to address social and psychological responses to remaining

underground, amid the threat of a nuclear attack disaster. In referencing scholarly literature that investigates the importance of different human psychological responses that preparedness measures for the nuclear attack disaster threat evidently addressed in the bunker, Peer et al. (2015) highlights how orientation is a fundamental mental function that includes processing of the relationship between the “behaving self” to time (events), persons (people), and space (places) (p. 11072).

Furthermore, the scholarly work describes how the human brain’s processing of time, person, and space, invokes additional mental processes specific to each of the domains, and produces patterns of activity in the human brain (Peer et al., 2015, p. 11072, 11073). In that regard, consideration of these brain processes within disaster preparedness measures are key to preventing neurological psychiatric disorders which may occur in persons that are indoors or underground for long periods of time, such as personnel that remained underground in the bunker during the Cold War era (p. 11072, 11075). Adaptive reuse of the Diefenbunker has both preserved and reincorporated into the bunker’s current use, preparedness measures that include specific designs and colours on walls to prevent spatial disorientation responses in persons inside the bunker. Thus, the preserved disaster preparedness measures, which once were taken for government personnel that remained underground in the bunker for lengthy periods of time, are examples that highlight how visitors to the site are able to ‘travel’ in time to witness how the disaster and emergency management practices during the bunker’s Cold War era of operations extensively stressed protection of mental orientation.

Regarding these examples, conservation of these distinctive preparedness measures on-site provides a display of an era for viewers to ‘travel’ to, in seeking to comprehend the seriousness of the Canadian government in preparing for the nuclear attack disaster threat during the Cold

War era. Moreover, it is critical to underscore that adaptive reuse which emphasized heritage conservation through measures cited in this Discussion Chapter, was made possible by the original steps taken to ensure heritage preservation of the site. These steps have enabled visitors to the site to uniquely encounter in modern time, an era where heightened preparedness for the nuclear attack disaster threat attended to a broad array of physiological and psychological complications that sheltering from this particular disaster threat could induce.

Visitors to the site also observe firsthand the disaster threat that these measures were taken to address, which continues to exist in modern time. In this regard, when visitors ‘time travel’ through the Diefenbunker, aware that in contemporary time over 12,700 nuclear warheads exist in the world, questions emerge regarding modern Canadian Civil Defence operations and contemporary preparedness to face the nuclear attack disaster threat (Kristensen & Korda, 2022). These examples of ‘time travel’ present at the Diefenbunker also provide visitors with a display of how government emphasized preparedness measures to this particular disaster threat, as opposed to response measures, which enhanced overall resilience to this particular disaster threat.

Also, as visitors ‘time travel’ through the conserved unique artifacts, the distinctly preserved bunker structure, and the uncertainly calm environment of the Diefenbunker, questions emerge about nuclear attack disaster preparedness measures in modern-day Canada, which is a nation administered by a representative democratic government. Governments that operate through various political systems, for reasons that remain outside the scope of this study, often focus on the response phase of disaster management, as opposed to preparedness. In a representative democratic political system, pressure to channel resources to other imminent disaster threats, especially in the response phase, continues to influence public policy. Thus,

further assessment of the site's Cold War era measures, exemplified through the theme of 'time travel' in this discussion, stands to uncover how preparedness for the nuclear attack disaster threat reached such a heightened level of importance during the Cold War era. Ultimately, visitors in 'time travelling' the Diefenbunker, who encounter the extent and depth of continuity of government and civil defence measures taken on-site to address the nuclear attack disaster threat, are reminded that to a certain degree, the measures themselves are correspondingly preserved in the site's history.

6.4 Theme #3: Upkeep and Maintenance

The third theme of four themes of classification that are included in this Discussion Chapter is, 'upkeep and maintenance'. The researcher identifies the theme of 'upkeep and maintenance' as constituting operations that are necessary for the Diefenbunker site to function in its current capacity as a Cold War bunker heritage museum. For instance, this could be operations that are undertaken to preserve the site's physical integrity. For example, on Sub-Level number 100, four stories below ground level, operations to upkeep the pipes and ventilation system on-site where air is filtered, to ensure that all air circulating throughout the bunker meets safety standards, is critical to the site's 'upkeep and maintenance'. Second, the researcher identifies the theme of 'upkeep and maintenance' through consideration of how maintenance operations are influenced by the site's original selection process. This theme also takes into account how upkeep amendments that were made to the Diefenbunker site, during its adaptive reuse transition process, permit and accommodate its current use as a heritage museum.

In analyzing the theme of 'upkeep and maintenance', this work identifies that there are several ways of defining the collection of terms that the theme encompasses. However, this Discussion Chapter provides specific references and highlights the differences between the terms

chosen. For example, historic preservation is a category of historic conservation. In conducting built heritage conservation, conservationists assess the worth of an existing site and oversee efforts to protect continuity of its existence. In contrast, built heritage preservation, which this section of the discussion primarily focuses on, broadly constitutes the protection of a heritage site from harm.

The theme of ‘upkeep and maintenance’ present at the Diefenbunker, is embedded in measures that are taken on-site to protect the site’s physical integrity, and capacity to function as a heritage museum. These measures are shaped by elements of the site’s selection process. These include upkeep and maintenance measures that prevent potential injury or seek to mitigate the effects on human health that are prompted by being below ground for long durations of time. Also, with lower temperatures below ground level, maintenance of the industrial boiler system in the Diefenbunker’s Machine Room is critical to the regulation of internal temperature in the bunker, which is necessary to ensure regular on-site operations are uninterrupted.

6.4.1 Presence of ‘Upkeep and Maintenance’ Theme in Diefenbunker

The ‘upkeep and maintenance’ theme is represented by figures 11 and 12. Rows from Table 1 are extracted to organize the discussion of the two photographic images, or the data, that represent this theme.

<i>Figure No.</i>	<i>Image No.</i>	<i>Name</i>	<i>Theme</i>	<i>Description</i>
11	0237	Ventilation System in the Machine Room	Upkeep and Maintenance	This picture is from Sub-Level number 100 of the Diefenbunker. The picture, which features the vents of the site’s ventilation system, displays the importance of ‘upkeep and maintenance’ for the any nuclear bunker site.

In viewing figure 11 (see Chapter 5), this picture represents an example of ‘upkeep and maintenance’ on-site, as it contains key information about the meaning and purpose of a vent system that is critical for site operations. Namely, in assessing the picture, observers are aware

that the intricate system of machinery observed in the photo is critical to the site's staff, and more pointedly their survival and wellbeing in the bunker.

Moreover, routine on-site maintenance checks on pipes and the ventilation system observed in this photo remain a crucial part of the 'upkeep and maintenance' of the bunker. Upkeep and maintenance of the pipe and ventilation system was once critical to the bunker's ability to block all external sources of air in case of a nuclear attack in the surrounding region, or a strike that resulted in a direct hit on-site. Also, given that such preparedness measures taken for the nuclear attack disaster threat remain embedded in the bunker's design, upkeep of the pipe and ventilation system set in place, is key to maintaining contemporary health standards on-site. These systems can only remain effective with regular maintenance checks.

Furthermore, observing the pipes and ventilation system at the lowest sub-level of the Diefenbunker, does not reveal the extent to which these pipes function within a larger ventilation system that extends outside of the bunker, above ground. For example, the ventilation system seen in the photographic data compiled from the Machine Room, connects to an above-ground vent within a broader system that runs to ensure maintenance of fresh and clean air in the bunker. These steps taken to ensure 'upkeep and maintenance' of the bunker, serve several purposes, among which the most prominent is addressing carbon dioxide buildup on-site.

The functioning of the bunker, both when it incessantly served the purpose of continuity of government, and its current purpose as a heritage site, has personnel inside throughout its duration of operations. The personnel on-site will produce carbon dioxide when they breathe, with the average human being exhaling nearly 20 litres of carbon dioxide per hour ("Bomb Shelters", n.d., para. 3). Moreover, as carbon dioxide constitutes a major pollutant for this particular bunker type, namely "sealed environments" below ground level, the odorless gas can

potentially inhibit operations (“Bomb Shelters”, n.d., para. 3). Thus, it is critical for the ventilation system on-site to recycle air, whereby concentrations of carbon dioxide in the air in sealed environments such as the Diefenbunker, could exceed 0.5% for several hours below ground.

The 0.5% level, or 5,000 parts per million (ppm), is considered to be the permissible exposure limit set by the U.S. Occupational Safety and Health Administration, or (OHSA) over the average eight-hour workday (“Carbon Dioxide Health”, 2020, p. 2). These maintenance operations mitigate potential impacts to human health that range from headaches to difficulty breathing, with more severe ramifications for persons that suffer from asthma and cardiovascular diseases (“Bomb Shelters”, n.d.). In addition, a Health Canada report on Residential Indoor Air Quality Guidelines has recognized studies that have identified the impacts of carbon dioxide on both decision-making and task performance. More specifically, studies cited by Health Canada, such as Satish et al. (2012) and Wargocki et al. (2000), have noted negative impacts on decision-making performance with higher carbon dioxide levels, and improved task performance with increased ventilation and lower carbon dioxide levels, respectively (“Residential Indoor Air”, 2020, p. 23, 24). These examples demonstrate how upkeep and maintenance of sealed environments such as the Diefenbunker site, maintain critical importance for the site’s current use that extends beyond solely ensuring basic health safety standards. Namely, upkeep and maintenance operations ensure that on-site conditions optimize workplace performance for museum personnel operating at the Diefenbunker site, in contemporary time.

<i>Figure No.</i>	<i>Image No.</i>	<i>Name</i>	<i>Theme</i>	<i>Description</i>
12	0249	Industrial Boiler System in the Machine Room	Upkeep and Maintenance	This picture is from Sub-Level number 100 of the Diefenbunker. In the picture, an industrial boiler system is observable, demonstrating the intricacy of the process of ‘upkeep and maintenance’ for any nuclear bunker site.

For the image depicted in figure 12 (see Chapter 5), the picture represents an example of ‘upkeep and maintenance’ of the site’s physical critical infrastructure systems. It also contains key information about the meaning and purpose behind the choice to place the ‘Machine Room’ on the lowest sub-level of the bunker. In addition, the industrial boiler system is important in supporting many site operations. Namely, the industrial boiler system is key to several critical processes that enable the site’s current adaptive reuse purpose as a Cold War heritage museum. These critical processes include electricity, steam production, and internal temperature regulation in the Diefenbunker.

In addition, in considering the site selection process, and how it subsequently shaped site design, it is important to note that the bunker’s infrastructure is constructed to ensure that access to the equipment in the Machine Room which supports upkeep and maintenance of the site, is only permitted for workers undertaking maintenance operations. Also, the location of the Machine Room on the bottom level of the site resulted in enhanced preparedness levels of protection given that the impact of a potential nuclear strike would have arguably been higher on upper sub-levels of the Diefenbunker. However, upon undergoing the transitional adaptive reuse process, the bunker’s unchanged layout provides natural access control which ensures that visitors to the site could not easily access site equipment, ensuring its protection from accidents or potentially nefarious activities that stem from human interference (“Design Guidance”, 2006, p. 1-25). Also, during the period of time between the site’s decommissioning and its repurposing as a museum, its structural layout ensured additional protection of the site from external natural

elements above ground, that could have damaged the Diefenbunker during its time out of operation. Subsequently, site selection enhanced the prospects for the site's preservation through structural design planning that ensured protection of maintenance equipment, and in turn, the entire site from harm.

6.4.2 Peer Reviewed Literature Grounding for Theme

In exploring the theme 'upkeep and maintenance' in the Diefenbunker, it is critical to delineate between various bunker maintenance strategies. In doing so, it is key to further explore the bunker maintenance operations that supported daily operations during the site's time serving the function of continuity of government, and its contemporary use as a heritage museum. In exploring this topic, this work draws on Breani & Dervishi (2019) which contributes to existing literature on nuclear bunkers. More pointedly, the scholarly work assesses thermal and energy performance in addition to the adaptive reuse efficiency of nuclear bunkers in Albania. In that regard, Breani & Dervishi (2019) describe "efficiency" both in relation to energy consumption evaluation, and in terms of the ability of a nuclear bunker to fulfill its original purpose, which fundamentally consists of a bunker's capacity to "shelter" persons below ground level (Breani & Dervishi, 2019, p. 1).

Moreover, Samuel (2018) in discussing the concept of site selection, references Khattak et al. (2017) in noting that the site selection process remains a complex process of analysis, evaluation, and in-depth investigation of a site's demographics, natural geographic location settings, and the design of a structure (p. 1133). In addition, the scholarly work in considering the construction of nuclear bunkers nearby nuclear facilities in India, also cites Al-Maliky (2008), in noting that key components to consider in the site selection process are building materials, and site design (p. 1134). Site design in this regard includes the degree of bunker burial below

ground level, and wall thickness. In that regard, Al-Maliky (2008) assesses aspects of the site selection process for a bunker, including engineering and architectural designs such as, wall thickness, location, and various forms of technology, such as ventilation and air conditioning for site maintenance. In doing so, the scholarly work underscores that site selection features including being situated below ground level, as well as a greater degree of burial, as constituting the most protective location settings in the process of site selection for nuclear bunker shelter sites (Al-Maliky, 2008, p. 1).

6.4.3 Discussion of Theme

In discussion of the concept of nuclear bunker adaptive reuse efficiency, and specifically its energy performance, it is correspondingly critical to consider the ‘upkeep and maintenance’ of machinery that shapes a bunker site’s energy performance. For example, it is key to note that hydroelectric power provided from machinery in the Diefenbunker’s Machine Room, during its Cold War era of operations, is still the form of energy provided on site in current time (Eyamie, 2022). In that regard, considerations were made as a part of on-site upkeep and maintenance to ensure continuity of power supply if external power was cut off, especially in the case of a nuclear strike. In this case, four diesel generators in the site’s Machine Room were upkept and maintained to power the bunker if catastrophic disaster scenarios were to unfold. However, while a total of four generators were upkept on-site, only two generators would have been required to secure power supply to the bunker in an outage (Eyamie, 2022). The first generator to come online was designed to provide power to communications only, whereas the second generator was to provide power to the rest of the bunker (Eyamie, 2022, para. 7).

Furthermore, in consideration of the impact of the site selection process on nuclear bunker adaptive reuse efficiency to support the bunker’s current purpose as a Cold War heritage

museum, a key concept to consider is bunker design. Two of the most important objectives of a nuclear bunker include a reduction of the effect of radiation, as well as resistance to both overpressure and wind (Al-Maliky, 2008, p. 1, 2). These considerations, encapsulated in a nuclear bunker's 'dna', naturally influence the design of a bunker. As every bunker maintains a different design, differing ways of achieving 'upkeep and maintenance' is inevitable. However, for the site's upkeep and maintenance, it is important to note that a site's location influences upkeep and maintenance operations in a variety of ways. For instance, a nuclear bunker below ground consumes between 44-145% less energy than the same structure above ground, demonstrating a considerably higher degree of energy efficiency (Brecani & Dervishi, 2019, p. 1). These examples demonstrate the considerable degree to which a site's selection process continues to influence a site's use, even after it has undergone an adaptive reuse transition to support new uses.

Moreover, the transition of adaptive reuse extended beyond matters of the transfer of ownership, and selection of artifacts to remain in the museum for visitors to encounter. Namely, the construction project to ensure the transitional process of adaptive reuse of the site to serve its current use as a Cold War bunker museum site that supports heritage tourism purposes, lasted from 2009 until its completion in the summer of 2010. Additionally, in the process, inspections to ensure asbestos levels were safe were also undertaken. The inspections found that type-3 asbestos operations were necessary to remove asbestos from two locations in the bunker (Fawcett, 2011). Also, the asbestos removal process required increased ventilation in certain areas that were sealed off, to protect the site's physical integrity. During the process, workers were also provided with showers to decontaminate themselves upon exposure. These examples highlight the extent to which upkeep and maintenance amendments made to the Diefenbunker

were necessary to enable the site to serve its current use as a Cold War nuclear bunker site that serves heritage tourism purposes.

Furthermore, in consideration of the site's selection process, and specifically its design structure, which is defined by its thick walls at various points throughout the bunker, a key facet of 'upkeep and maintenance' of the site's internal bunker temperature that must be considered, is the number of persons that were to take shelter on-site. This is because the number of persons taking shelter in an enclosed space maintains direct correlation with the humidity level and temperature inside the bunker, which could potentially impact the heart rate and body temperatures of persons sheltering in the bunker (Brecani & Dervishi, 2019, p. 1). These examples highlight the risks that face persons in enclosed spaces such as inside subterranean nuclear bunkers, and their exposure to various hazards, including fire hazards.

In addition, in assessing the manner by which upkeep amendments made to the Diefenbunker permit and accommodate the site's current use as a Cold War bunker museum, a key component of on-site 'upkeep and maintenance' operations to consider, is the Diefenbunker's fire safety program (Fawcett, 2011). For example, a fire alarm system on-site, with smoke detectors along the site's primary corridors, is upkept to ensure a level of fire disaster preparedness that adheres to Ontario laws. Also, a sprinkler system installed on-site, spans each level of the Diefenbunker and the blast tunnel. In addition, exit signs on-site are maintained and upkept with supply from an emergency power generator.

Also, during the site selection process, the precise location of the site chosen for the establishment of the Diefenbunker arguably reduced a considerable number of 'upkeep and maintenance' operations that would have been critical to operation of the site. Namely, such upkeep and maintenance operations would have potentially been necessary to sustain the

bunker's operations in both its past and present uses if the bunker had been located elsewhere. For example, the Diefenbunker is located in Carp, Ontario, which maintains an elevation of 110 metres above sea level ("Elevation", n.d. a). The site's elevation sits above the recommended 40 feet, or approximately 12 meters above sea level, cited by the Shelters and Shelter Management Reference Guide provided by USAID, whereby higher elevation for site selection is necessary to avoid the flood disaster threat (Bendix, 2019, para. 6; "Shelters", 2003, p. 8).

Moreover, the location of the Diefenbunker site contrasts the geography of the nation's capital city, Ottawa, Ontario, which maintains an average elevation of 72 metres above sea level ("Elevation", n.d. b). Thus, to a certain extent, the higher elevation reduces the nuclear bunker's vulnerability to the impacts of flooding disasters. These considerations ensured that the need for flood disaster preparedness measures that include additional drains on site, and flood retaining walls and barriers, that would require additional upkeep and maintenance operations, was avoided.

Thus, the Diefenbunker's location in a deep valley, but away from flood zones, also conceivably provides additional protection for the site from the secondary impacts of flooding disasters. Among these impacts are the spread of waterborne diseases. In addition, the site's distance from the centre of the more densely inhabited nation's capital, in a sparsely populated town, influenced and lessened the possibility of the site being converted for commercial use. This assertion is based on the notion that demand for commercial space is "not evenly spread", whereby businesses tend to "favour a city center location" (McDonald, 2018, para. 3, 4). The site's location setting, defined by its deeper subterranean burial, also made adaptive reuse for other non-history-centric purposes, and reconstruction of the site all together, more difficult. These factors ultimately shaped the menu of options for the site's future, and arguably produced

the favourable conditions for adaptive reuse of the site, specifically to serve the purpose of heritage tourism.

6.5 Theme #4: Continuity of Government & Civil Defence

The final of four themes of classification that are included in this Discussion Chapter is, ‘continuity of government and civil defence’. First, the researcher identifies the theme of ‘continuity of government and civil defence,’ as constituting operations that were necessary for the Diefenbunker site to carry out functions that ensured the Canadian government, operating with bunker nodes strategically spread across the nation, would be able to continue its essential governance operations in the event of a catastrophic disaster, especially nuclear war.

Second, the theme encompasses the civil defence measures that the Diefenbunker site supported to ensure civilians across Canada were prepared for a nuclear attack disaster. For instance, this could be posters from the bunker’s era of operations that sought to remind both civilians and government personnel that they maintained an imperative role in Canadian Civil Defence efforts. In addition, the theme of ‘continuity of government and civil defence’ can be embodied in the governance decisions that were made in the Diefenbunker’s War Cabinet room. For example, the theme of ‘continuity of government and civil defence’ is exemplified in the relationship between the Diefenbunker as the site of Central Emergency Government Headquarters, and various other bunkers that operated across Canada to ensure continuity of government. The government personnel operating out of the Diefenbunker site both established and coordinated defined procedures that would enable the Government of Canada to continue its essential operations in the event of a nuclear attack disaster.

6.5.1 Presence of ‘Continuity of Government and Civil Defence’ Theme in Diefenbunker

The ‘continuity of government and civil defence’ theme is represented by figures 13 and 14. Rows from Table 1 are extracted to organize the discussion of the two photographic images, or the data, that represent this theme.

<i>Figure No.</i>	<i>Image No.</i>	<i>Name</i>	<i>Theme</i>	<i>Description</i>
13	0428	Functional Reporting Structure of CEGHQ	Continuity of Government & Civil Defence	This picture taken of a poster in the Diefenbunker, features the functional elements of the Diefenbunker. In the photo, a description entails how the Diefenbunker functioned as the Central Emergency Government Headquarters in Carp, Ontario.

Namely, in drawing from figure 13 (see Chapter 5), the photo is an example of the theme ‘continuity of government and civil defence’. The picture contains key information encapsulated in a flow chart that is reproduced on a poster which is from a museum exhibit. The chart highlights the flow of primary information, decision orders, and identifies the elements of the CEGHQ that were to undertake coordination with other agencies, as a part of the implementation of emergency governance protocol. Additionally, the detailed diagram broadly assesses the various relationships between the CEGHQ, NATO, various international civil defence agencies, and various Regional Emergency Government Headquarters across Canada.

In assessing the photo, it is evident that the Diefenbunker was a site in which clearly defined emergency governance procedures were devised. These procedures could be implemented from the site in the event of a catastrophic disaster, such as a nuclear attack. In the photo’s chart, the War Cabinet is depicted at the centre. The War Cabinet’s location at the centre of the diagram indicates its primary importance in the process of disseminating orders to ministers and deputy ministers, which would then be passed onto national emergency agencies. The photograph also signifies that continuity of government operations not only considered the Government of Canada’s commitment to resume essential operations. More pointedly, the

diagram underscores that established Cold War continuity of government protocol at the Diefenbunker accounted for Canada's obligations to contribute to the protection of allied nations. It is important to note that Canada's commitment its allies during and throughout the Cold War, was one it was bound to through treaties, such as the North Atlantic Treaty.

<i>Figure No.</i>	<i>Image No.</i>	<i>Name</i>	<i>Theme</i>	<i>Description</i>
14	0230	Department of National Health and Welfare Poster (Circa 1950s)	Continuity of Government & Civil Defence	This picture taken in the Diefenbunker, features a Canadian Civil Defence poster from the 1950's made by the Canadian Federal Government's Department of National Health and Welfare. The poster states that "Civil defence relies on you" and "Disaster may never occur but . . . Bea Alerte." In the photo a woman holds red flowers and picks up more flowers as a re-eyed bull lurks behind her.

In analysis of the poster depicted in figure 14 (see Chapter 5), from the poster's statements and picture design it is evident that the Government of Canada considered the Canadian public as constituting a key facet of the country's civil defence program. In addition, civil defence represents the origin and bedrock of disaster and emergency management in Canada. In that regard, the photograph taken suggests that during the era of the poster's creation and dissemination, in the 1950's and onwards, the risk posed by a nuclear attack disaster was addressed by the Federal Government of Canada through the implementation of public outreach measures, such as measures exemplified by this poster.

6.5.2 Peer Reviewed Literature Grounding for Theme

In finding a precise definition for the theme 'continuity of government and civil defence', it is critical to delineate the relationship between both terms, which were primary components of the nation's overall response to the nuclear attack disaster threat, that followed nuclear weapons proliferation. In addition, this section of the Discussion Chapter considers the history of both continuity of government and civil defence in Canadian, and international disaster and emergency management. Also, in further defining additional terms that comprise this theme, it is critical to further delineate between emergency governance, a primary component of emergency

management, and continuity of government. In doing so, this work draws on a definition from McDougall (2020). The scholarly work examines and seeks to establish more clarity on the undefined meanings of various government obligations, especially the obligation to ensure continuity of government operations in Canada.

In defining these terms, the work references section four of the Emergency Management Act that came into force in August of 2007. More pointedly, the section cited in the Emergency Management Act provides the Minister of Public Safety and Emergency Preparedness the responsibility of “establishing the necessary arrangements for the continuity of constitutional government in the event of an emergency” (McDougall, 2020, p. 293). The article notes that while other terms including “emergency management” are defined in the act, the term “emergency” itself in the Emergency Management Act could include the COVID-19 pandemic, yet it remains undefined (“Emergency”, 2022; McDougall, 2020, p. 293). However, the scholarly work states that continuity of government, in the context of Canadian law, specifically constitutes planning and operations that are undertaken in “anticipation of a catastrophic event” that can decapitate the executive branch of the Government of Canada (McDougall, 2020, p. 293).

Furthermore, Burtch (2006) assesses civil defence history in Canada, placing focus on “On Guard, Canada”, a civil defence convoy that once travelled nationwide to rally support for civil defence across the country. The peer-reviewed journal article assesses civil defence efforts taken by federal and provincial levels of government in Canada, that linked the notion of “responsible citizenship” with citizen participation in overall national civil defence (Burtch, 2006, p. 739, 752). More pointedly, the Government of Canada stressed that participation of Canadian citizenry in national civil defence efforts was a “vital act of community involvement” (Burtch,

2006, p. 753). In considering the theme of ‘continuity of government and civil defence’, the scholarly work applies definitions of key terms that include “citizenship” and “responsibility”, in different contexts that are outlined in this section (Burtch, 2006).

Moreover, Burtch (2006) assesses citizenship as constituting a collection of core obligations including, obedience to the rule of law, military service, and taxation (p. 737). Furthermore, the scholarly work stresses that civil defence authorities in Canada “promoted” participation in civil defence as representing a “vital and permanent” component of citizenship (Burtch, 2006, p. 736). In regard to the notion of citizenship, the scholarly work identifies how Canadian Civil Defence authorities defined the term “responsibility” as constituting the role citizens played in participating in national civil defence efforts to “defend their hard-won rights”, which authorities stressed were at risk amid the overall Soviet threat (Burtch, 2006, p. 737).

6.5.3 Discussion of Theme

This section concludes discussion on the theme ‘continuity of government and civil defence’, the final of four themes of classification that are included in this Discussion Chapter. First, the researcher identifies the theme of ‘continuity of government and civil defence’ as constituting operations that were necessary to carry out the functions of continuity of government and civil defence during the Diefenbunker’s Cold War-era of operations. Namely, the theme encompasses Cold War-era efforts taken to ensure that the Canadian government, operating with bunker nodes strategically spread across the nation, would be able to continue its essential operations in the event of a catastrophic disaster, especially nuclear war. Also, the theme encompasses the civil defence measures that the Diefenbunker’s operations supported from the site to ensure civilians across Canada were prepared for a nuclear attack disaster during the Cold War.

In modern time, with the Diefenbunker now functioning as a heritage site, continuity of government protocol in Canada remains established to ensure that the Governor General, or Lieutenant-Governor at the provincial level of government, would continue to carry out the governance functions of the Prime Minister, in the event of the death or incapacity of the Prime Minister (McDougall, 2020, p. 294). In the event of a catastrophic disaster, such as a tactical nuclear strike that intentionally, or unintentionally targets the Ottawa vicinity, certain steps would currently be taken to ensure that government members could maintain continuity of essential government operations and functions. Current planning includes maintaining operation of energy, health, food, water, safety, and transportation, among other services during an emergency or disaster (“Guidance”, 2021). In that regard, a CBC report in 2017 identified that in response to the nuclear attack disaster threat facing the nation, the Government of Canada designated bunkers at two military bases to be the site of continuity of government operations in the event that a disaster would prompt the evacuation of the federal cabinet in Ottawa (Brewster, 2017, para. 2).

Moreover, the report noted that the plan would comprise a part of the federal government’s overall protocol for continuity of constitutional government (Brewster, 2017, para. 5). Namely, the report on the agreement between the Prime Minister’s Office and the Department of National Defence, cited the plan as being taken to ensure that little or “no interruptions to the availability of critical services” would occur as a result of continuity of government being hindered, due to the occurrence of a disaster (Brewster, 2017, para. 5). It is crucial to identify that in relation to this study, the 2017 CBC report cites the Diefenbunker in identifying how officials in the Government of Canada have contemporarily been “forced to think more in Cold War terms” and to adopt a “Cold War defensive posture” (Brewster, 2017, para. 7, 13).

Namely, in invoking the Cold War, the CBC report cited in this Discussion Chapter suggests uncertainty currently remains about contemporary civil defence operations that will be undertaken from these designated continuity of government bunker sites (Brewster, 2017, para. 19). In assessing photographic evidence of Cold War era continuity of government and civil defence operations that were undertaken from the Diefenbunker site, it is important to stress that the data compiled evidently demonstrates that the site served operations that extended beyond supporting the function of continuity of government during the Cold War.

For example, the Diefenbunker site served as a hub for conducting coordination with NATO and its member states during the Cold War. In that regard, the site became a critical component of Canada's commitment to the NATO alliance. For example, in the photographic data obtained from the Diefenbunker site, the relationship between the CEGHQ, other civil defence agencies, and with NATO, is underscored by the diagram. The photo demonstrates that the Cold War mindset extended beyond ensuring continuity of government through measures that ensured the physical safety of government personnel.

As a partner of NATO, the CEGHQ diagram underscores through the Diefenbunker's distinctive history, that the nation's Cold War mindset of responding to catastrophic disaster threats, placed emphasis on maintaining obligations to support the Canada's allies. This is because failing to do so also could have called into question any or all obligations that member states of the NATO alliance had for Canada during the Cold War. Canada's commitments to NATO during the Cold War were solidified by operations at the Diefenbunker site that sought to mitigate the risk of nuclear retaliation that the nation faced from NATO's adversary states.

In discussion of Canada's Cold War commitment to its NATO allies, Diefenbunker operations ensured continuity of government planning to solidify the federal government's

control of Canada. These operations, taken from the site's nerve center, were evidently considered a necessary facet of upholding the nation's ability to upkeep its commitments to the alliance during the Cold War. In that regard, steps that were taken to ensure the protection of the Prime Minister and government figureheads in line of succession at the Diefenbunker site, were evidently fundamental to ensuring Canada could properly uphold its commitments to the alliance during the Cold War.

Also, the close relationship between Canadian and U.S. Civil Defense during the Cold War, is identified in the diagram, marked by the CEGHQ Carp's cooperation with U.S. Civil Defense agencies. Furthermore, similar to Canada's Cold War efforts to ensure continuity of government, civil defence efforts in Canada had sought to emulate the example established by the United States, and often received support from the U.S. in establishing the foundation for Canada's Civil Defence. For example, Canadian officials took the opportunity to use a convoy to raise awareness about the importance of civil defence, a lesson taken from the United States. The convoy, which left Parliament Hill in 1953, completed a three-month tour across major Canadian cities including, Calgary, Regina, Vancouver, Edmonton, Winnipeg, and Montreal (Burtch, 2006).

Moreover, the "On Guard, Canada!" convoy, which showcased the impacts of a nuclear attack disaster, was a fundamental component in raising public awareness about the need for civil defence in Canada during the Cold War. The convoy was distinctive among broader Canadian Civil Defence efforts that sought to spread sentiment among Canadian citizens about how their own individual "responsibilities", in line with being "citizens", were a necessary component of national civil defence (Burtch, 2006, p. 739, 741). While Canadian organizations utilized the U.S.-made exhibit to display the dangers posed by the nuclear attack disaster threat, a

difficulty that would later become apparent was the endeavour of obtaining resources and sustaining public outreach, which the Diefenbunker's operations were critical to. These challenges would prove to be both Civil Defence Canada's greatest strength, and its greatest weakness (Burtch, 2006).

Furthermore, photographic evidence compiled from the Diefenbunker site, such as the Bea Alerte civil defence posters, demonstrates that civil defence education and awareness amongst the public, which the convoy also aimed to bring attention to, was a key part of the nation's Cold War civil defence strategy (Matthews, 2021, para. 1). It is important to underscore that outreach efforts made by the Federal Government of Canada to citizens across the country, largely defined civil preparedness efforts during the Cold War. These measures were implemented through an in-person outreach campaign, during the bunker's era of operations.

Also, from the site for instance, coordination with regional emergency bunkers that could support civil defence activities, including public outreach efforts across the nation, once took place. The relationship between the CEGHQ and these Regional Emergency Government Headquarters (REGHQs), demonstrates how the Government of Canada perceived the nuclear attack disaster threat to its national security. Namely, Canadian Civil Defence represented preparedness for the nuclear attack disaster threat posed to Canada's national security. Consequently, the catastrophic disaster threat was evidently addressed through coordination undertaken between the REGHQs, and the Diefenbunker which oversaw the nation's civil defence program.

6.6 Conclusion

To conclude, this Discussion Chapter gathers findings from four themes of classification. Moreover, this chapter, which featured discussion analysis of a total of eight pictures found in Chapter 5 Findings and represented in the tables in this chapter, discussed the meaning of the themes, partly based on the content of each photograph. These photographs were interpreted in their relation to the Diefenbunker, which is a prime example of a Canadian nuclear bunker that has undergone adaptive reuse to serve the purpose of heritage tourism. The relevance that results have for this research study extend to other nuclear bunkers sites that face either prospects of reuse or dereliction.

This Discussion Chapter also highlights that the Diefenbunker faced key challenges and opportunities prior to its conversion to a heritage site. Overall, the results in this section underscore that the themes of ‘time travel’ and ‘upkeep and maintenance’ largely represented key challenges in the process of adaptive reuse, whereas themes of ‘uncomfortable sites’ and ‘continuity of government and civil defence’ contrastingly largely presented opportunities.

Firstly, with regard to the theme of ‘time travel’, the findings underlined that visitors are provided an authentic experience that accurately reflects the site’s history. The site enables visitors to encounter its physical aspects and artifacts, that are distinct to the era in which the bunker operated. However, with regard to adaptive reuse, discussion of the theme of ‘time travel’ outlines the intricacy of operations that are necessary to undertake the process of built heritage conservation to support adaptive reuse. Namely, these operations were extremely challenging to undertake without compromising the site’s historic integrity.

Second, with regard to the theme of ‘upkeep and maintenance’, the findings in this section suggest that the site selection process minimized the amount of upkeep and maintenance operations that could have been necessary for the site to function in both its original, and current capacity. However, with regard to adaptive reuse, the discussion of the theme ‘upkeep and maintenance’ demonstrates that maintenance operations to support the site’s current use as a heritage museum, are diverse and extensive. In addition, discussion of the theme of ‘upkeep and maintenance’ outlines the amendments made to the site to enable adaptive reuse. The discussion uncovers how amendments and upgrades to transition the site into a heritage museum were enabled by a lengthy, intricate, and high-priced construction process, that carefully avoided harming the site’s physical integrity.

Third, with regard to the theme of ‘uncomfortable sites’, the findings suggest that tourism of the site could prompt feelings of discomfort among visitors, due to the site’s association with disaster and death. However, while the Diefenbunker remains an ‘uncomfortable site’, the findings discussed highlight that the site sits far away from other heritage sites that have been the location of mass death and suffering. Also, the discussion of the theme ‘uncomfortable sites’ uncovers the site’s unique position as both a history-centric dark tourism site, and as a type of ‘uncomfortable site’ that is associated with war and conflict in Canada. Namely, these characteristics of the site, in combination with public interest in the Diefenbunker’s various ‘uncomfortable’ aspects as a site that addressed the nuclear attack disaster threat, provided a major opportunity for the site to undergo adaptive reuse, and to become a Canadian landmark of dark tourism. In the end, the opportunity materialized.

Fourth, with regard to the theme of ‘continuity of government and civil defence’, the findings suggest that continuity of government and civil preparedness measures for a nuclear

attack disaster were at the heart of the site's Cold War era of operations. In many ways, the findings compiled identify how numerous continuity of government and civil defence measures that were implemented from the site during the Cold War, remain correspondingly buried in the site's display of history. However, these measures are also a representation of how the Government of Canada perceived the nuclear attack disaster threat posed to the country's national security. Moreover, the Diefenbunker's display of distinctive measures that were taken during the Cold War to uphold the nation's alliances and to support public education about the nuclear attack disaster threat, presented exceptional opportunities to generate heritage tourism on-site. Namely, the site's distinctive history as the center of the nation's continuity of government and civil defence operations, provides it with a unique ability to promote contemporary education and awareness of the nation's Cold War legacy.

Chapter 7 – Creativity in Adaptive Reuse Addition

This is the way of the pious and people of deeds...they will not waste even a mustard seed in the world, and they are distressed by any waste and destruction they see.

- *Bal Tashchit (Do Not Destroy or Waste) Mitzvah 529*

7.1 Introduction

This Mitzvah recalls something that we do not consider often enough as we pass by homes, buildings, and ruins that constitute historic sites. That is, historic sites are very delicate and precious in nature. Every site has a story to tell. Also, given that many historic sites are accompanied by troubled and dark pasts, we tend to oversee the importance of preserving them. Uncomfortable heritage sites that are no longer in use are often subjected to questions that inquire into various potential options for deciding their fate. In deciding a site's fate, it is essential to contemplate the strategy of adaptive reuse.

However, as we consider new strategies for adaptive reuse of uncomfortable heritage sites, and the opportunities and barriers that face such an endeavour, we must remember that a site's adaptive reuse can be advantageous and constitute a variety of positive impacts, regardless of a historical site's past. This chapter investigates the various ways in which post-war Flak Towers exemplify creativity in adaptive reuse. In section two, this study provides a historical background of the Flak Towers. In section three, as the concept of adaptive reuse is explained, the opportunities and risks facing sites that undergo adaptive reuse are outlined and discussed in sections four and five, respectively.

This chapter focuses on a specific example of Flakturm Stifskaserne located in Vienna, Austria. Specifically at Esterhazy Park, a World War II era flak tower was redeveloped into the Haus des Meeres, or House of Sea aquarium. This study proves that ultimately, by creatively

applying adaptive reuse, the worst of things could be remodeled to provide hope for the future, and the Vienna Flak Tower Aquarium is a good example of that creativity in action.

7.2 Vienna Flak Towers

German Dictator Adolf Hitler first sought the construction of the Berlin Flak Towers in 1940. The Flak Towers were originally built to shelter approximately 15,000 people (“The Flak Towers”, n.d.). In addition, there were different ‘generations’ of Flak Towers. For example, Flak Towers which took two years to build, from 1940 until 1942, which represented an attempt to fortify the capital city of Berlin from Allied aircraft, were Generation 1 Flak Towers (Chorny, 2022). However, the two pairs of Flak Towers that were built between 1942 and 1944 were Generation 2 Flak Towers. They included a Flak Tower complex in Hamburg, Germany, and one complex built in Vienna, Austria, to support anti-aircraft efforts in World War II Germany. In addition, Generation 3 Flak Towers, which this study focuses on, consisted of two pairs of Vienna Flak Towers that were constructed between 1943 and 1945. They remain the final Flak Towers that were built by the German Third Reich Dictatorship.

By the end of World War II, Austria, was a city in ruins. While Allied powers began the process of removing traces of the Third Reich Dictatorship, Flak Towers proved more difficult to remove. As the Flakturm Stiftskaserne, like other Post-war Flak Towers, were massive structures that overshadowed surrounding neighbourhoods, it was later determined that the combination of steel reinforced concrete, the towers’ size, and distinct construction, made the towers extremely durable, and difficult to disassemble.

Furthermore, in Austria’s capital city, Vienna, the Flakturm Gefechtsturm is also a third generation Flak Tower. Currently, in Augarten Park the flak tower remains nearby the grounds of

a military base used by Austrian Armed Forces (See Figure 17). Similarly, during World War II, the Flakturm Stiftskaserne was also used to provide shelter for civilians, with a capacity to protect up to 20,000 persons. Also, the Flakturm Stiftskaserne provided use for storage of various items. However, as anti-aircraft guns were once situated at the top of the Vienna Flak towers, their primary purpose was to provide air defence for the city during World War II.

Moreover, the Haus des Meeres remains nearby another Flak Tower, named the Stiftskaserne Gefechtsturm, signifying the site's former use as a combat tower (Dundon, 2017). At the time of writing in 2022, the Stiftskaserne Gefechtsturm remains under the ownership of the national government of the Republic of Austria. In addition, the site is administered by a property management agency that remains part of the country's national armed forces. Unlike the Haus des Meeres, the Stiftskaserne Gefechtsturm is not situated in the middle of a park. Instead, the site remains surrounded by a military building complex.

Also, the Stiftskaserne Gefechtsturm remains inside the protected perimeter of military barracks that in current time, continues to be in operation. Critical to the national security of the nation, the Stiftskaserne Gefechtsturm tower itself remains in use, serving a variety of security functions, and more pointedly, continuity of government through the operation of an emergency shelter for Austria's federal government (Koebe, n.d. a).

Moreover, while the Flak Towers have been put to various uses in modern times, their current use does not neglect the history that provided a foundation for the creation of the towers that now hover over Vienna. The Flak Towers remain both a legacy of, and a place for remembering those who were forced into slave labour, especially Jewish residents that lived under the Third Reich's Dictatorship. The Haus des Meeres was constructed by slave labourers,

Figure 17. Photograph JLR092322 Flakturm Gefechtsturm in Vienna



- **Caption:** The Flakturm Gefechtsturm in Vienna's Augarten Park.
- **Source:** Dr. Jack L. Rozdilsky, September 2022
- **Note:** Photograph used in MRP with Permission

as were other Flak towers in Austria and Germany during the Second World War (Moody, 2019).

7.3 The Concept of Adaptive Reuse

There are many reasons why adaptive reuse as a strategy for attending to historic sites often falls to the bottom of the menu of options for planning a site's future or is rejected all together. Broadly speaking, adaptive reuse is a very complex process. Additionally, among countless reasons, adaptive reuse generally involves maintaining an existing site's structure and envisioning a way for its continuity, despite the fact that the structure survives in an environment that is often entirely unrecognizable from the environment that once surrounded the site at the time of its foundation and use.

In contrast, there are many reasons why adaptive reuse can become the chosen approach for attending to historic sites with an uncertain future. For example, as population density continues to rise in major cities around the world, built structures maintain limitations for reconstruction. Above all, adaptive reuse presents the opportunity to fully activate the best possibilities that a historic site can become in its new form, which can additionally transform a site's surrounding urban setting (Plevoets & Van Cleempoel, 2019).

To be clear, adaptive reuse of a site constitutes the act of remodelling and altering a site to accommodate new uses, or new users (Stone, 2019). For example, this could be the conversion of a site that was formerly used to station anti-aircraft weapons for military purposes, into an aquarium for tourism. Also, adaptive reuse could feature the use of a church that is converted into an art gallery. In addition, adaptive reuse could for instance, feature the conversion of a Flak Tower into both a restaurant and bouldering wall for entertainment.

However, it was not always clear that each Flak Tower would be converted for their modern-day uses. In addition, it could not have been entirely possible to predict that the Haus des Meeres would be able to accommodate multiple new uses, whilst maintaining remembrance of the building's history on plaques inside the Flak Tower. The Flak Towers ultimately remain an example of the creativity that can emerge from adaptive reuse, and the distinct impact it maintains for visitors to the historic site.

Moreover, adaptive reuse often involves a combination of engineering, interior design, legal, architectural, and political expertise being utilized simultaneously to make the possibility of reuse a reality. In addition, transforming the vision of adaptive reuse into reality, involves securing a delicate and often complex balance between various conflicting community views and values, which can remain both a microcosm, and a flashpoint of a clash of the values held by a society (Stone, 2019). This dichotomy could be recognized in the case of the Vienna Flak Towers.

Furthermore, the Vienna Flak Towers represent an uncomfortable and dark past in Austria where horrific crimes against humanity were committed. However, while the reasons for the destruction of the Flak Towers remain tenable, the site's adaptive reuse exemplifies a tension in a country that seeks positive incorporation of the towers into the urban life of the capital's residents. The Flak towers ultimately achieve this correspondingly in remembrance of what the towers once were, and how they came to be.

7.4 Opportunities Supporting Adaptive Reuse

Stone (2019) identifies a critical argument supporting adaptive reuse. In that regard, Stone points out how in society, we are often reminded of the need to conserve valuable resources, and

to reuse, and recycle. However, if historic sites are also considered as a valuable resource belonging to society as a whole, it is arguable that such principles that prevent waste and seek positive reuse, ought to be contemplated as we consider adaptive reuse for uncomfortable historic sites.

Furthermore, many opportunities can emerge from adaptive reuse of a historic site. For example, the Flakturm Stiftskaserne demonstrates how adaptive reuse can activate urban regeneration. In addition, various other opportunities are generated by the Esterhazy Park Haus des Meeres. Figure 18 shows the exterior view of the Haus des Meeres where the flak tower was redeveloped into an aquarium. (See Figure 18). This section will demonstrate how urban regeneration, cultural continuity, economic development, and environmental sustainability was arguably enhanced through adaptive reuse of the Esterhazy Park Haus des Meeres site.

7.4.1 Urban Regeneration

Moreover, urban regeneration constitutes a specific approach to city planning. More pointedly, urban regeneration seeks to address and improve economic and social complications that a particular urban region faces. In addition, urban regeneration has been essential in combatting urban deprivation and decline, which has occurred in major cities around the world. Also, urban regeneration has proven key to aiding revitalization of urban spaces, and critical in support of their subsequent recovery from armed conflict.

For example, in the case of the Flakturm Stiftskaserne, opportunities for transforming the heritage site that once served a major function during the violence of World War II, into urban parks to spur urban regeneration, materialized.

Figure 18. Photograph JLR092422 - Adaptive Reuse of Flak Tower in Vienna



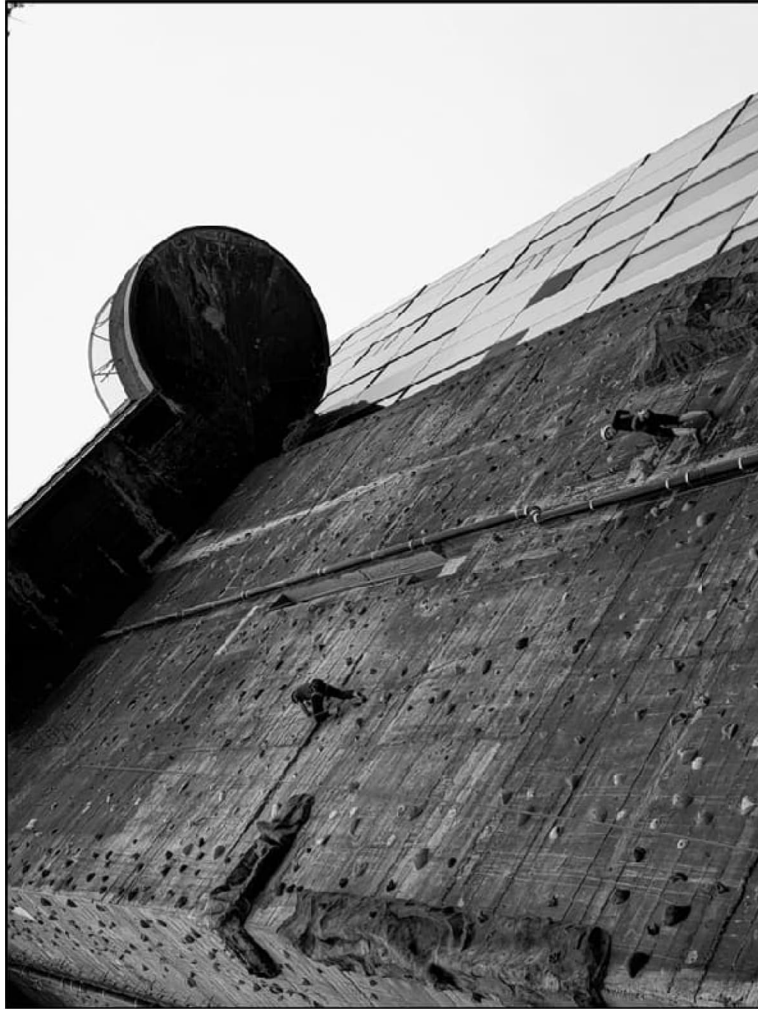
- ***Caption:*** Flak Tower in Esterhazy Park that was redeveloped into the Haus des Meeres (an aquarium).
- ***Source:*** Dr. Jack L. Rozdilsky, September 2022
- ***Note:*** Photograph used in MRP with Permission

In assessing the case of the Vienna Flak Towers, the historic site's surroundings feature the creation of a children's playground that has enabled community members to actively benefit from urban revitalization. In this regard, families are presented with the opportunity to gather at Esterhazy Park, and their children can subsequently benefit from remaining physically active and enjoying leisure space.

Also, the site itself has prompted urban regeneration through the conversion of the building, which was arguably approaching abandonment or decay, into a leisure space that attracts urban climbers on the converted site's bouldering walls (See Figure 19) (Koeb, n.d. b). Climbers are able to engage in the leisure activity to both increase mental and physical strength as well as endurance in a way that presents distinct benefits for the community (Fetters, 2016). This is because the activity, with all its benefits, is accessible to large amounts of people, making its positive impacts felt widely in the urban setting it is situated in. These examples demonstrate how adaptive reuse of the Haus des Meeres Flak Tower has evidently prompted urban regeneration by enabling increased leisure space in the urban setting it occupies, while correspondingly enhancing the urban aesthetics of an urban area that once had an uncertain future.

Furthermore, as buildings contain profound meaning, history from a heritage site can be analyzed to determine the cultural future of a community that surrounds a historic site (Stone, 2019). In addition, the structures of certain historic sites ultimately remain immobile and in certain cases, such as in the case of the Flakturm Stiftskaserne Flak Towers, virtually indestructible. However, as these sites continue to exist, adaptive reuse has proven that their form can be preserved and transformed to serve a variety of purposes from an urban planning perspective.

Figure 19. Photograph .JL.R092422-2 - Vienna Flak Tower Converted for Bouldering



- **Caption:** Conversion of a Flak Tower into a leisure space that attracts urban climbers on the converted site's bouldering walls.
- **Source:** Dr. Jack L. Rozdilsky, September 2022
- **Note:** Photograph used in MRP with Permission

These include increased leisure space in the city, which has enhanced urban aesthetics, while allowing the site to additionally serve the function of creating economic opportunity. These changes have transformed the cultural future and urban settings which the site occupies and prove how the Haus des Meeres embodies an opportunity for urban regeneration that materialized.

In addition, the conversion of the Vienna Flak Tower into the Haus des Meeres represents an example of how adaptive reuse of uncomfortable heritage sites remains a sustainable form of urban regeneration. To be clear, environmental sustainability in the context of uncomfortable heritage sites, refers to the ability of adaptive reuse to transform an uncomfortable heritage site in a manner that benefits the present natural environment and protects future ecosystems that support human wellbeing and health (Nabas, 2019).

Moreover, evidence of the site's contribution to sustainable urban regeneration is encapsulated in the fact that adaptive reuse resulted in the prevention of the Flak Tower's destruction. In doing so, adaptive reuse ensured that subsequent demolition waste that would have been accumulated if the site had become derelict and eventually demolished, was avoided entirely (Nabas, 2019; Yung & Chan, 2012). Instead, adaptive reuse enabled the Vienna Flak Tower Stifskaserne to revitalize the surrounding community through the use of a creative notion of adaptive reuse that defied the expected idea that obsolete or blighted urban settings require demolition and reconstruction.

7.4.2 Remembering the Past Without Losing It

The Romans once spoke of a “genius loci”, which was known in classical Roman religion and around Rome as constituting the protective spirit of a place (Plevoets & Van Cleempoel,

2019). One of the greatest opportunities for adaptive reuse that emerge from a historic heritage site is the remnants of the site itself, be it buildings, ruins, or human beings that live to tell the story. Furthermore, as we assess uncomfortable heritage sites, it is crucial to underscore that each particular site is unique and maintains a story to tell the world (Stone, 2019). It is arguable that negative heritage sites that address “shameful and unpleasant” parts of history can both prompt and reflect responsibility within, and the maturity of a society (Nabas, 2019). However, preserving the historic integrity of negative heritage sites also speaks to a society’s values. It is arguable that even if the story is not always a happy one, it is fundamentally important that it is protected and told.

It is important to recognize that adaptive reuse provides the opportunity for the population currently living in the city, as well as visitors, the benefits of obtaining information about the legacy that has been left behind by those who lived before them. In this regard, Stone (2019) touches upon issues of both identity and collective memory. In doing so, Stone describes how restoring heritage sites in effect establishes continuity with the past, and ultimately correspondingly shapes the manner by the conditions are set to produce the future.

Moreover, the heritage aspects of the Vienna Haus des Meeres Flak Tower site maintain the ability to address social issues and improve those complications through pursuance of strategies that increase social inclusivity. In that regard, through adaptive reuse, the Haus des Meeres Flak Tower brings both Viennese and international visitors together. Furthermore, the diverse collection of visitors that use the site for various purposes, strengthens social inclusivity. In the surrounding regions of Vienna, through spreading collective awareness of the site’s dark past, people come together to both remember and ensure that past heritage is not lost, and that the site’s historic integrity is protected. To be clear, historic integrity represents the manner in

which a historic site conveys its historic “attributes or associations” (“National Historic Landmarks”, 2018). More pointedly, historic association represents the direct connection between the historic site and key historic events or persons that hold a connection to the site. Thus, the site, through maintaining its historic integrity, increases education and awareness, enabling remembrance of the site’s history for visitors, which in turn, will collectively hold historical knowledge from the past, which can be passed down to future generations of global youth.

In addition, adaptive reuse also can be achieved as a means of addressing uncomfortable pasts, through uniting the public in opposition to former uses of a site. An example of this can be observed in the Stiftskaserne Haus des Meeres. In contemporary time, adaptive reuse has enabled the transformation of the site that was formerly used by Hitler’s armies in World War II and blighted surrounding neighbourhoods, to prompt public solidarity in opposition of the site’s former use. Signs on the building that read ‘never again’ remain an example of how the building’s adaptive reuse has creatively and ethically enabled site reuse by striking a delicate balance between enabling modern forms of entertainment and ensuring public solidarity through preserving the site’s past for historical education that defies the hate that once defined the Vienna of the Third Reich Dictatorship.

Moreover, the preservation of the historic integrity of the site, alongside its conversion into multiple adaptive reuses, including a heritage site, provides the opportunity for residents from surrounding communities to maintain continuity of knowledge about the structure’s original goals, its history, and the legacy of those who built it, through maintaining and preserving both knowledge and understanding, that can be shared with both local visitors and residents of the city. In addition, international visitors benefit their home countries, through the knowledge they

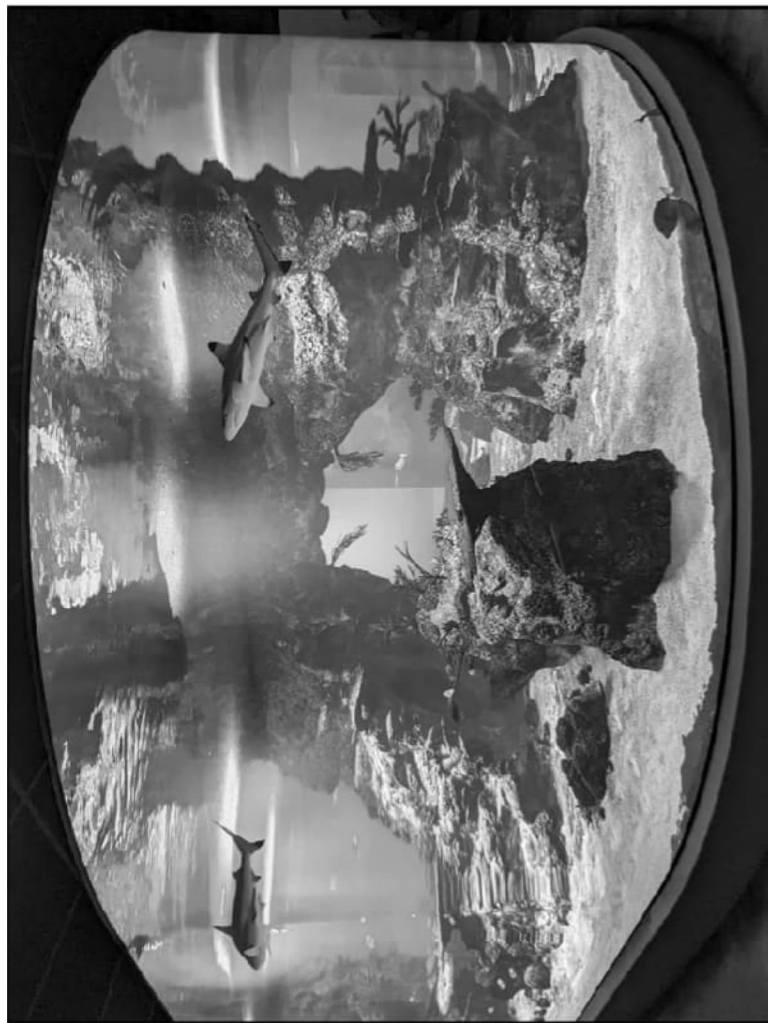
bring back to their home countries. In correspondence with ensuring the historic integrity of the site, survival of such knowledge maintains the ability to impact the culture of surrounding communities, and the world more broadly, as it sets the conditions that will shape them in the future, through dissemination of the knowledge held about this subject in the international community (Nabas, 2019).

7.4.3 Specific Opportunities Represented by Esterhazy Park Haus des Meeres

As this paper assesses creativity in adaptive reuse, the Esterhazy Park Haus des Meeres remains a key example of creativity in adaptive reuse at work. This section assesses the wide-ranging, and broad reach of benefits of adaptive reuse of the Stiftskaserne Haus des Meeres Flak Tower. More pointedly, this section will outline the specific benefits provided by the aquarium, as well as the site's dining venue that overlooks the city of Vienna.

At the Flakturm Stiftskaserne, and more pointedly, the Haus des Meeres, the site formerly used for military purposes now houses an aquarium. There are many benefits of the site's adaptive reuse, and subsequent housing of an aquarium. For example, aquariums, such as the one at the Haus des Meeres, provide an opportunity to ensure safe habitats for a wide range of species, including endangered species within the surrounding Vienna region. Like other aquariums, the Haus des Meeres provides a safe place in the event that animals in nearby communities need rescuing. In addition, the Haus des Meeres Zoo provides an opportunity for local-level research to be conducted to determine ways in which animal health can be enhanced, and how the protection of local wildlife can support nearby animal habitats in the city ("Top-seven benefits", 2020). In addition to benefits for wildlife, benefits for visitors are also evident from the adaptive reuse of the Flakturm Stiftskaserne into the Haus des Meeres aquarium (See Figure 20).

Figure 20. Photograph JLR0924222-3 - Vienna Flak Tower Converted into Aquarium



- *Caption:* Conversion of a Flak Tower into aquarium (as seen above) provides a wide range of benefits to visitors.
- *Source:* Dr. Jack L. Rozdilsky, September 2022
- *Note:* Photograph used in MRP with Permission

For example, aquariums have been known to reduce stress for visitors. More pointedly, aquariums and the animals in them can provide a health enhancing visual stimulant for visitors (“9 Aquarium Health”, 2016/2020). Thus, it is critical to note that the Haus des Meeres can also help persons with disabilities, anxiety disorders, or families by providing them a chance to reduce their stress levels.

Furthermore, older age is the top known risk factor for Alzheimer’s disease. As nearly a fifth of the Austrian population is sixty-five years of age or above, the aquarium provides a wide range of benefits for visiting Alzheimer’s patients, including improved short-term memory, and improved memory functions, which could reduce the need for medication, and subsequently reduce healthcare costs (“9 Aquarium Health”, 2016/2020).

Moreover, tourism remains a key component of the Austrian economy. In 2020, approximately fifteen billion U.S. dollars in revenue were created from the Austrian tourism sector. In addition, over 15 million tourists visited the country during 2020, as the COVID-19 Pandemic intensified (“Development and Importance”, n.d.). It is important to note that revenue incurred from tourism remains an opportunity to support adaptive reuse projects that prompt urban regeneration, such as the conversion of the Flak Towers. For example, by 2004, over 250,000 people visited the Haus des Meeres (Nabas, 2019). In addition, in assessing tourism to Vienna from data the same year, the Haus des Meeres site ranked 14th in terms of the number of visitors to attractions in the entire city. Thus, as visitors and revenue poured into the site converted site, that positively impacted surrounding communities through sustainable development and economic growth, which could have arguably taken longer if planning resulted in the site undergoing demolition and reconstruction, these examples underscore the

opportunities for urban regeneration presented by adaptive reuse of an uncomfortable heritage site.

The findings in this section underscore the benefits that adaptive reuse provided for visitors to the site, as well as the community more broadly. As the benefits are assessed, what remains clear is that the creative notion that a Flak Tower could be converted into both an aquarium and a bouldering wall materialized, and positively impacted a diverse group of persons from different demographics, in a multitude of ways. This section proves that although there are clear reasons for destroying an uncomfortable heritage site, adaptive reuse should be considered for an uncomfortable heritage site, given the wide range and multitude of positive benefits it evidently presents.

7.5 Risks Detracting from Adaptive Reuse

There are many risks that are associated with adaptive reuse of a historic site. For instance, adaptive reuse can negatively impact urban planning. In addition, sites that have been positively transformed through adaptive reuse maintain vulnerability to other societal changes, including economic downturn, and can in turn produce the opposite, unintended negative economic impacts for surrounding communities. This section assesses the risks presented by adaptive reuse for urban regeneration, preservation of a historical site's integrity, and identifies specific risks posed by adaptive reuse to the Haus des Meeres.

7.5.1 Urban regeneration

Moreover, in considering the impact of adaptive reuse for urban regeneration, it must be underscored that not every single historic site necessarily remains a guaranteed candidate site for adaptive reuse. This is especially the case when modern building code requirements are taken

into consideration (Garcia & Kwon, 2021). The Vienna Flak Towers embody an extremely unique structure with physical dimensions that greatly impact the site's surroundings ("Flakturm v G-Tower", n.d.). For example, the Flakturm Stiftskaserne Haus des Meeres measures at 31 metres long, 47.3 metres high, and 15 metres wide, where wall thickness reaches up to 2.5 metres (Nabas, 2019). Moreover, as we consider urban planning for adaptive reuse of the Vienna Flak Towers, we must consider the risks associated with pursuing this strategy.

The conversion of the Flak Tower Stiftskaserne Haus des Meeres site to prompt urban regeneration was arguably a complex and burdensome task that sought to balance safety, creativity, and community wellbeing. For example, given the structure of the Flak Towers, including the fact that they are largely indestructible, considerations were made to ensure that the structure's physical integrity could safely be preserved alongside considerations about the surrounding communities and local terrain ("Flakturm v G-Tower", n.d.).

Furthermore, adaptive reuse maintains evident disadvantages, as in the case of the Vienna Flak Towers. This is arguably because adapting the existing Flak Towers sites and structures, as with other sites that undergo adaptive reuse to accommodate different uses, can potentially be more costly than the option of demolition and reconstruction (Garcia & Kwon, 2021). Also, the process of incorporating Vienna Flak Towers into the community in a positive manner is arguably more complex than demolition.

Ultimately, as we plan adaptive reuse of historical sites for urban regeneration, we must consider the broad array of risks that exist. For example, there is a chance that former historical sites can become places that experience violence and vandalism among other social problems (Plevoets & Van Cleempoel, 2019). In that regard, there remains the possibility that if urban

planning is not conducted properly, sites that are converted for reuse in order to prompt urban regeneration can result in the opposite of the original intended objective, urban decline.

7.5.2 Remembering the Past Without Losing It

While the task remains both complex and difficult, it is important to recognize laws and policies that aid the conservation of historic sites in order to pursue site reuse are established internationally. For example, The Vienna Memorandum of 2005 underlined the conception of historic urban landscape in connection with heritage sites and the importance of conserving and protecting such sites. In doing so, the memorandum provides recommendations on the manner by which adaptive reuse can be successfully undertaken in correspondence with measures to protect the historic integrity of world heritage sites or to ensure that their conversion remains ethical in that it accurately and appropriately conveys the site's historical attributes (Plevoets & Van Cleempoel, 2019).

Moreover, cultural continuity represents the preservation of the history of a culture. As heritage strengthens cultural continuity, the manner by which a society inherits and passes on history to future generations will come to define cultural continuity in a society. However, as the Vienna Flak Towers, among other heritage sites that are related to acts of cruelty and great atrocities, remain negative heritage sites, ethical and moral challenges can arise when adaptive reuse for such sites is considered. Among the greatest challenges that adaptive reuse posed to the historical integrity of the Flakturm Stiftskaserne, was securing a way for visitors to experience the benefits and learn about the past without losing the heritage itself, all together.

This issue was clearly addressed within site planning. For example, in the Haus des Meeres site, there is a permanent exhibition provided for visitors to the site, which was created for the purpose of maintaining the site's heritage and historic integrity. The exhibition was also created

to maintain history for future generations (Nabas, 2019). Also, the permanent exhibition on-site contains a total of twenty-two panels. Each panel is unique in outlining the history of the Haus des Meeres, during its time as a Flak Tower, and more pointedly, the role it played in the Third Reich era. In this regard, the exhibition of panels represents a step that addresses the risk of history being lost. In addition, it ensures that visitors on-site are provided with the opportunity to learn about the site's history, in detail, preventing the risk that visitors to the site remain unaware about its past.

For example, inside the Haus des Meeres, an art exhibit on the 10th and 11th floors of the Flak Tower, in both German and English, provides an opportunity to understand the horrors of the site's past, through art (Nabas, 2019). In addition, a museum with a replica World War II era command centre, including authentic sound recordings and films from civilians, is present. Also, daily guided tours are offered for visitors that include video presentations outlining in detail, the site's past. However, while the exhibit and museum both remain to address the site's uncomfortable past, the risk always remains that even when visitors are informed on the details of the site's past, its uncomfortable history can arguably be overlooked by some who just cannot fathom the discomfort that comes with understanding how history developed the way it did. Also, while steps are clearly taken to address and mitigate these risks, the risk always remains that the Haus des Meeres site's dark and uncomfortable history can be overshadowed by lively and enjoyable leisure activities, as human nature's temptation to turn towards fun and comfortable often overshadows our willingness to face the uncomfortable truth.

7.5.3 Specific Risks Represented by Adaptive Reuse of Esterhazy Vienna Flak Tower

There are many risks that face a historic site that undergoes adaptive reuse. For instance, in the case of the Vienna Flak Towers, if urban planning is not taken into careful consideration, risks including economic downturn could have disproportionate impact on the site and surrounding region, and subsequently upend the long-term advantages of adaptive reuse of the historical site. For example, the restaurant created at the Haus des Meeres site where the Flak Towers were formerly in operation, can be impacted by economic downturn (See Figure 21).

Furthermore, economic downturn could result in the Vienna Flak Tower Haus des Meeres site experiencing the snowball effects of economic downturn such as, low consumer demand, an inability to provide pay for employees, which can subsequently result in a rise in unemployment. In addition, if a sizeable number of employees predictably reside in nearby residential communities, the ramifications of such changes may consequently begin to negatively impact the local economic wellbeing of surrounding communities.

In addition, tourism is a major source of economic revenue and thus a vulnerability for the site. Upon the occurrence of the pandemic, tourism to Austria experienced a massive decline. For example, in assessing data obtained for the year 2020, tourism income measured just over \$15 billion USD, in distinction to almost \$26 billion USD from the previous year (“Development and Importance”, n.d.). This devastating impact evidently maintains major ramifications for a site like the Haus des Meeres, especially if the costs of upkeeping the site, including soaring energy costs that partly resulted from the conflict in Eastern Europe with potential to push restaurants like the one at the Haus des Meeres into bankruptcy, are considered. These examples underline several of the risks which a site that undergoes adaptive reuse faces.

Figure 21. Photograph JLR092422-4 - Vienna Flak Tower Converted into a Restaurant



- ***Caption:*** Conversion of a Flak Tower into a restaurant on top of an aquarium (as seen above). Empty seats are present due to COVID-19 restrictions and the European economic and energy crisis.
- ***Source:*** Dr. Jack L. Rozdilsky, September 2022
- ***Note:*** Photograph used in MRP with Permission

Additionally, for the aquarium that is creatively incorporated into the Haus des Meeres, management faces major challenges of securing economic income, visitors, and an increased risk of loss of business when disasters strike, as evidenced by ramifications that followed the occurrence of the COVID-19 Pandemic. Moreover, it is arguable that the adaptive reuse of a Flak Tower into an aquarium presents additional and unique challenges for ensuring the site continues to function and remains afloat economically. For example, considering the major costs of taking care of animals, and the intricate task of ensuring that many species that are endangered receive the care necessary to survive, it is evident that major risks face the site in both the long-term and near future, that stem from adaptive reuse.

7.6 Conclusion

This study proves that despite the dark history of uncomfortable heritage sites, by creatively applying adaptive reuse, the worst of things could be remodeled to provide hope for the future, and the Vienna Flak Tower Haus des Meeres is a good example of that creativity in action. Today, passing by the Flak Tower in Austria, visitors are reminded that ‘never again’ will hate be tolerated at a site that was once defined by it (Chorny, 2022). While it was once unpredictable that Third Reich anti-aircraft towers would prompt urban regeneration, with a unique set of recreational activities an aquarium, restaurant, and bouldering wall, and even a park, adaptive reuse underscores that when creativity is deployed, the limits of ideas that can materialize are endless.

This study finds that both opportunities and risks facing various aspects of the Vienna Flak Towers, and especially the Haus des Meeres, are present and will continue to exist in the near

future. It determines that global geopolitical events, and tensions emanating from the violent conflict in Eastern Europe that have impacted the European continent, could have a disproportionate impact on the site due to the major role in generating revenue played by tourism. It also finds that with some risks, such as those posed to the site's historic integrity, careful measures have been taken to mitigate the possibility that the site loses connection with its uncomfortable past in the future. Also, findings suggest that among many of the opportunities that exist, such as the site's role in prompting urban regeneration, that benefits are both broad in terms of their generalities and far-reaching in terms of the positive impacts they maintain for natural resources, global ecosystems, and a diverse collection of demographic groups that they benefit.

Albert Einstein once remarked that imagination is more important than knowledge. This study underlines that there was clear reasoning for this assertion. While knowledge has limits, imagination does not. Moreover, for disaster and emergency management, in the age of disruption, the value of imagination is crucial. As evidenced by the case of the Vienna Flak towers, with regard to many of the problems facing the recovery phase in disaster and emergency management, and especially the uncertain fates of heritage sites, when it comes to consideration of adaptive reuse for former historical sites, it will be our imaginative capabilities that guide discussion to solving complex problems, like the uncertain fate of the Vienna Flak Towers, with novel solutions.

Finally, the Flakturm Stiftskaserne Haus des Meeres located in Vienna, Austria, that was turned into an aquarium, is a model for demonstrating how new creative uses can be found for former war-related structures. The story of the Flakturm Stiftskaserne is also a testament to the fact that we can learn from and benefit from a site without forgetting its past, or compromising

its physical or historic integrity. Other places with derelict structures that were formerly used for military purposes maintain the possibility of using the example of the Haus des Meeres for inspiration for finding their own new and creative forms of adaptive reuse.

Chapter 8 – Conclusion

8.1 Introduction to Conclusion

This Conclusion Chapter will assess four primary conclusions in answering the question: “What are the lessons learned from Canada’s Diefenbunker that can help us to understand the opportunities leading to repurposing or the barriers leading to dereliction for large-scale Cold War-era nuclear bunkers?”. In doing so, this Conclusion Chapter explains how the Diefenbunker faced key challenges and opportunities prior to its conversion into a heritage site.

8.2 Four Primary Conclusions

The first two conclusions underline how the themes of ‘time travel’ and ‘upkeep and maintenance’ present in the Diefenbunker represent barriers for repurposing that lead to site dereliction. The second set of conclusions assess how the themes of ‘uncomfortable sites’ and ‘continuity of government and civil defence’ largely present opportunities leading to site repurposing. Moreover, the third part of this Conclusion Chapter highlights opportunities generated by this study for future research based on further exploration of the research topic, “Many successful schemes were led by the individuals with vision: Do not wait for deus ex machina”, featuring focus on North Bay and Waterloo (Laraia, 2019, p. 344).

Ultimately, a clearer conclusion emerges here. The dilemma is not only that nuclear bunkers sites such as, the Diefenbunker site, present both opportunities and barriers to reuse. The key dilemma and lesson learned from the example of the Diefenbunker as a Cold War nuclear bunker site, is that barriers need to be overcome in order for adaptive reuse to materialize. Lastly, this conclusion closes with final words on the relevance of the results of this

research study, and how this study's relevance can extend to other nuclear bunker sites that face either the prospects of reuse or dereliction.

8.3 Conclusion One

First, this study suggests that the theme of 'time travel' in the Diefenbunker provided both opportunities and barriers for repurposing of the site. For example, the findings underlined that visitors were provided an authentic experience that accurately reflects the site's history and enables visitors to encounter the site's physical aspects and artifacts that are distinct to the era in which the bunker operated. The benefits of 'time travel' for repurposing could be witnessed in steps taken to ensure conservation of the Diefenbunker site, in a manner that protected its historic integrity. For example, on Sub-level 400, one story below ground level, vertical and horizontal stripes on walls and floors provide the opportunity for visitors to 'travel' to the era of bunker operations to get an accurate sense of what daily life in the bunker would have been like during the Cold War. Also, the theme of 'time travel', evident in the preserved artifacts that were utilized in the site's conversion to a heritage site, was conclusively an invaluable part of the site's repurposing.

However, regarding the process of repurposing the site into a heritage site, which was undertaken through adaptive reuse, the findings in this study suggest that overall, the opportunities presented by the theme of 'time travel' in the Diefenbunker for repurposing were heavily outweighed by barriers that limited the site's potential for repurposing as a heritage site, and could have potentially led the site to the path of dereliction. For instance, in considering how artifacts and the preservation of the site's features, including wall colours and patterns provided a unique and authentic experience for visitors during the site's new use, it is important to

underscore that this study proves that the intricacy of operations to undertake the process of built heritage conservation to support adaptive reuse, remains extremely challenging.

For instance, construction inside the building to support its use as a heritage site was carefully undertaken to balance adherence to modern safety standards without compromising the site's physical integrity, such as its computers, and the site's designs, which were preserved very closely to the way they were used during the bunker's Cold War era of operations. As the site's physical integrity was protected by local community-led efforts, even after the bunker's on-site operations ended in 1994, it is unclear if the bunker could have been converted to serve its current heritage tourism use, without extensive efforts that crucially preserved the site's historic integrity. Therefore, the Diefenbunker overcame the challenge of barriers.

Moreover, with hundreds of artifacts in addition to distinct building design characteristics that served the Diefenbunker's previous function of continuity of government, the task of preserving them all and choosing which artifacts and site design characteristics could remain, in order to provide an accurate understanding for viewers of the bunker's history, required a long and complex process. For instance, this included considerations such as the careful placing of ashtrays on a particular desk, or the placement of typewriters on several desks in the Cabinet Secretariat. While placements of objects were often made in no particular order, the careful protection and selection of remaining artifacts and their particular placement somehow brings visitors right into the era of bunker operations, in what evidently took long and careful consideration. In addition, the authenticity of the site, which largely exists within its objects, structure, and the environment of the Diefenbunker, was vulnerable to the risk of physical damage without extremely careful care. Also, these risks would have been intensified during the

duration of four years, or nearly half a decade, whereby the site was left unprotected, and its future hung in the balance.

Furthermore, in the case of the Diefenbunker, as with other sites that have undergone adaptive reuse for heritage tourism purposes, site authenticity is not due to computer-generated artistic remodelling, or digital manufacturing that re-creates objects, and design plans for structures and a site's environment (Plevoets & Van Cleempoel, 2019). Rather the authenticity of all aspects of the Diefenbunker site, were encapsulated in site artifacts, structure, and environment, which were all key to the aesthetics of site integrity. These aspects of the site were defined by the age and preservation of these site features (Plevoets & Van Cleempoel, 2019). However, if the site's objects had been moved elsewhere for other use and damaged or rendered as unsavable in the process, as is the case with other similar nuclear bunker sites, it is fundamental to note that visitors would not have been provided with the same level of familiarity with the site's historic purpose.

In addition, if the site had been subject to exploration, or unregulated visits by tourists or urban explorers, in the age of disruption and false information, it is unclear how visitors would interact with the site's various unique features (Plevoets & Van Cleempoel, 2019). The site arguably would not necessarily have been protected from harm well enough to provide visitors with an authentic experience that accurately reflects the history of the era in which the bunker operated. Also, endless misinformation in the digital era could have prohibited 'time travel' to the site's era of operations. This could have prompted the Government of Canada to sell the site for other uses, or to destroy the site, as dereliction remained an option that avoided the potential for aspects of the site to be used to create false narratives about the site's unique history. In conclusion of the theme of 'time travel' present in the Diefenbunker, built heritage preservation

efforts and more pointedly, the extent of efforts that are necessary to preserve the site close to its original form, as evidenced in the careful display of heritage at the Diefenbunker, remain particularly discouraging for considerations of site repurposing for other similar sites. Thus, ‘time travel’ conclusively represents a barrier to adaptive reuse, that could lead to site dereliction in other similar cases of nuclear bunkers with uncertain fates.

8.4 Conclusion Two

Second, with regard to the theme of ‘upkeep and maintenance’, the findings in this study suggest that ‘upkeep and maintenance’ operations are undoubtedly necessary for the Diefenbunker site to function in its current capacity. For example, on Sub-Level 100, four stories below ground level, upkeep of the pipes and ventilation system on-site where air is filtered to ensure that all air circulating throughout the bunker meets safety standards and does not pose threats to human health, is critical to the site’s ‘upkeep and maintenance’. Issues such as maintaining proper building air circulation during the COVID-19 Pandemic are especially important upkeep and maintenance tasks. In addition, it must be noted that the Diefenbunker’s site selection process reduced certain upkeep and maintenance operations that could have been necessary for the site to function in both its original and current capacity, particularly if its location setting had been established elsewhere. The Diefenbunker’s selected location in a deep valley, but away from flood zones, additionally remains an example of how the site’s selection process likely shielded the site from the impacts of other types of disasters.

However, with regard to the theme of ‘upkeep and maintenance’ present at the Diefenbunker site, findings of this study suggest that overall, the opportunities presented by the theme of ‘upkeep and maintenance’ in the Diefenbunker for repurposing, and adaptive reuse in particular, were heavily outweighed by barriers of ‘upkeep and maintenance’ that could have

limited the site's potential for repurposing as a heritage site, and could have led the site to the path of dereliction. For example, had the Diefenbunker's original site selection process resulted in its placement in a different location that was vulnerable to flooding, flooding impacts could disrupt operation of the site as a museum. The spread of waterborne diseases, damage from overflow, and dispersion of contaminants on-site, would be negative impacts of flooding. It is key to note that these examples demonstrate how repurposing efforts to undertake adaptive reuse of the site for heritage tourism purposes, were already influenced by choices made prior to the establishment of the site. Thus, these findings remain discouraging for similar nuclear bunker sites with uncertain fates. Namely, it remains discouraging that a major component of a site's ability to undergo adaptive reuse is already pre-determined by factors outside of the control of advocates for, or planners overseeing, repurposing efforts, a major factor that must be taken into critical consideration.

Regarding adaptive reuse, the findings also suggest that various components of 'upkeep and maintenance' operations on-site that made adaptive reuse possible, are extensive and costly. For example, amendments made to the site to enable adaptive reuse in the form of heritage tourism, were only made possible by a lengthy, intricate, and high-priced construction process (Fawcett, 2011). Often in cases of nuclear bunker sites with uncertain fates, the cost of repairs are several times the cost of demolition (Weidner, 2020). For example, at the MEGHQ Freeport Kitchener bunker site, while the cost of demolition is estimated to be approximately \$225,000, an estimate of the cost of site rehabilitation was placed at four times the cost (Weidner, 2020, para. 6). These factors underscore how the 'upkeep and maintenance' of a site poses a major barrier to repurposing and could be discouraging for similar nuclear bunker sites that face uncertain futures and calls for dereliction.

For instance, other museums not located in underground bunkers maintain fire safety procedures put in place in accordance with provincial fire code regulations. Due to the Diefenbunker's massive layout, a fire alarm system on-site with smoke detectors along the site's primary corridors was deemed to be a necessary part of the site's upkeep to ensure a level of fire disaster preparedness that adheres to Ontario laws (Fawcett, 2011). Also, a sprinkler system installed on-site, spans each level of the Diefenbunker and extends into the site's blast tunnel. Additionally, considering that the Diefenbunker continues to remain a nuclear bunker that serves new uses, its site design, a key component of the site's pre-determined selection process, also remained out of control of advocates for the site's repurposing. Thus, the pre-determined factor of site design, whereby the site is constructed below ground level, influenced modern repurposing efforts through the need for lighted exit signs on-site to be maintained and upkeep with supply from an emergency power generator below ground in the bunker's Machine Room. These measures were taken in case power supply from above ground is cut off, even temporarily.

Moreover, a renovation project, a key component of 'upkeep and maintenance' operations to ensure adaptive reuse of the site could serve its current purpose of a heritage site that supports dark tourism, lasted from 2009 until its completion in the summer of 2010. The process, which costed \$2-million CAD, was only made financially affordable by a combined effort of government fundraising and donations from private foundations (Fawcett, 2011). It is important to again stress that renovations were only made possible due to a combination of public and private fundraising efforts. In addition, during the process, inspections searched for various on-site hazards, such as asbestos to ensure levels were safe, and adhered to modern provincial regulations. As the inspection process found that type-3 operations were needed to remove asbestos from two locations in the bunker to comply with provincial regulations, the asbestos

removal process required extensive measures, including careful sample removal and increased ventilation in certain areas that were sealed off, in order to mitigate major threats to the site's physical and historic integrity. In conclusion of the theme of 'upkeep and maintenance', renovations of the site to enable it to serve its current function of a Cold War heritage museum were extensive, and remains particularly discouraging for considerations of site repurposing. Conclusively, 'upkeep and maintenance' represents a barrier to adaptive reuse, that could lead to site dereliction in other similar cases of nuclear bunkers with uncertain fates.

8.5 Conclusion Three

Third, with regard to the theme of 'uncomfortable sites', the findings suggest that the site could result in visitors feeling discomfort due to the site's association with disaster and death. Considering that the Diefenbunker does remain an 'uncomfortable site', that is indirectly associated with mass death and profound human suffering, based on those considerations, the site on a six-level scale as presented in the Discussion Chapter, is classified by this study as being situated on the fourth level, or classified as a 'dark' site, a judgement which is cemented by the site's authenticity. For example, on-site, visitors come into contact with displays of an atomic bomb. The type of atomic bomb observed on-site, prompted the establishment of the Diefenbunker, and is comparable to the size of the 'Fat Man' bomb dropped on the Japanese city of Nagasaki during World War II which resulted in the deaths of at least 40,000 persons in Nagasaki (Wallerstein, 2020). These uncomfortable displays on site, combined with the uncomfortable reality that nuclear weapons continue to pose lethal threats to Canada and the global community more broadly, could result in viewers feeling discomfort or uneasiness.

While the site overall maintains many features that are a legitimate part of the site's history and could bring discomfort for visitors, it has become a major Canadian landmark of dark

tourism. Also, in consideration of the theme of ‘uncomfortable sites’, it is critical to underscore that while this study determines that the Diefenbunker stands on level-four of the dark tourism spectrum due to the seriousness and the post-apocalyptic nature of the disaster threat it was constructed to shelter personnel from, it is key to recognize that there is still a distinction between ‘dark’ and ‘darker’ tourism (Stone, 2006). Furthermore, on a six-level scale that includes classifications of dark tourism, the Diefenbunker on a level four classification of ‘dark’ sits far away from level-six sites such as Auschwitz or the killing fields of Cambodia which contrastingly have direct associations with massive amounts of death and tragedy.

Thus, the key to understanding where the Diefenbunker lies on the dark tourism spectrum, rests in the difference between the Diefenbunker as a site that is associated with death and suffering, as opposed to other sites that have themselves been directly the site where suffering and death have occurred. While the Diefenbunker does remain a ‘dark’ and ‘uncomfortable site’, it is conclusively indirectly associated with mass death and profound human suffering, which cements the distinction between the Diefenbunker site and other sites on the higher two levels of the spectrum. This distinction results in a reduction of the number of feelings of depression and horror that are prompted within visitors to the Diefenbunker site (Stone, 2006).

Also, as the Diefenbunker is heritage centric, it becomes evident during tours to the site, which are classified as dark tourism, that the site represents a legitimate cornerstone of Canadian Civil Defence efforts of the Cold War. In that regard, the site’s distinct history and authenticity, supported by government contributions, private donations and fundraising efforts, ultimately presented a rare opportunity for adaptive reuse to serve dark tourism purposes, and potentially made site tourism more affordable for visitors (Fawcett, 2011). These examples underscore how

the theme of ‘uncomfortable sites’ at the Diefenbunker presents major opportunities for site repurposing, a lesson that could be utilized at other nuclear bunker sites with uncertain fates.

8.6 Conclusion Four

Fourth, with regard to the theme of ‘continuity of government and civil defence’, the findings suggest that both challenges and opportunities for repurposing emerge. For example, upon transfer of civil defence operations from the Diefenbunker to the Canadian Forces Station North Bay, a lack of willingness on the part of Canada’s federal and provincial governments to support comparable civil preparedness measures for a nuclear attack disaster, which were once at the heart of the site’s Cold War era operations, resulted in a lack of planning and government abandonment of the Diefenbunker site. The site which closed in 1994, was no longer deemed necessary to support Canadian Civil Defence. From 1994 to 1998 the Diefenbunker’s fate remained uncertain. Namely, when risk perception changes, so does public and government attention for preparedness measures. In the case of the Diefenbunker, the nuclear attack disaster risk was determined to have overwhelmed preparedness capabilities that the site once offered, impacting government use of the site.

However, for site repurposing, these barriers were overshadowed by the opportunities presented by the ‘continuity of government and civil defence’ theme present in the Diefenbunker. For instance, though the site was decommissioned, it is key to note that during the Cold War, the Diefenbunker site once served as the hub for conducting coordination with NATO. In addition, the site was a critical component of Canada’s commitment to the NATO alliance.

While the site no longer directly serves the purpose of continuity of government and civil defence, its unique historic role in Canadian Civil Defence has resulted in the fact that the site continues to remain relevant to Canadian Civil Defence in contemporary time. This is primarily evidenced through the site's ability to raise awareness and education about the importance of civil defence in Canada, amongst the Canadian public. Moreover, the topic of civil defence continues to remain relevant given the uncertain future of many nuclear bunker sites in Canada and around the world today.

The site, which has undergone adaptive reuse to a museum, no longer directly serving the function of continuity of government and civil defence, now serves heritage tourism purposes. Without a continuity of government nuclear bunker site comparable to the Diefenbunker in Canada, that directly serves the purpose of heritage tourism, the site's history places the Diefenbunker in a unique position to generate contemporary awareness about the importance of civil defence efforts among the Canadian public, through tourism provided by the site.

At the time of writing, as the topic of nuclear war continues to gain relevance around the world amid recent geopolitical developments, it is important to again stress that the unique history and distinct role of the Diefenbunker in Canadian continuity of government and civil defence efforts proven in this study, places the site in an invaluable position to raise awareness, to educate, and to inform the Canadian, and even global public, of the importance of civil defence for public safety. In conclusion, this study finds that the theme of 'continuity of government and civil defence', present at the Diefenbunker, raises considerable awareness among visitors and researchers that in the past, Canada's Federal Government did take preparedness for nuclear war very seriously. Conclusively, these examples underscore how the theme of 'continuity of government and civil defence' represents an opportunity for site

repurposing, a lesson that could be utilized at other nuclear bunker sites with uncertain fates. Above all, the presence of the theme of ‘continuity of government and civil defence’ on-site presents a concrete chance for the public to be the source of change that prompts the Government of Canada to revive what findings in this study suggest as contemporarily relevant elements of Canada’s Civil Defence program, such as continuity of government measures and public protection and outreach measures, that the Diefenbunker once supported.

8.7 Future Opportunities for Study

One of the goals of this study is to generate further interest and prompt further thinking in considering on why it may not be wise to let decades old nuclear bunkers become derelict and fall into abandonment. The themes representing opportunities and barriers for adaptive reuse of former nuclear bunkers that have been developed in this work can potentially be applied to looking at other former nuclear bunkers in Canada and elsewhere.

This section of the Conclusion Chapter considers future opportunities for study of former nuclear bunker sites. Indeed, in the province of Ontario alone, two sites may exist for future study. One such site for potential future study is a former nuclear bunker on the premises of a Canadian forces base in North Bay. Another site for potential future study is a former nuclear bunker that served the purpose of a Municipal Emergency Government Headquarters (MEGHQ) in Kitchener, west of Toronto. While this study did initial scoping of these two potential study sites in addition to the Diefenbunker, to sharpen the focus of this work the primary site of exploration for this study remains as the Diefenbunker alone. However, a brief background is provided here for the former North Bay and Kitchener nuclear bunkers, as they can potentially serve as future study sites for this author and/or researchers to explore.

8.8 NORAD UGC Bunker

The North American Aerospace Defense Command Underground Complex, located in North Bay Ontario, is situated 680 feet below ground level. In this Conclusion Chapter, this site will be referred to as the “NORAD UGC”. The structure was designed to shelter 400 people in the event of a nuclear attack. Like the Diefenbunker, this nuclear bunker would shelter military and government personnel and provide for an operations site for matters concerning North American aerospace defense. They would be protected from the impact of a 4-megaton nuclear detonation 267 times more powerful than the atomic bomb used to attack the Japanese city of Hiroshima (Ricketts, 2014). During the Cold War era, Canada’s strategic location, more pointedly being nestled between the United States and the Soviet Union intensified the nuclear attack threat posed to the nation. At any time, in the event that the Cold War turned into a ‘hot war’, there remained a high potential that Canada would become a “major nuclear battleground” between warring superpower parties, underscoring the seriousness of the nuclear attack disaster threat posed to the nation (Ricketts, 2014, para. 2).

On October 1st, 1963, air defence operations officially begun in the NORAD UGC, and continued interminably until October 2006. It is important to note that other than the Diefenbunker, there is no similar defence complex in Canada that compared in terms of size and scope of civil defence operations overseen on-site at the NORAD UGC. Also, due to Canada’s front-line position, the Canadian Air Defence Command and Control Centre was deemed to be the most critical component of the NORAD ‘pie’, with regards to the deployment of bombers (Ricketts, 2014, para. 6).

For instance, the early warning systems placed at NORAD, as well as a successful reaction to a Soviet attack, were critical for the survival of Canadian and U.S. Forces defending the

continent against potential attacks from enemy forces. In that regard, the site's importance may be encapsulated in the quote of one Air Force Officer from the defence alliance that stated, if "we [NORAD defences] lose North Bay, we lose the continent" (Ricketts, 2014, para. 6). Above all, the critical importance of this site in the North American continental defense network is ultimately what led planners to develop it underground.

However, contemporary warfare preparations have seen the creation of the hydrogen bomb, as well as more advanced, more powerful, and precision-guided missile technology. In that regard, NORAD determined in 2006 that maintaining air defence operations underground no longer served a viable military purpose, according to an organization assessment at the time. Thus, by 2006 it moved its air defence operations above ground. Since the decision was implemented, the facility continues to remain vacant.

Furthermore, the Department of National Defence (DND) has recently announced plans to decommission the Complex. As the Complex lies below the Trout Lake water table, a possibility remains that the pumps will be turned off and the facility will be subjected to flooding.

Despite the site's possibility of facing dereliction, there has been some movement to propose adaptive reuse of the site. As collected from media reports and publicly available documents, it appears that a North Bay area resident Mr. Trevor Schindler has been acting in the capacity of private citizen to advocate for the preservation of the North Bay Nuclear Bunker. While it was beyond the scope of this study to take action to contact or interact with Mr. Schindler with respect to this work, a lesson that can be inferred is that public advocacy may in fact play an important role in keeping former bunkers from going into a state of dereliction.

In commitment to these efforts, Mr. Schindler continues to act, although without significant support (Turl, 2021). Moreover, Mr. Schindler noted that when NORAD abandoned the site in 2006, he assumed at the very least that it would eventually become a “museum or national historic site” (Turl, 2021, para. 6). As the vision did not materialize, Schindler underscored that such a project could benefit North Bay in many ways.

The current campaign, led by Mr. Schindler, which can be described as a forceful ‘last push’ to protect the site from destruction, calls on the Government of Canada to commission a feasibility study into preserving the NORAD UGC (Turl, 2021). In addition, the plan calls for developing the site into a tourist destination, which could result in the site being repurposed as a national historic site, park, or museum. To conclude, as possibilities continue to emerge, and it becomes clear that only time will reveal the fate of the NORAD UGC, one is reminded that all who seek to preserve the understated value of Canadian history, and any persons that identify a connection to any aspect of Canadian identity that appeals to them, maintain a critical role to play in protecting Canada’s “natural, cultural, and architectural heritage for future generations”, as these efforts ultimately depend on all the support that is received from the general public (“Discover”, 2016, para. 8).

8.9 MEGHQ Freeport Kitchener Bunker

In terms of future study, another potential study site located to the west of Toronto is a former nuclear bunker located in Kitchener, Ontario. Similar to North Bay, there appears to be advocates calling for preservation and even perhaps a plan is coming into place for its reuse. As with the North Bay site, decisions were made to focus this study on the Diefenbunker alone, but it is suggested that this site can potentially serve as a future study location for this author and/or other researchers to explore.

The fate of a Cold War-era nuclear fallout bunker located in Kitchener Ontario, named the MEGHQ, has reached a critical juncture point in current time (Martin & Sharpe, 2021). The MEGHQ-Freeport Bunker, located at 3571 King St. E. in Kitchener's Schneider Park, near Freeport Hospital, faces an uncertain future. However, events in the bunker's contemporary history are marked by a fight to protect the bunker and shield it from demolition.

The term "MEGHQ" represents Municipal Emergency Government Headquarters. Stacy McLennan of the Ken Seiling Waterloo Region Museum notes that with regards to the Kitchener Bunker, emergency plans in place, were structured around the notion that critical members of government would be able to maintain continuity of government operations in the event of a nuclear attack (Pierce, 2020). For example, the regional chair, mayors, the chief medical officer, and other members of critical government staff would seek shelter in the bunker and would still be able to communicate with other bunkers that were set up in other municipalities, if a catastrophic disaster scenario were to unfold.

As collected from media reports and publicly available documents, it appears that a Waterloo area resident Mr. Reesor has been acting in the capacity of private citizen to advocate for the preservation of the Kitchener Nuclear Bunker. While it was beyond the scope of this study to take action to contact or interact with Mr. Reesor or the Waterloo Bunker Association with respect to this work, a lesson that can again be inferred is that public advocacy may in fact play an important role in keeping former bunkers from going into a state of dereliction. In correspondence with these efforts, a Heritage Impact Assessment completed in 2020, found that the building is worthy of designation under the Ontario Heritage Act (Duhatschek, 2021). Additionally, The Waterloo Bunker Association and its leadership intend to see the bunker

restored and brought back to its original state and thereafter to be opened to the public “to be toured”, as per Reesor’s statements (Martin & Sharpe, 2021, para. 4).

Moreover, Charles Allen, the assistant director of facilities with the Region of Waterloo, has noted that demolition remains one of the cheapest options for the MEGHQ bunker site’s fate because of the state of the building. Also, Allen notes that another argument against the bunker’s restoration is that the site would be pretty expensive to restore it into a ‘usable’ state. In that regard, the Kitchener-Waterloo region has estimated that a demolition would cost approximately \$225,000, whereby rehabilitation of the site was estimated to exceed the cost of demolition by at least four times (Pierce, 2020, para. 19).

However, as of 2022, the abandoned Cold War bunker near Freeport Hospital, owned by the Region of Waterloo, is set to undergo emergency repairs. Also, the Kitchener-Waterloo Regional council recently ratified a plan to spend \$687,000 on emergency repairs to the former fallout shelter when it approved the overall 2022 regional budget. The repairs will seek to prevent further damage and to remove hazardous materials from the site (Thompson, 2021, para. 1, 4). A long-term project wouldn't start until 2023, but officials estimate a rehabilitation project to be in the range of \$4.5 million (“Cold War”, 2021).

Also, it has been estimated that the \$4.5 million cost of rehabilitating the building for new use would be spread over the span of two years beginning in 2023 until at least 2024, and will be incorporated into the capital budgets for those years (“Cold War”, 2021). While the future of the bunker remains unclear, the developments noted in this chapter underscore that efforts are moving in the direction of the site being repurposed, however it still remains unclear precisely when and how that transformation will transpire.

Future research that this study has indicated, would incrementally add to the knowledge base of answering the question of reuse or dereliction of former cold war bunkers in Canada and would explore reasons for why keys to success, or potential hinderance for development projects resulted.

According to Laraia (2019), a future study question to explore would include, “Many successful schemes were led by the individuals with vision: Do not wait for deus ex machina” (Laraia, 2019, p. 344). In many cases where adaptive reuse of nuclear bunker sites materialized, the site needed a champion or an individual with vision. These examples disprove the notion that situations which seem to be unsolvable should be postponed or prolonged until a particular event, or a ‘deus ex machina’, results in a solution unexpectedly emerging to the seemingly unsolvable problem.

8.10 Significance of the Diefenbunker

All things considered, the Diefenbunker is a significant site that illustrates the possibilities for reuse of a former nuclear bunker. The significance does not only lie with the creativity or uniqueness of the adaptive reuse illustrated by the Diefenbunker. As highlighted in Chapter 7, high levels of creativity in adaptive reuse, like turning anti-aircraft flak towers into an aquarium exist in Europe, not Canada. Not to downplay the quality of the cold war museum at the Diefenbunker, the act of making a former nuclear bunker into a museum is nothing new. At other locations outside of Canada, museums have been created at former nuclear bunkers. The significance lies with the scale of the site and the extent to which the curation choices made in the Diefenbunker have resulted in a site that is like no other in Canada, in terms of the nearly full preservation of most of the elements of a 1960s era nuclear bunker. Taken as a whole, this site is

significant as it is rare that any 1960s era structure, let alone a formerly secret nuclear bunker, have been faithfully preserved and remain open to the public nearly 60 years later.

As a short side note, this study does not suggest that the Diefenbunker could in the short term revert to its original use as serving as a hardened continuity of government site to protect government officials from nuclear war. While elements of the original structure have been maintained, it cannot go back into use as a nuclear bomb shelter in its present configuration. There are no plans to consider that type of active reuse as modern-day fallout shelter. While it is beyond the scope of this study to speculate on the options available to protect Ottawa's parliamentarians, essential service bureaucrats, and leadership if Canada's seat of government faced an impending nuclear strike, one at least hopes those men and women making up the federal government of Canada have some options available to them in the present, like the protection provided by the Diefenbunker in the past.

In this Conclusion Chapter, it was briefly noted that two other sites in Ontario, North Bay and Kitchener, have former nuclear bunkers that could potentially be put into other new uses, or they may go derelict. It is suggested that for those sites, if the adaptive reuse of a museum were being considered, the Diefenbunker serves as a 'best in class' example of what can be done. Aspects of what the Diefenbunker has accomplished should serve as a model to guide development of other bunkers converted to museums. Both for Canada and elsewhere, if in the future somewhere a project was underway to turn a former nuclear bunker into a museum, it would behoove the organizers of such a project to take time to study and in fact visit the Diefenbunker. The Diefenbunker illustrates what can be done to preserve a formerly secret, large scale, underground complex of a nuclear bunker that has been decommissioned.

In addition, when considering the profession of disaster and emergency management, the Diefenbunker is also very significant. In the offices housing disaster management professionals, one can occasionally come across scattered artifacts from the mid-twentieth century era of civil defence, such as the outdated radiation detector with the “CD” logo used as a paperweight, or antique posters on the wall representing 1950s ‘duck and cover’ campaigns. These objects of interest alone are of limited utility to represent the richness of past civil defence activities. By the Diefenbunker having a large site intact to display numerous artifacts important to civil defence history in their native setting, it serves an invaluable educational role. Providing a unique tactile example of the foundations of the activities that were the precursors to what we know today as the emergency management profession is an important contribution to understanding the history of the profession of emergency management.

In conclusion, the Diefenbunker is significant in two ways. First, it provides a ‘best in class’ example of how a former nuclear bunker can undergo adaptive reuse and become a museum. The Ottawa museum serves as inspiration to others who are attempting to do the same with other former nuclear bunkers. Second, in addition, the Diefenbunker is significant as one of the few examples of a site that showcases historical aspects of the Disaster and Emergency Management profession. Perhaps immersion into a place highlighting emergency management activity of the past can inspire emergency managers for the future.

8.11 The Challenge of Barriers that Need to be Overcome

In the case of the Diefenbunker, this Conclusion Chapter cites Laraia (2019) to highlight three key main barriers that needed to be overcome for adaptive reuse to be successful, and applies them to the case of the Diefenbunker. In doing so, this chapter briefly outlines and

describes how these barriers were overcome in the case of the Diefenbunker and were conclusively, ‘game-changing’ in propelling adaptive reuse of the site.

Moreover, Laraia (2019) argues that in order for a redevelopment project to be successful, several recommendations can be followed for those responsible at various levels of project management. Among them, the scholarly book cites the necessity of defining who the property owners are, and will be. In the case of the Diefenbunker, in 1994, the Federal Government of Canada sold the Diefenbunker site to the local township of West Carleton, which is now officially apart of the city of Ottawa. In assessing the Diefenbunker’s history, in 1994, the local residents of the communities of West Carleton lobbied the municipality to give them permission to run educational tours of the nuclear bunker site (Fawcett, 2011).

In addition, as a part of community-led lobbying efforts, community members pressed for the Diefenbunker site to receive the designation of constituting a National Historic Site of Canada. While community members and local volunteers sought to buy the property and operate it as a permanent museum, their efforts became successful in 1998 when the site became a not-for-profit charitable museum that remained under the official ownership of the community. These examples demonstrate how recommendations cited, including the establishment of clearly defining property ownership in correspondence with the rallying of local government offices to fit the project into local political priorities, turned the possibility for successful adaptive reuse of the Diefenbunker site into reality (Laraia, 2019, p. 344).

Additionally, the scholarly book identifies the recommendation of protecting human health and the environment (Laraia, 2019). In the case of the Diefenbunker, this recommendation could be evidently observed in the careful measures that were implemented to ensure built heritage preservation and conservation during the site’s transition to support adaptive reuse. For example,

during amendments to the site, classified under the theme of ‘upkeep and maintenance’, the removal of asbestos involved sealing off other parts of the site to preserve its environment, and showers provided for workers to decontaminate, measures which both protected the health of workers and future visitors alike. Ultimately, these recommendations cited in Laraia (2019), could also be identified in increased ventilation of areas during the asbestos removal process. Overall, these steps conceivably resulted in the protection of the artifacts on-site and ensured safer site standards for human health. In turn, these steps arguably reduced anxiety for visitors to what already is a dark and ‘uncomfortable site’, resulting in a major barrier for tourism being removed.

In considering another recommendation from Laraia (2019), it must be highlighted that for successful project development and subsequent adaptive reuse of these nuclear bunker sites, it is not advisable to wait for a *deus ex machina*, or an unexpected event in a seemingly hopeless situation that suddenly overcomes these barriers and solves the problem of the uncertain state in which the sites remain in (Laraia, 2019). While the challenge of key barriers that needed to be overcome in the case of the Diefenbunker are covered and explained in this conclusion chapter, both at the North Bay NORAD UGC and Kitchener MEGHQ Kitchener Freeport bunker, there is evidence of champions that can lead the uncertain fate of both sites toward a successful vision of adaptive reuse that materializes.

An example of this activity is Mr. Schindeler in North Bay who is an advocate for adaptive reuse by writing an op-ed about possible reuse of the site (Schindeler, 2021). Correspondingly, evidence that *deus ex machina* is a barrier that needs to be overcome in cases of nuclear bunker sites with uncertain fates, can be referenced in the example of Mr. Reesor in Kitchener-Waterloo, whose leadership in the Waterloo Bunker Association is pressing for bunker site restoration, and

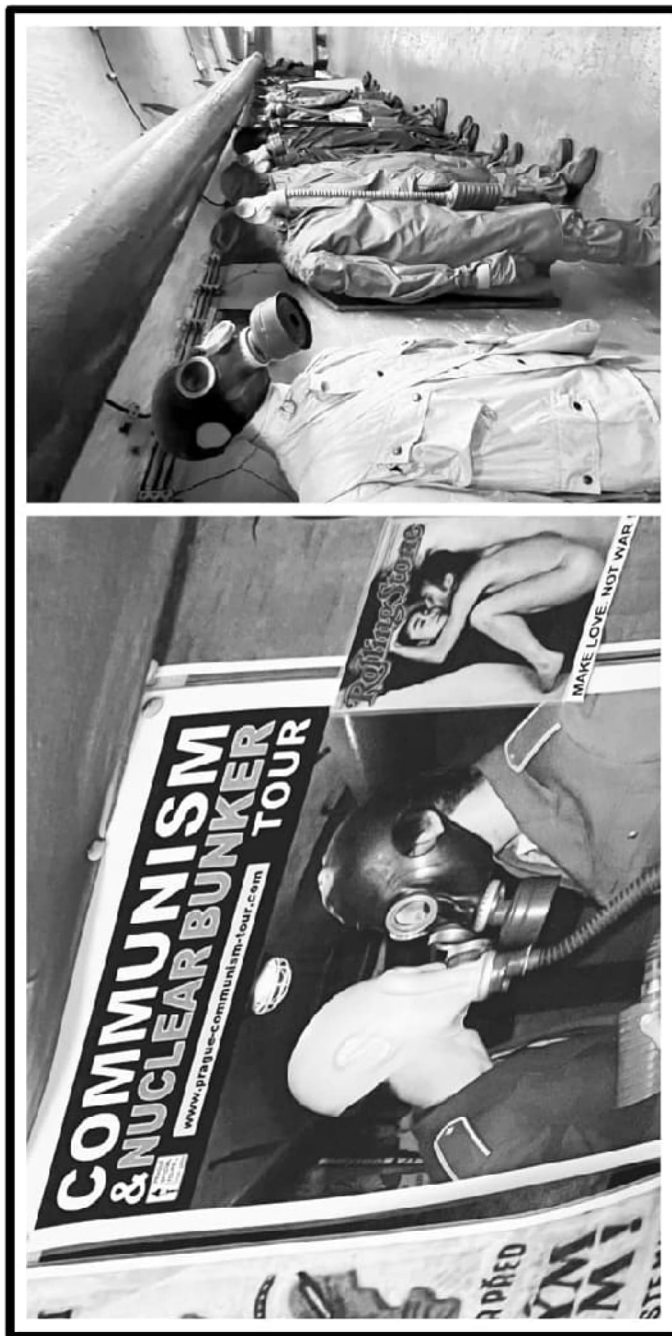
for the site to host public tours (Martin & Sharpe, 2021). Lastly, while these examples of citizen participation in influencing the future fate of bunkers are interesting for future research, they also remain beyond the scope of this study.

8.12 The Significance of Imagination and Creativity

In chapter 7, I address imagination. Also, in Laraia (2019), it was stressed that reuse of sites is inherently case specific. In addition, it was suggested in the scholarly book that “expertise and imagination should go hand in hand” (Laraia, 2019, p. 344). In my direct work with detailed study of the Diefenbunker, and in my indirect work involving study of the Vienna Flak Towers reuse, I have also come to the conclusion that for any reuse of former cold war nuclear bunkers to be successful, imagination is a key ingredient. The work of Rozdilsky (2022) is drawn upon to highlight examples of creativity in bunker reuse from the Czech Republic. (See Figure 22)

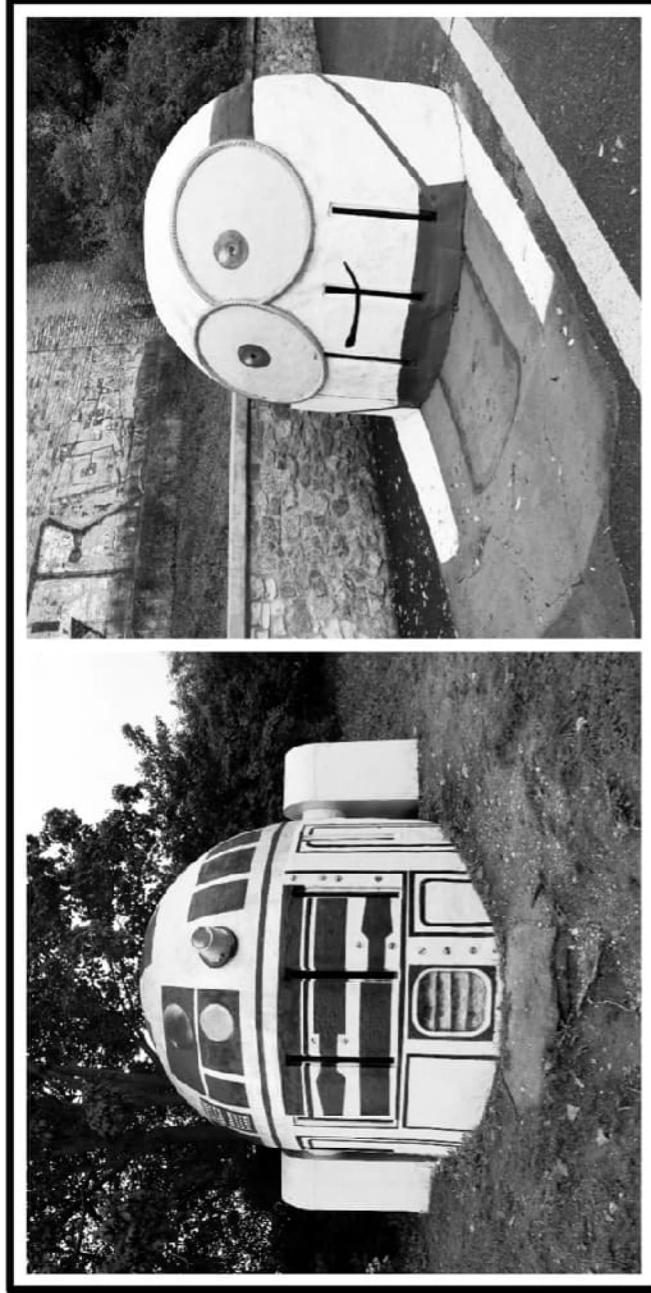
For example, in Prague, there are many creative reuses of former cold war nuclear bunkers. In some underground bunkers, liberties have been taken to create innovative sites for commercial tourism. Interior spaces have been decorated with obsolete Soviet-era gas masks placed on costumed mannequins. Such installations were created in support of using the bunkers as tourism attractions. At another operational fallout shelter in Prague, street artists have painted the surface ventilation shafts as robots and cartoon characters. (See Figure 23) In fact, the city did not condone the unauthorized spray painting of the ventilation shaft as the Star Wars R2D2 robot, but at the same time it was expressed that they liked the décor on the formerly unsightly shaft (Coleman, 2017).

Figure 22. Photograph JLR092022 - Imagination in Nuclear Bunker Reuse in Prague



- **Caption:** Example of imagination in bunker adaptive reuse depicted as creative themes for commercial tourism opportunities and ironic displays of mannequins in Soviet-era gas masks. Scenes from interior of Bezovka Nuclear Bunker in Prague, Czech Republic.
- **Source:** Dr. Jack L. Rozdilsky, September 2022
- **Note:** Photograph used in MRP with Permission

Figure 23. Photograph JLR091722 - Painting on Bunker Air Vents in Prague



- ***Caption:*** Example of imagination in bunker adaptive reuse depicted by street artists' painting of surface level air vents as the Star Wars robot character R2-D2 and a Minions cartoon character. These air vents are part of the support infrastructure for the Folimanka fallout shelter in Prague, Czech Republic.
- ***Source:*** Dr. Jack L. Rozdilsky, September 2022
- ***Note:*** Photograph used in MRP with Permission

In another example of creativity for reuse of bunkers coming from Central Europe, in Vienna, the exterior walls of flak towers have been used as large scale ‘canvasses’ both for authorized and unauthorized works of contemporary art. The flak towers are examples of former Nazi anti-aircraft defences and above ground bunkers to protect against aerial bombardment. The exterior walls of the massive structures have become spaces showcasing typographic text-based works. In fact, the flak towers of Vienna have showcased the work of the ‘godfather’ of the conceptual art movement Lawrence Weiner with his graphic text work “Smashed to pieces (in the still of the night)” painted on the flak towers. It is thought that Wiener’s text emblazoned on the Nazi anticraft military towers may have political undercurrents alluding to Kristallnacht (Greenberger, 2021). Kristallnacht (the night of broken glass) refers to a series of pogroms in 1938 against the Jewish population in Germany (“Kristallnacht”, 2019).

All things considered, the fate of former nuclear bunkers can be addressed in positive ways promoting their adaptive reuse by application of creativity. Elements of irony, humor, social commentary, or even avant-garde art can be applied to make the uncomfortable sites of former nuclear bunkers more user friendly to the public. (See Figure 24) For potential reuse of former nuclear bunkers in Canada, we can learn from the examples of creativity applied to these uncomfortable sites like the fallout shelters in Prague or Flak Towers of Vienna.

* This space is intentionally blank *

Figure 24. Photograph JLR092422-5 - Vienna Flak Tower Exteriors used for Art



Caption:

Example of imagination in Flak Tower adaptive reuse depicted as using Flak Tower exteriors as a space for contemporary art consisting of typographic text-based works (Smashed to pieces [in the still of the night] & historystoria wa[r]s you tie[d] world). 'Smashed to pieces' depicts text related to the works of conceptual artist Lawrence Weiner. Scenes depicted are from the exterior of flak towers in Arenbergpark in Vienna, Austria.

- ***Source:*** Dr. Jack L. Rozdilsky, September 2022
- ***Note:*** Photograph used in MRP with Permission

8.13 Conclusion -- The Last Word

Finally in my judgment, the Diefenbunker is a significant model for how creativity, planning, hard work, and perseverance were used to convert a former military site into a Cold War museum. As with the examples from central Europe, similar traits of creativity are important for the future preservation and reuse of remaining Cold War nuclear bunkers in Canada. In conclusion, it would be a shame if our disaster and emergency management Cold War heritage of nuclear war civil defence is lost through neglect and subsequent dereliction.

Appendix

Appendix

Acronym Index

<u>Acronyms Index</u>	
CBC	Canadian Broadcasting Corporation
CEGHQ	Central Emergency Government Headquarters
CFS	Canadian Forces Station
COG	Continuity of Government
CRS	Congressional Research Service
DEM	Disaster and Emergency Management
DC	District of Columbia
DND	Department of National Defence
EASE	Experimental Army Signals Establishment
EOC	Emergency Operations Centre
FEMA	Federal Emergency Management Agency
ICBM	Intercontinental Ballistic Missile
JCPOA	Joint Comprehensive Plan of Action
MEGHQ	Municipal Emergency Government Headquarters
MRP	Major Research Paper
NATO	North Atlantic Treaty Organization
NORAD	North American Aerospace Defense Command
NTM	National Technical Means
OCIPEP	Office of Critical Infrastructure Protection and Emergency Preparedness
OHSA	Occupational Safety and Health Administration
OSAX	Ottawa Semi-Automatic Exchange
PPM	Parts Per Million
RAND	Research and Development
RCAF	Royal Canadian Air Force
REGHQ	Regional Emergency Government Headquarters
RPG	Rocket-Propelled Grenade
SAM	Surface-to-air missile
SLBM	Submarine Launched Ballistic Missiles
START	Strategic Arms Reduction Treaty
STRAD	Signals Transmission Receiving and Distribution
TEMPEST	Telecommunications Electronics Material Protected from Emanating Spurious Transmissions
UGC	Underground Complex
US	United States
USAF	United States Airforce
WW	World War

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