

**Exploring the Role of Public Health in Climate Change
Initiatives and the Mining Industry
in Ontario, Canada**

by
Nicole Hutchuk

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Background: Climate change is a global crisis that is impacting population health. With its significant expansion, the mining industry in Ontario, Canada has the potential to contribute to the development of green energy technologies, but can also threaten the climate and population health. Research has begun to explore the impact of extractive industries on climate change but has not examined the barriers for climate change initiatives and policy implementation in Ontario in relation to population and environmental health. This research aims to address the role public health can play in promoting climate change initiatives and policies in extractive industries in Ontario.

Objectives: The objectives of this research are to (1) understand the role that public health could play in mitigating the impact of Ontario's mining industry on the environment; (2) understand what barriers might prevent public health from playing a more active role in climate action within the mining industry in Ontario; and (3) explore what key actions could be taken to address barriers to allow public health to take an active role in the extractive industry in Ontario.

Methods: This study employed a qualitative methodological approach using semi-structured interviews as a primary method of data collection. Interviews were conducted with 12 key stakeholders, including policy makers, representatives of public health units, government workers, researchers and not for profit agencies. Data was analyzed utilizing a critical realist lens using inductive, thematic analysis.

Findings: This study displayed the complexity of the government priorities in the green energy transition and opposing viewpoints of environmental and health advocates. The findings suggest that public health should play a larger role in advocating for health to be at the forefront of climate change initiatives in the mining industry in Ontario. It highlighted how to mitigate barriers and tensions to public health interventions while seeking to utilize or implement health frameworks that have not yet been applied in the mining sector in Ontario.

Conclusion: There is potentially a role for public health to have in regard to policy creation, advocacy and implementation in public health units across Ontario. Public Health Ontario could be viewed as a body to provide scientific knowledge and evidence for industries and public health units in relation to climate change initiatives and the mining industry. There is a lack of collaboration between industry, health units, government and community. Current regulations and policy do not reflect the needs of surrounding, impacted communities and the climate crisis.

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Dedication

I would like to honor the memory of my late Grampa, William (Bill) Cook, by dedicating this master's thesis to him. This journey began with you. You have instilled in me an invaluable wealth of knowledge and deep reverence for the outdoors and our planet. I am thankful for the many years we had together – our endless conversations about fishing, land use, and gaining insights into this world. I will cherish the fact that you were able to begin this journey with me, and provide your “two cents”. I am forever grateful for the foundation you laid.

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List of Abbreviations

°C	Degrees Celsius
CO ₂	Carbon Dioxide
COP21	Conference of the Parties 2021
COVID-19	SARS CoV-2
EAA	Environmental Assessment Act
EIA	Environmental Impact Assessment
ESG	Environmental, Social and Governance
EV	Electric Vehicles
GHG	Greenhouse Gas Emissions
ha	Hectares
HIA	Health Impact Assessment
HiAP	Health in All Policies
IA	Impact Assessment
MAC	Mining Association of Canada
MOC	Memorandum of Cooperation
MOU	Memorandum of Understanding
NDC	National Determined Contributions
NGO	Non-Governmental Organization
PHO	Public Health Ontario
PPM	Parts per million
SDG	Sustainable Development Goal
TSM	Towards Sustainable Mining
UN	United Nations
WHO	World Health Organization

Chapter 1: Introduction

Climate change is a crucial concern for public health. It impacts human health by threatening clean air, safe drinking water, food security and shelter, which will ultimately lead to death and illness due to increased extreme weather events such as heatwaves, storms, floods, and growing prevalence of zoonosis (World Health Organization, 2022). As the earth continues to warm past 1.5°C, this may lead to more severe natural weather, causing significant damage to humans and society (Haines & Ebi, 2019). The United Nations (UN) defines climate change as long-term shifts in temperatures and weather patterns, with some changes being natural such as variations in the solar cycle (United Nations, 2022b). Humans have been the main drivers of climate change since the 1800's primarily due to burning of fossil fuels such as coal, oil and gas (United Nations, 2022b). Due to human activity and our unsustainable practices, the Earth is now 1.1°C warmer than it was in the late 1800's, with the last decade (2011-2020) being the warmest on record to date (United Nations, 2022b). In 2019, the average global carbon dioxide (CO₂) emissions were a main driver of climate change, reaching a record high of 409.8 parts per million (ppm), an increase from 400.1 ppm in 2015 (World Health Organization, 2022). Even without an increase of emissions, climate change is still being impacted by ecosystem and biodiversity loss and environmental degradation, all contributing to the era of the Anthropocene. The Anthropocene can be described as a new geological epoch which is human-created, becoming a force of nature equal to or greater than natural forces, with changes being driven by and focusing on growth in material and financial wealth (Hancock, 2022).

In the future, we will continue to see less extreme cold, increase in drought, reduced seasonal lake ice across the Arctic, thinning of glaciers, and the warming and melting of permafrost (Bush & Lemmen, 2019). For the human population, climate change means negative health implications such as non-communicable disease (i.e., respiratory, cardiovascular and mental illness) along with injury and death from extreme weather events (Berry & Schnitter, 2022).

The mining industries significant expansion in Ontario has the potential to contribute to the development of green energy technologies, but can also threaten the climate and population health. Its contribution to releasing harmful emissions and its environmental impact may have detrimental affects on population health. The spread of disease may be exacerbated by pathogens and contaminants to people due to vector-borne disease and changing of ecosystems and biodiversity patterns (Berry & Schnitter, 2022). As our ecosystems continue to be depleted, the

loss of biodiversity will cause a decline in plant production and increased water scarcity (United Nations, n.d.). Not only will we see visible signs of destruction, but global health care systems will continue to be overburdened when a natural disaster strikes due to increased patient emergencies and infrastructure shortfalls. Globally, climate change is expected to cause approximately 250,000 additional deaths per year between 2030 and 2050 because of the rates of malnutrition, malaria, and heat stress alone (World Health Organization, 2022). The impact to population health may be immediate, last years, or be completely irreversible due to loss of culture and multi-generational trauma (Berry & Schnitter, 2022).

Climate change has lasting implications on health. Therefore, there is a need for public health to act to help mitigate negative impacts of climate change on the environment and human health. While adaptation strategies are necessary to prepare for more upcoming disasters and crises, it will be important for public health to create climate change strategies across multiple sectors to prevent health issues from increasing. Climate change policies should be at the forefront of the agenda for politicians, scientists and policymakers alike in order to position humanity in a way that attempts to undo harm we have caused. At the same time, adaption and mitigation strategies should not come at the cost of significant environmental degradation and negative health impacts caused by extensive increase in mineral production for the ‘green’ energy transition. This research therefore aims to address the role public health can play in promoting climate change initiatives and policies in extractive industries in Ontario.

1.1 Climate Change Policies

1.1.1 Global Policies

Global climate change policies are necessary in order to attempt to decrease CO₂ and greenhouse gas (GHG) emissions and limit the impact they have on the environment and the planet. These policies are also needed to reduce the loss of ecosystems and biodiversity. There are some global policies and approaches which create opportunities for adaption and mitigation, such as the Paris Agreement, Sustainable Development Goals, and initiatives from the World Health Organization (WHO) (Fears et al., 2021). Yet, there does not seem to be a global

solidarity allowing countries to implement policies which tackle all-encompassing climate issues or view this problem through a holistic health lens – one that will be mandatory for success.

One legally-binding international treaty is the Paris Agreement. As the earth continues to warm due to human activity and disruptions to biodiversity, GHG emissions act like a blanket around the earth, trapping the sun's heat therefore increasing global temperatures (United Nations, 2022b). The Paris Agreement attempts to slow this process while adapting to, and tackling climate change on a global level. The Treaty has a goal of limiting warming below 2°C compared to pre-industrial levels, while reducing GHG emissions to achieve a climate neutral world by mid-century (United Nations Framework Convention on Climate Change, 2022). This was adopted on December 12, 2015 by 196 parties at the 21st Conference of the Parties (COP 21) in Paris, and began to be enforced as of November 4, 2016 (United Nations Framework Convention on Climate Change, 2022). Although an important step toward a global strategy to reduce the risk of climate change (Delpla et al., 2021), without further action, the earth will continue to warm and the Paris Agreement Treaty goals will not have been met. In order to keep warming below the 1.5°C level, fossil fuel emissions must decrease by about 6% per year from 2020-2030 (United Nations, 2022b). Although the Paris Agreement requires each involved Party to prepare, communicate and maintain the Nationally Determined Contributions (NDC's) they intend to achieve, it does not require countries to develop a long-term GHG emission strategy (United Nations Framework Convention on Climate Change, 2022).

There are also the Sustainable Development Goals. These goals are an urgent call to action, created to guide global development efforts by all countries in a global partnership, adopted by all UN member states in 2015 (United Nations, 2022a). The purpose of these goals is to tackle climate change, preserve oceans and forests while ending poverty, reducing inequality, finding strategies to improve health and education and spur economic growth (United Nations, 2022a). This is relevant as the goals include water, energy, climate, oceans, urbanization, transportation, and science and technology while recognizing that these are all interconnected with one another. Finally, Sustainable Development Goals build global partnerships to improve human lives and protect the environment (United Nations, 2022a). Current policies seek positive outcomes for population health, social justice sustainability and survivability (Fears et al., 2021). However, often times these policies and frameworks are disconnected across industries and do not consider how

to integrate health into policymaking across sectors. In order to bridge this gap, it will be important to include what the WHO has adopted as a Health in All Policies (HiAP) approach.

Public health should utilize a systems-based approach involving policy across all sectors, known as HiAP, at the global and regional levels (Lavis et al., 2012). This may help link outcomes across regions when developing mitigation and adaptation strategies for climate change. Although not a climate change policy, HiAP is a framework aiming to minimize social and health-related harm by considering health and social implications of policies in all levels of government (Martin et al., 2018). It systematically takes into account health implications of decisions, in order to improve population health and equity, seeking synergies and improving accountability of policymakers for health impacts at all levels of policy making (Diallo, 2023). HiAP is a collaborative approach encouraging integration of health considerations into policymaking across sectors to improve the health of people and their communities. HiAP has a critical role because risk factors for disease, socioeconomic and environmental determinants of health, often determine health outcomes, and yet are seen as outside the scope of the health sector (Marmot, 2005). By implementing a HiAP approach with regard to climate change initiatives, we could see improvements to the health of populations by governments assessing how policies affect upstream drivers of health and social conditions (Tonelli et al., 2020). Implementation of this approach may be a step toward achieving health equity globally, while creating socially equitable and healthy futures. For example, further legislation could help in the protection of forests and wetlands while reducing air pollution across multiple sectors, such as energy and manufacturing industries (Tonelli et al., 2020). There are however some challenges to taking this approach. If governments perceive HiAP to interfere with economic growth, there may be little interest in adopting this strategy (Tonelli et al., 2020). Part of the goal of this research is to explore ways to address current challenges to policy implementation and potentially close the gap on how industrialized sectors, such as extractive industries, address the issues of climate change, and consequently health. By utilizing a HiAP approach, we can successfully target policy integration with the help of some additional practical approaches.

In combination with HiAP, it may be beneficial to include health impact assessments (HIA), which are multidisciplinary, voluntary and unstandardized processes aiming to protect and promote population health by informing decision-makers about potential impacts of projects (i.e. a mine), programs and policies, encompassing a holistic view of health (Diallo, 2023; Jones &

Bradshaw, 2015; Nowacki et al., 2014) Although HIAs are not a formal policy, they are a tool to analyze potential projects by incorporating scientific data, public health expertise and stakeholder contributions, while using a systematic approach (Jones & Bradshaw, 2015). If these approaches were adapted in conjunction with one another, they could fill the gap of prioritizing health and environmental impact while providing a framework for implementing health into practice and creating a collaborative approach to integrate into policymaking across sectors. The main purpose and key benefits of HIA are to minimize negative impact and maximize positive health outcomes for the population by promoting wellbeing, health and equity, while jointly encouraging agencies to work together (Manatu Hauora Ministry of Health, 2023; Parry & Kemm, 2005; State of Alaska Health Impact Assessment Program, 2015). In the context of this research, it may be useful to consider how HIAs may play a role in policy development when it comes to understanding the health implications mining has on surrounding communities.

Although the process of a HIA is to screen, scope, assess, recommend, report, monitor and evaluate, there is currently no standard procedure for conducting HIAs, as noted in government-issued reports which focus on attaining high standards of health for populations (Jones & Bradshaw, 2015). HIAs are therefore met with community resistance at times due to failure on their part to capture appropriate information and identify all ways in which industries such as resource extraction may impact community health (Jones & Bradshaw, 2015). Revisions are needed to ensure the tool is used appropriately for each development context. If these revisions were adopted, HIAs could become a tool and method embraced similarly across industries and by all stakeholders, making it a useful part of the impact-assessment process (Krieger et al., 2010). HIAs may be a good example of how we can adapt policies and frameworks in a way that give step-by-step guidance to implementing tangible and actionable steps. This may assist in the effectiveness of a policy or program while producing a framework for implementing health into the practice of impact assessments (IA).

The One-Health framework operates at a global level, gaining traction internationally, nationally, regionally and locally with hopes to achieve optimal health outcomes while taking a collaborative, multisectoral and interdisciplinary approach to the shared environment of people, animals and plants (Centers for Disease Control and Prevention, 2022). The goal of One-Health is to allow entities to exist harmoniously in a shared environment, while designing and implementing programs, policies and legislation to conduct research across multiple sectors to achieve better

public health outcomes (Centers for Disease Control and Prevention, 2022). One-Health attempts to reverse and identify how to combat health issues at a human-animal-environment level while inspiring an interdisciplinary approach. Due to changes in climate and land use such as deforestation, the environment has become disrupted, contaminating water sources and increasing disease in humans and animals (Centers for Disease Control and Prevention, 2022). By utilizing this collaborative approach in the context of climate change and mining, One-Health may help address multisectoral health disparities and encourage collaboration and understanding at multiple levels when considering how to integrate policy.

There is a need for policy to be put in place globally and federally to protect the health of communities while exploring new ways to approach frameworks that will encompass a more holistic outlook on population health. That becomes extremely difficult however, as global landscapes and politics differ drastically. One potential example could be to look at how health is interrelated with the entire planet and not strictly focusing on one level in the system or industry. Planetary Health, as defined by the Planetary Health Alliance (2022), is “a solutions-oriented, transdisciplinary field and social movement focused on analyzing and addressing the impacts of human disruptions to Earth’s natural systems on human health and all life on Earth.” Planetary Health explains that we are facing the sixth mass extinction of life on Earth due to climate change, pollution of air, water and soil caused by changes in land use and cover, as well as degradation of the environment and marine systems (Planetary Health Alliance, 2022). As climate change intensifies, ecosystems will continue to transform and exacerbate each other (Planetary Health Alliance, 2022). This framework situates human health within human systems while considering natural systems where our species exists, and the boundaries of the planet and its resources, addressing biodiversity loss and health equity (Hancock, 2023; Horton & Lo, 2015). By looking at the broad scope of the issue, we are encompassing the entire planet’s health, ranging from our place in the solar system, to human life, to the existence of the smallest of organisms. This framework may be beneficial to incorporate into policy documents across sectors in order to decrease our footprint on natural systems by considering resources we are depleting at an alarming rate.

Similarly, Eco-Health is a concept that was created to bridge disciplines and aim to understand the multi-faceted relationship between humans, animals and the environment (Lisitza & Wolbring, 2018). This model was proposed to help preserve natural capital and sees it as critical

to protect the environment (Hancock, 2020). Damaged ecosystems and communities are often impossible to rebuild, therefore we must see environment, social and human cost as not being external to one another (Hancock, 2020). Failing to account for the health impact of industry would be failing to recognize the importance of public health impact, which ultimately excludes health from policy making considerations (Hancock, 2020). Eco-Health is not currently included in environmental and health models; therefore, the impact of public health is excluded from policy making considerations.

There is exceptional impact on human and population health from climate change and there is a need for public health to intervene and explore different models and frameworks for policy intervention. Governments currently collaborate on climate change policy around the globe however, they very rarely seem to coordinate with public health (Awuor et al., 2020). There are not many policies, frameworks or models that seem to be operating at the scale needed to meet the targeted level of intervention, especially when it comes to extractive industries. In addition, the proposed solution of ‘green’ technologies comes with its own costs. For example, we may not have nearly enough minerals on the planet to sustain the energy transition that would be required to meet climate change goals (Hancock, 2020; Kneen, 2022). Knowing this, we should seek to find ways to connect policies, frameworks and models so they are working in conjunction with one another, or recognize that a new framework is needed to address multifaceted challenges and take action while realizing the boundaries of our planet. This is important given that addressing climate change involves a substantial shift towards renewable energy sources, necessitating widespread adoption of green technologies. However, these green technologies rely heavily on mining and minerals, which come with their own environmental consequences and associated destruction. As noted by Nowacki et al (2014), “it is an obvious conclusion that health should be considered adequately by all sectoral policies, plans, programs and projects” (p. ix). By further understanding policies, approaches and frameworks that are in place outside of the mining industry, there could be policies developed focusing on combining population and environmental health of the planet, all contributing to climate change initiatives.

Globally, we can see that there are many policies, regulations and/or movements seeking to address climate concern. However, Canada does not necessarily utilize many of these resources or perspectives available. In addition, the Canadian and specifically Ontario governments do not appear to be following these recommendations that may assist in decreasing climate concern,

especially when it comes to mining industries. Without there being any global standards, it becomes difficult to regulate industry, as each country has freedom to address mining as they see fit, regardless of where in the world they are operating. Canada does however have a great number of climate reports outlining how it plans to address climate change.

1.1.2 Canadian Policies

Currently, Canada does not have a meaningful HiAP approach at the federal level, or in most provinces (Tonelli et al., 2020). Further challenges arise with the changing levels of government across the country with different economic priorities. Canada is attempting to be a leader in climate change initiatives, yet seems to face hardships internationally. Federal initiatives do not always translate to provincial or municipal agendas, further creating discrepancies in each jurisdiction's views on climate action. Despite the astronomical impact on human health, climate change policy has only recently begun to be championed and public health has recognized the demand for decision makers, and the need for adaption and mitigation to be informed by policy (Fears et al., 2021).

In Ontario, the Provincial Government has been engaged in climate change policy more aggressively since 2007, mainly under the direction of the Ministry of Environment, Conservation and Parks. First steps began with signing a memorandum of understanding (MOU) between Ontario and California, with the goal of reducing GHG emissions and promoting energy efficiency (Awuor et al., 2020). This act began as a way to bridge similar goals between countries (Canada and the United States) by seeing an urgent need for collaboration. This MOU led into a memorandum of cooperation (MOC) in 2022 which further considers goals of mitigating climate change, as well as preventing biodiversity loss, cutting transportation emissions, and continuing to carry out cooperative activities through policy and regulatory measures, such as the adoption of clean technologies and accelerating action on biodiversity conservation (Government of Canada, 2022b). GHG emissions from mining and burning of fossil fuels is a major contributor to air pollution; however, current policies, such as the counting of GHG emissions and carbon credits in place, measure pollutants from transportation, food and energy use choices (WHO, 2022). Although Canada is on its way to a net-zero carbon future, with the government stating it is on track to meet its goal of having 90% non-emitting electricity generation by 2030 (Environment

and Climate Change Canada, 2021b), this neglects to address holistic issues such as ecosystem and biodiversity loss that arise from extractive industries contributing to climate change. The goal of this research is to explore how to mitigate these issues and address barriers that may prevent climate accountability within the mining industry in Ontario, while encouraging cleaner ways to mine within the province. In considering this, seeking ways to support the mining industry with green technology may allow for newly implemented policies to suit needs of the industry and health outcomes combined. Public health could have a role in bridging the gap between industry, government and community need. Incorporating public health and drawing upon their knowledge may help bring a clear health lens to the impacts of climate change within the mining industry and how public health may mitigate or reverse some environmental devastation.

By imagining a different way to approach public health's role in climate and environmental initiatives, we may be able to build upon current policies and approaches such as the Paris Agreement, HiAP and One-Health. These will be pertinent frameworks to carry forward as we think about how policies can be implemented into public health, as it will allow industries to think more fruitfully about the impact their projects have on the environment and on people and the planet's health. Although actionable policies and visions are in place such as the Paris Agreement and HiAP, they are not used for practical application, nor are they all mandatory. HIA may be the only assessment that guides us through a step-by-step process on how to anticipate, measure, and respond to health outcomes affected by industrial development. Incorporating the vision and goals of current policies and approaches will hopefully improve how industries create less detrimental impact for future generations while considering health at the forefront and building upon the much-needed collaboration between sectors.

1.2 Mining and Extractive Industries

Mineral extraction is a global practice which has taken place for thousands of years, however, there has been little consideration given to the destruction it may cause to the environment. Although mining is economically profitable and produces commodities that are necessary for consumption by humans, it also is a major cause of environmental destruction and driver of climate change. Some indirect impacts of mining include infrastructure development, large settlements, increased agricultural conversions and logging (Mercer et al., 2011). This creates

environmental exposures that may have an impact on humans by creating toxins and chemicals from mining, posing severe threats to human health (Mactaggart et al., 2016). Despite these impacts, mining is proposed as a way to help with energy transition by using minerals to aid in a significantly lower carbon future (Drexhage et al., 2017). The expansion of mining, however, will have inevitable impacts on the environment, yet there are no comprehensive global standards in place for its protection (United Nations Environment Programme, 2022). There should, therefore, be more thought on how mining could proceed, in a way that protects environmental and population health.

Mining creates a “forest footprint” which extends beyond the site of the physical location of the extraction due to transportation (i.e., vehicles and railways), infrastructure development and settlements of workers (Mercer et al., 2011). Its impact on deforestation and land degradation are externalities, seemingly beyond what is currently measured, which may pose an issue for quantifying the amount of environmental damage that can truly occur from this industry. In a report discussing the impact of protecting and restoring forest carbon in tropical forests in Africa, it was estimated that 30-35% of human induced GHG emissions come from land use activities such as resource extraction, which includes mining (Mercer et al., 2011). In comparison with other countries around the world, deforestation appears to be higher in lower-income countries due to many high income countries already having their lands heavily deforested by these activities (Mercer et al., 2011). Kramarz (2022) coins this particular use of land and contributor to climate change as “slow violence”, referring to environmental disaster impacting communities while creating a dominant discourse around climate disaster by negating forms of environmental violence and deflecting accountability from the offenders. This causes significant harm to the environment and also intentionally creates an unequal power distribution to those impacted by slow violence. This includes those who have the least amount of power to contest or resist the event, with little recourse to respond to the issue, further marginalizing surrounding communities (Kramarz, 2022). Similar to climate change, slow violence does not impact all communities in the same way, leaving some at a higher disadvantage than others (Kramarz, 2022).

The mining industry provides minerals such as copper, iron, lithium, and others, some of which also contribute to the developments in digital technologies and greening energy (Jacka, 2018; Turner, 2022b). Extracting resources can be seen as pertinent for socioeconomic development and a way to help fuel the economy and positively contribute to the ‘green’ energy

transition (Jacka, 2018; Brisbois et al., 2019). Although mining in Canada is a large contributor to employment and economic growth, it is also a direct contributor to climate change. Massive peatlands in Ontario's far north store about 35 billion tonnes of carbon which regulate the climate and house endangered species such as caribou, wolverines and migratory birds (McIntosh, 2022). Through its protection, it would also reduce emissions released by land degradation and digging up the world's second-largest intact peatland complex would be equal to annual emissions from over 39 billion cars (McIntosh, 2022). In addition, CO₂ and methane are emitted through practices such as burning coal and clearing land and forests for industry production of energy, transportation and agriculture (United Nations, 2022b). This in turn negatively impacts surrounding communities by leaving land in a desolate condition.

Nearly all large-scale mining corporations agree to rehabilitate former mines yet we typically do not see these practices taking place (Jacka, 2018). Land rehabilitation after mines close is often difficult or near impossible in some areas due to the removal of trees unable to be replenished and created toxicity in the water from methylmercury exposure (Jacka, 2018). In Peru, nearly 2166 hectares (ha) per year were being destroyed, then following the 2008 global recession, this increased to 6145 ha per year (Jacka, 2018). Mines continue to operate at high intensity throughout the world today. They are often framed as a way to "bounce-back" from an economic recession, yet the practice of mining contributes to poor health outcomes. Seeking a way to integrate new policies and frameworks into this industry may help limit the impact on the environment and population health.

Environmental impact assessments (EIA) are the most widely used tool for environmental management, especially within Canada. However, there does not seem to be clear technical standards in place for gathering data and assessing potential impacts on surrounding areas, and certain forms of extractive development do not trigger a required EIA (Mercer et al., 2011). In addition, there are no international standards for gathering data such as measuring carbon impact, posing an issue for the use of EIAs in exploration projects (Mercer et al., 2011). In creating an international or national tool that decreases stripping of the environment, there could potentially be a substantial number of ecosystems and biodiversity left undisturbed. This may be where a HiAP approach could gain momentum and be useful to implement across sectors. HiA's are voluntary in Canada, which allows for less regulation and different standards across the country. By better integrating a HiAP approach into EIAs and HIAs within Canada and perhaps beginning

with Ontario as a mining superpower, policy makers and Public Health Ontario (PHO) may have opportunity to work with industries who have authority to conduct these practices in order to promote health and well-being, while addressing social and environmental considerations occurring from environmental degradation from extractive industries. It will be important to understand how public health could bridge frameworks or create new approaches to mitigate environmental damage. These concepts are needed in an Ontario context to suit the needs of the province and ongoing evaluation of extractive projects.

Communities face long-term environmental issues and health threats from mining during the extraction period, as well as after the fact with abandoned mines which often create heavy metal, soil and water contamination and increased radiation exposure (Gibson & Klinck, 2005). In Yellowknife, Yukon, the “Giant Mine” project resulted in massive amounts of arsenic trioxide polluting the snowmelt, rivers and lakes used for drinking water within the community (Keeling, 2015). To *resolve* this issue, the mines installed pollution control devices which stored the arsenic trioxide underground in specially constructed chambers, where today we see over 237,000 tons of arsenic sitting under this old site, making remediation extremely difficult and a severe threat to future generation’s health (Keeling, 2015).

Not only do old mines and sites pose undeniable threats to the climate and the environment, and therefore population health, but the extractive industry is also rooted in colonial practice (Brisbois et al., 2021). Mining disadvantages already vulnerable populations and is recognized as one of the greatest threats to Indigenous people due to confiscation of land, impact on culture, health, food and language (Pike et al., 2021). For example, many northern Canadian First Nations and Inuit communities see greater disruptions to sea ice, wildlife and vegetation, leading to a change in hunting practices such as fishing and foraging, a decreased consumption of cultural foods and an increased reliance on retail stores (Berner et al., 2016; Dodd et al., 2018; Kipp et al., 2019; Medeiros et al., 2017). In addition to colonial practice, it further exacerbates issues of economic marginalization with an impact on traditional livelihood, causing cultural upheaval with the sudden arrival of extractive industries (Keeling, 2015). These practices often contribute to environmental damage and increase health concerns for nearby communities by escalating rates of chronic disease (Kramarz, 2022). Extractive industries are directly connected to environmental racism where many Indigenous communities in North America are located downstream from contaminated areas due to industrial developments (Tsuji et al., 2007). The David Suzuki

Foundation describes environmental racism as a form of environmental injustice that occurs when policies or practices in the development industry intentionally, or unintentionally, result in more pollution or health risks in Indigenous and racialized communities (Cullis-Suzuki, 2023). Some examples of this include inadequate enforcement of environmental standards for polluting industries or companies, operating near racialized communities, or patterns of unequal access to environmental benefits such as clean water (Cullis-Suzuki, 2023). As a society that is currently dependent upon resource extraction, it will be an essential task to determine how we can continue to mine while eliminating colonial practices and environmental racism, and instead focus on positive health outcomes for all.

Mining practices continue to create social conflict and tensions between communities and the industry (Jacka, 2018). Within Canada, it is commonly noted that coal-mine workers report overall poorer self-rated health and also higher rates of chronic disease (Mactaggart et al., 2016). The mining industry has been shown to further link poor social and physical health while creating greater economic inequalities through increased local housing prices and negatively impacting people's mental health (Mactaggart et al., 2016). Those who are employed by the industry do share a link between riskier activities such as smoking and drinking with further health impacts such as increased respiratory illness, cancers, blood disorders, acute injury, infectious disease (i.e., sexually transmitted infections), mental disorders, and chronic injuries (Brisbois et al., 2019; Mactaggart et al., 2016).

Canada is home to a multitude of mines with Ontario being positioned to become the global supplier of choice for minerals that are integral to the 'green' transition (Invest Ontario, 2023). To date, Canada produces 60 different minerals and metals at almost 200 mines, with an additional 6500 sand, gravel and stone quarries (Government of Canada, 2022a). Ontario alone has 41 active mines spanning mostly across northern Ontario with nine producing base metals (i.e., nickel, copper, zinc), 21 gold mines, one platinum-palladium, one iron, and nine major industrial mineral mines and quarries producing salt, gypsum, calcium carbonate, nepheline syenite, talc and wollastonite (Invest Ontario, 2023). Ontario's mineral production in 2020 was valued at \$10.5 billion, with \$570 million spent in 2020 on approximately 300 mineral exploration projects (Invest Ontario, 2023). This vast industry has created 28,000 mining jobs and an additional 47,000 jobs that were indirectly connected to mining (Invest Ontario, 2023). Mineral production occurred

country-wide, however, Quebec, Ontario, British Columbia and Saskatchewan made up three quarters of Canada's total value of mineral production in 2020 (Government of Canada 2022b).

The negative health impacts of mining on populations are disproportionate and will likely continue to increase as industries continue with production and further contribute to the climate crisis. The practice of mining often further puts women at a disadvantage and also contributes to exacerbated health inequalities in populations which already have poorer outcomes of social determinants of health. Mining is often a male-dominated industry that may isolate women to the home, while downplaying their economic agency, further enforcing a patriarchal ideology (O'Faircheallaigh, 2013; Suliman, 2019). Furthermore, men capture more of the direct-related benefits of extraction while women encounter land loss, displacement, community fragmentation and environmental pollution (Parks & Buitrago Orozco, 2018). Social determinants impacted may include employment, work environment and housing, strained by the influx of mining and may bring a sense of losing control over community connectedness due to its transient workforce (Mactaggart et al., 2016). The Ring of Fire development in northern Ontario is an example of this marginalization. Three surrounding communities are now under a "boil water" advisory, and face increased health risk due to inability to hunt traditional foods such as caribou, creating food insecurity, while severing traditional and cultural practices (Gilchrist-Blackwood & Xie, 2022).

In Ontario, during the SARS CoV-2 (COVID-19) pandemic, which began in March 2020, many of the mining sites were initially shut down along with other businesses and industries in order to protect the population from contracting the virus. Early reports show that restrictions put in place led to a decrease in air, land and water travel which ultimately decreased commercial exploitation of natural resources and manufacturing (Bates et al., 2021). The crisis was seen as a political opportunity and although many mine sites were mandated to initially shut down, they were quickly deemed as essential services, regardless of community push-back, and started operating at high intensity (Bernauer & Slowey, 2020). This continued to pose threats to the health of those living and working in the area due to the continued transportation of workers throughout the provinces (Bernauer & Slowey, 2020). Further health risks were created for mine workers as mines continued to operate during the COVID-19 pandemic with the continuation of fly-in-fly-out workers. This created health concerns for communities where mining projects took place, as it had physical and mental health implications (i.e., potential new disease from transient workers and disruptions to community relationships) while putting the risk for COVID-19 transmission at a

higher rate (Bates et al., 2021). With a loosening of restrictions within this field, there were also a rollback of environmental protectors (Bernauer & Slowey, 2020; Gilchrist-Blackwood & Xie, 2022). For example, Alberta and Ontario temporarily suspended their environmental regulations that were typically in place, allowing extractive industries to use roadways that were meant to be left untouched to aid in migratory animal patterns (Bernauer & Slowey, 2020). This created issues for communities protesting the proposal as they were not allowed to congregate due to mandated restrictive gathering capacities. The pandemic continued to fuel racist and colonial power asymmetries between mining and communities, giving projects an opportunity to be pushed through, and governments an opportunity to ignore their obligations to Indigenous peoples under treaties, the United Nations on the Rights of Indigenous Peoples, (UNDRIP) and the Canadian constitution (Gilchrist-Blackwood & Xie, 2022).

Difficulties arise in a political context due to the lack of global regulation for the mining industry, leading to varying standards within Canada. The industry is subject to regulations from federal, provincial, and territorial Acts, with many requiring approval from the Federal Government (The Mining Association of Canada, 2023b). Consequently, the major participants encompass all levels of government within Canada, as well as stakeholders such as policymakers, lawyers, industry representatives, and affected members of civil society.

1.3 Canadian Health Systems Context

Public health in Canada encompasses population health, focusing on health indicators influenced by social, economic, and physical environments (Fierlbeck, 2011). The healthcare system operates at federal, provincial and municipal levels, with publicly funded but privately delivered services governed by the Canada Health Act (Government of Canada, 2016; Hutchison et al., 2011). Federal-provincial coordination occurs through the Pan-Canadian Public Health Network and the Public Health Agency of Canada (Fierlbeck, 2011). Regional centers and National Collaborating Centres contribute to public health through informal connections and regional bases (Fierlbeck, 2011). Overall, public health in Canada operates under shared responsibilities, collaboration, and information sharing among all levels of government, enabling a coordinated response to public health challenges. Ontario's public health system is comprised of a variety of organizations such as the Ministry of Health, Ontario's Chief Medical Officer of Health and local

public health units, also working together to promote healthy conditions for Ontario residents (Ontario Agency for Health Protection and Promotion, 2020).

There have been suggestions on how to move forward within the mining industry in a way that could potentially mitigate some environmental and health challenges. However, even with these recommendations, it is clear that more needs to be done in Ontario to regulate the mining industry's impact on climate change, environmental and population health. Although recommendations through frameworks and initiatives such as Planetary Health, Eco-Health or One-Health have begun to be incorporated into policy outside of mining, Public Health Ontario still has a rather limited role within this industry.

The goals of PHO are to keep Ontarians safe and healthy while preventing illness and improving health (Ontario Agency for Health Protection and Promotion, 2023). PHO was created as an arms-length scientific and technical organization in 2008 to focus on the health of populations (Ontario Agency for Health Protection and Promotion, 2020). Their areas of expertise are in chronic disease prevention, emergency preparedness, environmental and occupational health, health promotion, injury prevention and infectious disease and microbiology, all helping to monitor health and support local public health units through research and providing technical advice (Ontario Agency for Health Protection and Promotion, 2020).

A definition of public health would therefore include being free from disease or injury. It can be defined as “what we, as a society, do collectively to assure the conditions for people to be healthy” (Satcher & Higginbotham, 2008, p.1). Public health encompasses a set of values and philosophy, viewing the world through the lens of health promotion, protection and disease prevention, involving professionals with specific skills dedicated to these objectives (Canadian Public Health Association, 1992). It therefore focuses on the whole population including safe food and impact to communities through healthier built environments, all improving health conditions (Ministry of Health and Long-Term Care, 2021). Further, their focus is on preparing for and protecting against infectious disease outbreaks and environmental incidents, while controlling potential health emergencies and leading in public health research (Ministry of Health and Long-Term Care, 2021; Ontario Agency for Health Protection and Promotion, 2023) – all relevant to the impacts of mining development.

By working within a multidisciplinary team, Public Health Ontario may be able to improve the health of Ontarians by allowing for new frameworks that align with climate change initiatives.

In addition, public health bodies could become involved in an advocacy role to work both top-down and bottom-up. This project aims to understand how these approaches could be looked at or combined to create policies and frameworks that could lead to a change in the way extractive industries obtain the earth's natural assets that are central to our energy transition, while working to build meaningful relationships between extractive industries and health to mitigate climate and environmental impact. As Antonio Guterres, UN Secretary-General, stated in his speech at UN Headquarters in New York City: "The state of the planet is broken. Humanity is waging war on nature. This is suicidal" (Kotan, 2020).

Chapter 2: Study Objectives

The mining industry in Ontario, Canada is a contributing factor to climate change and environmental degradation. With the climate crisis framed as a pressing issue, it is important to think of the role that public health could play in helping to mitigate the negative health impacts of mining on both population and environmental health. The goal of this research is to understand how public health could build collaborative relationships with the mining industry to mitigate negative environmental and population health impacts, while bridging relationships with key stakeholders and create a shared understanding of need with impacted communities. By exploring this topic, I hope to identify barriers to policy implementation in climate change initiatives and extractive industries and the way they intersect, while creating actionable recommendations for policy and framework solutions.

2.1 Research Questions

This research examined the following question: “What role could public health play in climate change initiatives in the mining industry in Ontario, Canada?” In order to address this question, I explored the following sub-questions:

1. What role could Public Health Ontario play in mitigating the impacts of the province’s mining industry on the environment?
2. What barriers might prevent Public Health Ontario from playing a more active role in climate action in the mining industry in Ontario?
3. What could be done to address policy barriers so that Public Health Ontario could take a more active role in the extractive industries in Ontario?

The above research questions sought to understand the role of public health in current initiatives, if any, while exploring pathways to promote environmentally friendly policies and forge an innovative path for public health to play an active role in climate change solutions in the mining industry, all conducive to the health of Canadians.

Chapter 3: Methods

3.1 Research Design

This research utilized a qualitative methodology rooted in a critical realist ontology and epistemology. A critical realist views empowerment as a central goal, committing to emancipation and self-actualization, while understanding generative mechanisms which have produced a situation (Connelly, 2001). Critical realism in the context of this research links climate change policies to the wider social, economic and political climate, providing a path to critique and give political and ethical considerations for social action (Connelly, 2001). This involves understanding viewpoints of the actors themselves to unpack ideologies and mechanisms which build current policy and frameworks.

A critical realist approach requires the researcher to reflect on their own beliefs and values and how they might inform the research inquiry (Connelly, 2001). As an individual who believes that mining is essential to our economy yet could be done in a much less destructive way, it was important to step back and truly listen to the opinions of others with an open mind. Coming from a middle-class background with both white and blue-collar history, I have seen the importance of the mining industry for economic development; however, it would be negligent of me to undermine the severity by which the planet and climate is changing. Although I approached this study with my own experiences and interpretations of climate change and its relationship to mining, I was required to be open to the interpretations and power dynamics of others. Having lived in an oil and gas dominant sector in Calgary, Alberta for six years of my adult life, I recognize its positive benefits of the industry's economic contributions, while also understanding the negative effects mining has on the social determinants of health. I also feel I have a deep relationship with the Earth and feel empathy toward its drastically harmful changes. It was therefore important to focus on how we could build policies or frameworks that suit the needs of the planet while protecting population health and not depleting the earth of its natural resources, while being respectful of differing political opinions.

3.2 Study Sample, Recruitment, Data Collection

3.2.1 Study Sample

In order to understand the role public health could play in mitigating the negative environmental and health impacts of the mining industry, I attempted to recruit stakeholders from various interest groups. These included policy makers, public health and government representatives, mining companies, not for profit agencies, environmental advocacy groups, academics, lawyers and researchers who had a sense of Ontario's public health structure and climate change and/or the mining industry. These participants were called upon to reflect the goals of the study and its application to an Ontario context.

3.2.2 Recruitment

Initially, the intention for this study was to focus on one specific group of individuals such as public health units or government in order to gain a deeper understanding of political factors involved with policy formation. Understanding that this may be a barrier to recruitment, I was open to recruiting additional participants such as not-for-profits and non-governmental organizations (NGO). By focusing on one group, I was hoping to gain a comprehensive understanding of one particular group, rather than a small sample size that may yield conflicting opinions.

I began recruitment by reaching out to my personal connections and then to public health units and health ministries across Ontario by circulating a recruitment email (see Appendix A). Quickly realizing that individuals or organizations did not feel a sense of urgency or ownership toward this topic, I expanded my recruitment scope. This encouraged me to contact multiple levels of government agencies within Ontario, not-for-profits, mining companies, health officials, lawyers and researchers who conduct their work in policy, climate change and/or the mining industry throughout Ontario. I also advertised the study poster on LinkedIn (see Appendix B). While engaging in recruitment, I frequently encountered instances where individuals responded not as individuals with a personal interest in the topic, but rather as a representative of their organization. Consequently, I strived to engage multiple individuals within the same organization

to gather diverse opinions and gain better understanding of the consistency or variations across their viewpoints. Participants were selected based on who appeared to have an understanding of climate change frameworks.

Once I began conducting conversation with individuals through phone or email, I utilized a snowball sampling technique by asking participants to share information about the study within their social networks at the end of our informal conversation or interview. Many responses offered information about other potential participants or organizations where recruitment could be shared, helping to widen my pool of potential interviewees.

An excel tracking sheet was utilized to record all people contacted and note further snowballed connections, dates of contact, follow up information, types of responses received and meeting information. The objective was to understand which groups or individuals were more likely to participate, leading to purposeful targeting in the future. When someone contacted me to express their interest in participating, they were sent a letter of information and consent form via e-mail to review the study processes and procedures (see Appendix D). Upon confirmation, interviews were scheduled with individuals who agreed to participate or further discuss the study prior to proceeding with an interview. Of 115 people, organizations and governing bodies directly contacted by cold call or email, 12 agreed to participate.

3.2.3 Data Collection

Interviews took place between December 2022 and March 2023. The length of the interviews spanned from 30 minutes to an hour and a half, with most interviews lasting roughly one hour. I arranged a date, time and platform to connect with the participant after they agreed to engage in the study. The letter of information outlined that participants had the option to meet online or over the phone. All participants choose to meet using Microsoft Teams or Zoom as a platform. One participant did request in-person; however, they were located roughly five and a half hours from my location and thus agreed to meet via Microsoft Teams. Participants had the option to have their interview both audio and/or visually recorded with all individuals agreeing to meet via camera.

Semi-structured interviews were conducted with stakeholders in order to solicit their views and allow them to express their opinions about climate change policies within public health and

mining industries. This method of data collection gave participants space to discuss their views and empower them to think of practical solutions to issues that are suppressed by political forces or outside barriers. Interviews began with general, introductory questions in order to collect information regarding their current and previous work history. I also collected information regarding participant's knowledge in health, climate change and mining industries. The interview then focused on participant's personal views on mining, climate change and health while gaining insights to their knowledge of policies and initiatives globally, and within the province. The remainder of the interview asked questions regarding barriers and solutions to implementing policies and approaches while seeking to understand a public health lens (see Appendix C). Once complete, all interviews were transcribed verbatim.

In line with a critical approach is the assumption that hegemonic interests have constructed prevailing accounts of reality, therefore there is a need to investigate these further for their social, political and economic agendas that may be served (Giacomini, 2010). The aim of this mode of data collection therefore was to identify causal mechanisms responsible for events, prompting examinations of truth, justice, facts and values acting as motivational forces in social institutions (Connelly, 2001; Yucel, 2018).

3.3 Ethics

This study was reviewed and received ethics clearance from the University of Waterloo Research Ethics Board (ORE #44683). Once ethics was obtained, I began to recruit participants and then schedule interviews. Prior to the interviews taking place, participants were encouraged to ask any questions they may have regarding the study or to discuss the consent form. Participants were informed that their identity would remain confidential throughout the study and tactics to conceal their identity were used as best as possible. I also explicitly asked some participants who were in more vulnerable roles to share how they could, by role, be referred to throughout the study. This may be meaningful for participants due to the controversial political nature of this topic, especially those working for organizations who may hold differing views toward the mining industry.

3.4 Participants

Twelve participants took part in this study. Among the participants, there were representatives from public health units across Ontario, government, not-for-profit and NGO representatives who worked as advocates for climate change and/or extractive industry initiatives, researchers and health professionals. All participants had extensive knowledge and experience in the areas of public health, climate change or extractive industries, or a combination of the three. Some participants assumed multiple roles and responsibilities within the context of this study. Participants worked in their respective role for a range of 2-40+ years, with many holding related positions previous to their current role. Most participants had over 15 years' experience in their field.

There were four NGO participants, five public health unit participants, one Government of Ontario employee and two participants who were employed by universities across Canada. Out of these participants, there were two directors, five managers, one consultant, medical health officer, associate professor, and health promoter.

Throughout this paper, the participants will be described by their general role and association type. For example, “a manager in a public health unit”. Due to the nature of this research and the participants' roles, I am unable to reveal further details. Participants will therefore also be described throughout the study as P1-P12, listed in no particular order.

3.5 Data Analysis

After conducting the interviews, I used otteri.ai software to transcribe each interview. I listened to the recordings and corrected the transcriptions before beginning the analysis. After transcribing each interview, I imported them into NVivo, a qualitative data analysis software, often used in qualitative research (Woods et al., 2016). I conducted an inductive thematic analysis utilizing the Braun and Clarke method. Themes were addressed based on identifying their level of importance to the interview questions while seeking meaning and patterns that emerged, after reading the text and developing categories based on what I read (Braun & Clarke, 2006; Gaber, 2020). Although difficult to set aside my own bias at times, themes were not driven by my theoretical perspectives but took shape as I moved through the data sets. Writing began in the first phase, while ideas and annotations continued to be noted through coding right until the end of the

analysis process. After initial themes were found, data sets were checked in relation to a mapping of the analysis (Braun & Clarke, 2006). The transcribed and coded interviews were shared with my supervisor to discuss initial findings and make further analytical assumptions. Once they were reviewed, codes were defined and named to appropriately tell the overall story of the data.

A final coding took place to identify any missed themes from earlier coding stages. Mapping of the themes allowed any additional themes emerging to be coded and added to the data. Specific examples were extracted in the second and third round of coding from interviews in order to add vivid description, while contributing to the final thesis report. As a person who believes mining is essential to our economy, I also feel the drastic overconsumption of the society we are living in. It was important for me to be open to differing opinions while seeking to understand and give voice to the participants of this study. I had to be mindful that my positionality did not overshadow the value that participants sought to explain, while recognizing the intersections of various social identities and power dynamics at play.

A critical realist lens was applied to the data by examining social, political and economic assumptions made by participants in the second and final analytical stages, seeking to understand power relations which may have informed what participants have or have not mentioned. Throughout this process, I utilized memoing to be attuned to my own biases by considering my positionality and outlook on climate action and the mining industry.

As the interviews took place, many participants spoke about legislation relevant to this topic which led to a documentary analysis of government reports and literature. Documentary analysis is commonly used and is an extremely powerful method in health policy research (Dalglish et al., 2021). It is a systematic procedure for reviewing documents to unpack knowledge contained within a document, providing insights into social phenomenon, and context to generate questions (Bowen, 2009; Dalglish et al., 2021). Throughout this research, qualitative documentary analysis was used alongside interviews and observations to allow for data triangulation and to provide scientific rigour to strengthen the findings, while providing a description of existing problems or opportunities (Cardno et al., 2017; Dorji et al., 2023; Wood et al., 2020). Climate change and mining policies, documents and news articles were identified from a search of government, NGO and news websites.

The findings for this thesis are organized in the following manner. First, I discuss the Ring of Fire as a case study, presenting an analysis of government positions through documentary

analysis and incorporating participant views. I then discuss claims against the Ring of Fire, exploring different perspectives. Next, I delve into the current role of government policy in climate change initiatives and mining, examining Canadian climate change and mining reports. Participant's views are shared on these topics. In the final research chapter, I explore the role of public health in climate change initiatives and mining while explaining the current involvement of public health. I present and discuss participant accounts related to this.

Chapter 4: Ring of Fire

Ontario is a province full of vast beauty and natural diversity. It is covered with luscious forests and waterways in Ontario's great north (see Figure 4-1), providing abundant shelter and rich resources for all whom utilize the surrounding area, from people to animals to microorganisms. Hidden within the earth's core, Ontario has been gifted with some of the world's most valuable natural resources such as nickel, cobalt, chromite, gold, copper, platinum, zinc and many others. These rich resources have allowed our communities and society to grow and change over a number of years, positioning Canada as one of the world's top mining destinations.

Figure 4-1:



Lez, G. (2017). Aerial photography of northern Ontario's Ring of Fire [Photograph]. Canada Geographic. <https://canadiangeographic.ca/articles/aerial-photography-of-northern-ontarios-ring-of-fire/>

The "Ring of Fire" (ROF) was first discovered in 2007 (see Appendix G) by Richard Nemis, a Sudbury born lawyer and promoter of the minerals exploration sector (Ross, 2019).

Joining in Nemis' discovery were also John Harvey, Donald Hoy, Neil Novak and Mac Watson (Ross, 2019). Its name came from Nemis' love for the famous singer, Johnny Cash. The location of Ring of Fire is approximately 500 kilometers north east of Thunder Bay, and covers roughly 5000 square kilometers in Ontario's north, with the potential to include resources such as chromite, cobalt, nickel, copper and platinum (Ministry of Mines, 2022). It is also home to North America's largest peatland, critical to not only Ontario, but the world's ability to store and capture carbon (see Figure 4-2). Peatlands play a significant role in storing carbon over other types of ecosystems. They hold large volumes of freshwater supporting rivers, lakes and other wetlands (Wildlife Conservation Society Canada, 2021). Although they only cover 3% of the earth's land surface, the North American peatlands comprise of 32% of the global coverage, with 25% of them located in Canada (Wildlife Conservation Society Canada, 2021). The Ring of Fire currently stores roughly 35 billion tons of carbon (Schlote, 2023). Peatlands are vital for slowing climate change as they remove carbon dioxide from the atmosphere and when displaced through wildfires, permafrost thaw or human disturbance (i.e. extraction), larger amounts of carbon get released in a shorter period of time, contributing to greenhouse gases (Wildlife Conservation Society Canada, 2021). According to one study, disturbing all the peatland within the Ring of Fire that is covered by mining claims could result in the release of approximately 130 to 250 megatons of carbon into the atmosphere (McIntosh, 2022). Peatlands recover at an alarmingly slow rate, growing a maximum of one millimetre per year (McIntosh, 2022), therefore, keeping this carbon in the ground will be pertinent to slowing climate change. In order to get to net zero emissions by 2050, a goal laid out by the Paris Agreement and agreed upon by Canada, Ontario's peatlands should remain intact so they may continue to serve their essential function of storing carbon within our atmosphere (Wildlife Conservation Society Canada, 2021).

Figure 4-2:



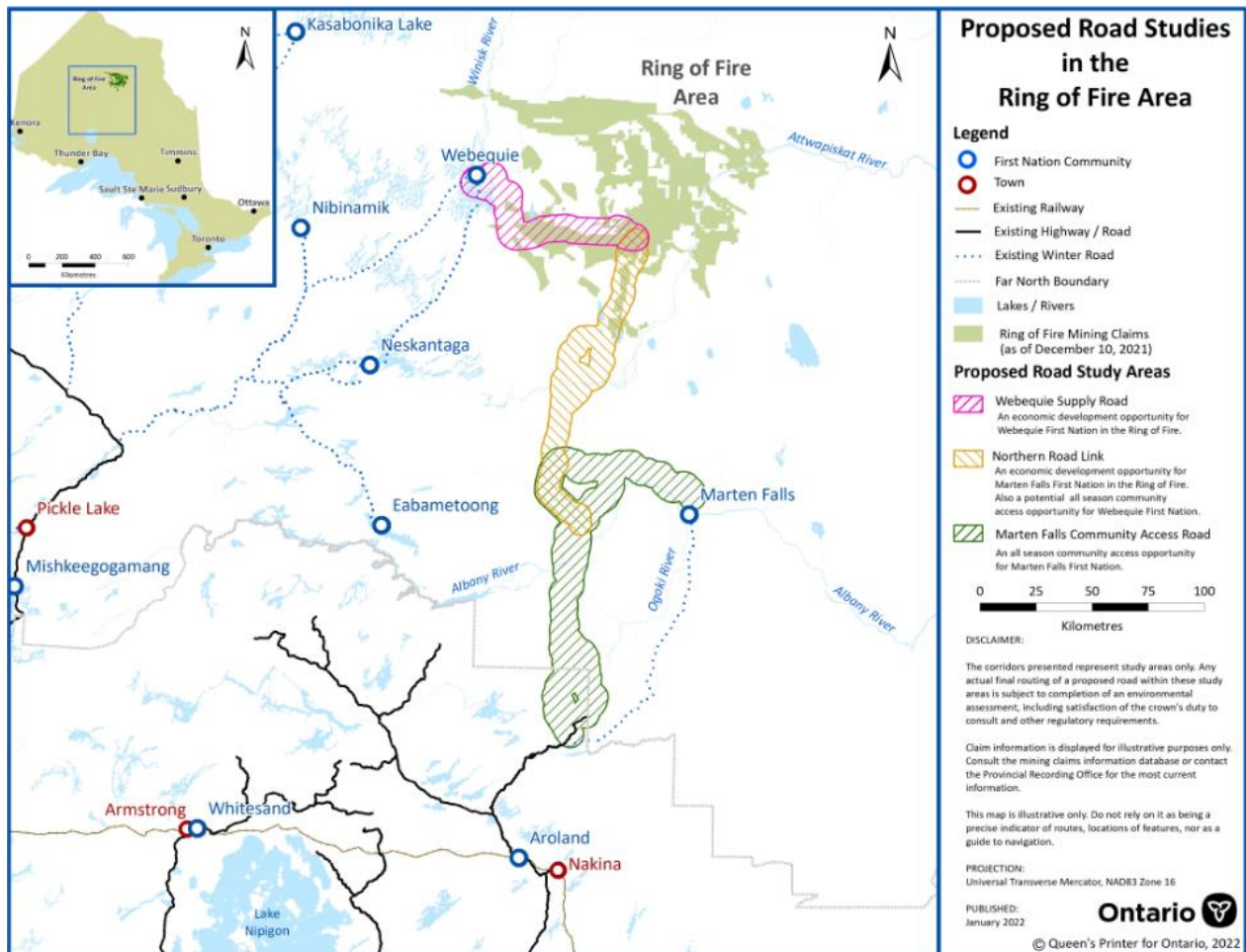
Lez, G. (2017). Aerial photography of northern Ontario's Ring of Fire [Photograph]. Canada Geographic. <https://canadiangeographic.ca/articles/aerial-photography-of-northern-ontarios-ring-of-fire/>

The Ring of Fire cite is currently owned by Wyloo Metals, an Australian mining company, purchased for over \$600-million in April of 2022 from Noront Resources, turning this public company to private hands as is it de-listed from the stock exchange (Turner, 2023b). The Ontario government has positioned the Ring of Fire as the primary mining development site that will pave the way for the province's transition to green technologies, with the production of electric vehicle (EV) generation, along with increasing solar and wind power. The Ring of Fire was named one of the most promising opportunities for critical minerals by the Government of Ontario, contributing to the economy by producing jobs, generating revenue, building infrastructure, and bringing prosperity to the north, including First Nation communities (Ministry of Mines, 2022). The Ring of Fire is positioned to be a major player in the climate change solution because of its role in the green energy transition.

To assist in this development, a northern road link is being proposed, allowing reliable transportation methods to the site through a two-lane, all-weather road (Turner, 2023a), a novel

introduction to this northern region. The landscape currently remains largely unscared, with limited ways to access neighbouring communities unless by ice road, boat or aircraft. With the quickly changing climate, ice roads will no longer be a reliable source for transporting vehicles and goods for the proposed mine (Bush & Lemmen, 2019; Sturm et al., 2017). The road proposal includes Marten Falls community access road and the Webequie supply road (see Figure 4-3) for approximately 450 kilometers through Ontario’s dense boreal forest and peatlands (Turner, 2023a).

Figure 4-3:



Ministry of Mines. (2022, February 7). Ontario’s Ring of Fire. Ontario’s Ring of Fire. <http://www.ontario.ca/page/ontarios-ring-fire> of Mines, 2022)

There are many stakeholders involved in and advocating both for and against the Ring of Fire such as lawyers, Indigenous communities, environmental agencies, activists and government. The discovery and potential development of the Ring of Fire has created substantial controversy with all involved as it demands an immense number of resources to be removed from the earth

(see Figure 4-4 & 4-5). The Ring of Fire has seemed to create a divide between the priorities of the government, communities including First Nations, grassroots organizations, and community members who hold high value to the environment. In reviewing literature and government documents, reports and news articles suggest that the government holds high value and promise to utilize these resources in a way that positively support the ‘green’ energy transition. It is viewed as a solution to the climate crisis and the way forward to transition to a ‘green’ economy. In addition, the Ring of Fire has proposed to create roughly 350 jobs directly on site, while the mine’s life operates for an estimated 11-20 years, with an additional 500 individuals required for the construction phase (Gamble, 2017).

Figure 4-4:



Lenz, G. (2015). *A mining exploration camp in the Ring of Fire, James Bay Lowlands, Northern Ontario Canada.* The Globe and Mail. <https://www.theglobeandmail.com/business/article-federal-funding-ontario-ring-of-fire/>

Figure 4-5:



(McIntosh, 2022) The now-closed De Beers Victor mine, located near Attawapiskat First Nation in the Far North of Ontario. Photo: De Beers

The findings from this research suggest that Ontario has a long way to go in order to reach conclusions on how to proceed with the Ring of Fire, if at all. The presence of conflicting perspectives during the progression of the Ring of Fire project and in line with participants from this research, has led to certain elements of the proposed site experiencing delays, as community input is deemed necessary. Nonetheless, the government is actively striving for sustainable solutions through the ‘green’ energy transition. These competing opinions have stirred up uncertainty and many questions by different groups and stakeholders, while the government of Ontario is positioning itself in a way that emulates urgency to develop the site. This next section will utilize government reports and news articles, and the few participants who voiced their opinion in favour of, or understanding the need for mining in regard to a climate solution.

4.1 Claims in Favour of Ring of Fire

The government positions the Ring of Fire as a climate change solution, framed as an opportunity for Ontario and First Nation’s communities to lead climate and green energy goals

(Turner, 2022b). In Spring 2022, the Ford government took a stance claiming to be the “number one manufacturer of electric battery-operated cars in North America” (Turner, 2022b). Participants understood the government’s stance whether viewed positive or negatively, and its connection to the mining industry. According to government reports and news articles, the government of Ontario sees this opportunity as a way to benefit society on multiple levels and contribute to the climate solutions. Based on current reports, the government does not suggest any gaps in current practice, although transparency was noted as an area for improvement in the future. A participant working as a director in one of the offices of the Government of Ontario, discussed the importance the extractive industry plays in mitigating the climate crisis, however also explained the need for further adaptations:

We understand the environmental footprint of the extractive industry, and also their role in solutions. And that's one that's been pumped up by the current government has been the role of extractive industries in the battery and electric vehicle supply chain, which has been a major push for our government to make the connection (P1).

The Canadian Critical Mineral Strategy has five core objectives (Government of Canada, 2022a). The goals are to do the following:

1. Support economic growth, competitiveness, and job creation
2. Promote climate action and environmental protection
3. Advance reconciliation with Indigenous peoples
4. Foster a diverse and inclusive workforce and community
5. Enhance global security and partnerships with allies

The Ontario government has taken positive steps through the Critical Minerals Strategy to advance the Canadian economy as well as help lay a foundation for Canada’s industrial transformation to a greener, more secure economy (Government of Canada, 2022a). They claim that investing in critical minerals will support emission-reducing supply chains addressing climate change working toward the zero-emission standard. In addition to the strategy, the government has also outlined their emissions performance standard, which industries are meant to follow in order to meet the urgency of greener solutions. The same participant discussed the emission standards and their role in contributing to the decline of GHG emissions over time. In addition to this, he discussed how

we are slowly seeing a transition toward greener investments – a step, he believed, was taken in the right direction:

We've got our critical minerals strategy, which is on the you know, on the solution side, the extractive industries are covered. Those big layers are covered by our emissions performance standards. So, they have annual emission requirements regulated that they have to meet on an annual basis which will be declining over time, out to 2030.

It [the mining industry] is an important economic engine, and there aren't great solutions for reducing emissions. We're in this transitional period in many industries, where it's still much cheaper to go ahead and use fossil fuels and develop resources, you know, in the old way, the new ways and in more efficient ways, cost more money, and aren't as well understood and carry potentially some risks. And so, there's reluctance to take these new processes up. I think we're seeing signs of change in that the financial backers of many of these operations are looking for, to invest in new and greener solutions. But, it's not nearly at the scale and pace that it needs to be. The governments are reluctant to regulate industry too hard. We've pushed a fair bit with our emissions performance standard, and that's been driven, in large part by the Federal Government's carbon pricing program. We were at it with our cap-and-trade program, we're headed that way. But then the current government rolled things back. So, it's this combination of cost, technology, availability, courage of government, you know, the willingness to push back. And I think the overall global landscape is significant there as well, if we're competing against trading partners who aren't subject to the same rules, then their costs can be cheaper. And in most cases, these commodities are internationally traded -- the cheapest price wins, right? (P1)

This quote exemplifies how impactful cost is to the government of Ontario and how this may influence global trade. Although the Ring of Fire is located in Canada, it is no longer a Canadian owned company. Global businesses and partnerships cross international boundaries, creating difficulty in clear and consistent rules, as outlined by this participant. As Canadian companies expand their operations globally and foreign countries enter the Canadian market, the potential cost of certain mines becomes evident in terms of hindering environmentally sustainable methods of production for the end product. As the participant noted, without a government that is willing to push back and implicate the necessity behind higher environmental protectors, there is more opportunity for companies abroad to essentially outbid and provide a service for a fraction of the cost, with potentially more harm to the climate and population.

This rhetoric appears to be in line with how the current government is positioning themselves within our economy. The government stance appears to be one providing more economic freedom and value for the country. The Canadian Minerals and Metals Plan supports this viewpoint as being competitive, sustainable and responsible, while benefiting all Canadians (Natural Resources Canada, 2022). Interestingly, Ontario and Saskatchewan chose not to be signatories to the plan at its release however, government officials from each province are continuing to work collaboratively to drive progress for the mining industry (Natural Resources Canada, 2022).

With the Ring of Fire seen as a substantial economic opportunity for Canada, there is a push to develop the site as quickly as possible. The Federal Government has expressed its commitment to the EV value chain and requiring more investment in order to be a leader of technology manufacturing, otherwise falling behind the United States and Europe (Gratton, 2023). Pierre Gratton (2023), President and CEO of the Mining Association of Canada (MAC) quotes: “we need many more Canadian mines, smelters and refineries to feed the needs of battery plants and the EV value chain”. Understandably, with an industry this large, Canada could be threatened by international companies ‘beating them’ in the race to produce some of the largest EV supply chains, as two participants mentioned. Even with the government having strategic plans in place, there is this competing tension to be able to produce as quickly and efficiently as possible while trying to meet the needs of climate concerns. When this participant was asked why the government may be reluctant to regulate the mining industry, his response consistently revolved around the influence of cost:

They [the government] don't want to impose costs, they don't want to lose jobs. So, it's that old tension, you regulate, it costs money, we're gonna move somewhere else, or we're gonna have to do business somewhere else. So you've got to see these standards coming up, all around the world. You also need an acknowledgement in the market of the importance of where your minerals come from, and how they were produced. And that's starting to come. So we're seeing many of the major multinationals really more interested in their supply chains and the environmental footprint of those supply chains, because that's a potential market edge for them. And automotive, I think, is the one is a big one where we've seen interest in, of course, electrification, and batteries or the minerals coming from ethically sourced, lower carbon sourced places. So that whole supply chain can be greened up. So then - when they start looking at the supply chain further

to the resources in the minerals that are extracted and how, what their footprint is I think they will start to look at that (P1).

This quote exemplified how the government is beginning to green industrial sectors, while mitigating tensions between opposing viewpoints. Greening the industry is a major platform for the government and will be required in order to meet emissions standards. In addition to creating a marketable edge for companies, it will also lead to the creation of jobs. In Canada's 2021 Nationally Determined Contribution Under the Paris Agreement, it was discussed how funding will be increased for Indigenous protected and conserved areas while also protecting biodiversity, fighting climate change and protecting and creating jobs (United Nations Framework Convention on Climate Change, 2021). A news release by Ontario's Environment, Conservation and Parks noted the site construction alone requiring 900 plus workers, with an operating workforce estimated at 375 people which will bring economic growth to the region and jobs to the community (Environment, Conservation and Parks, 2022).

Finally, many news reports published within the last few years also discuss how developing the Ring of Fire will be seen as 'a chance of a lifetime' for Indigenous communities. A news release from Environment, Conservation and Parks (2022) in Ontario states that nearby communities to the proposed Ring of Fire such as Biigtigong Nishaabeg, located less than 10 kilometers from the project, have been heavily involved and are supportive, provided that all adverse environmental effects to the community are appropriately mitigated. In addition, CBC News' Mike Crawley wrote how the Ford government positioned itself to speed up mining permits in Ontario, with Minister George Pirie stating "there will be no change to the stringent environmental process that we have – the duty to consult [with Indigenous communities] will not be changed. None of that's being affected" (Crawley, 2023).

There is no doubt that a project of this scale would bring economic prosperity and jobs to the surrounding communities however, there is significant concern with how Ontario is taking a stance on the urgent race to climate action. Even with current initiatives and goals of both the Federal and Provincial Governments, findings from this research suggest that the negative aspects of going ahead with a project of this scale to be more problematic. This next section will outline the findings describing immense concern regarding not only the Ring of Fire project, but how mining notably contributes to opposing government viewpoints of climate change action and goals.

4.2 Claims Against Ring of Fire

Although the government is focusing on decreasing vehicle emissions, most participants noted this as problematic and causing more harm than good to the environment due to the push for EVs to be built. Most participants discussed how the mining industry contributes to environmental degradation and how this negatively impacts climate change action. The health of the population was discussed by participants and how further environmental degradation has negative health ramifications, events that were mentioned in relation to previous catastrophic instances.

Canada's 2021 Nationally Determined Contribution Under the Paris Agreement from the UNFCCC (2021) notes that the Government of Canada will commit millions of dollars in investments for zero-emissions vehicles along with further investment in active transportation in order to meet net-zero by 2050. However, the same report noted they will embrace the power of nature to support healthier families and more resilient communities (United Nations Framework Convention on Climate Change, 2021). The Government of Canada comments they will "invest more than \$3 billion over 10 years to plant two billion trees" and "invest \$631 million to restore and enhance wetlands, peatlands, grasslands and agricultural lands, as well as improve land management practices, and conserve carbon-rich ecosystems" (UNFCCC, 2021, p.6). The contradictory statements appear to align with participants' perceptions of the government's priorities and commitments, as they struggle to establish a direct link between environmental degradation and the pursuit of climate action, despite recognizing advantages associated with mining activities. One participant took it upon herself within her lifelong work to understand the value that peat brings to sequestering carbon. Now, a retired consultant with years of experience, working with mining affected communities and local economists, discussed how peat seemed to be worth more than the minerals being extracted themselves from previous mine sites in northern Ontario:

In 2017, the peat was worth over \$4000 a hectare in terms of carbon sequestration and carbon storage because it stores old carbon as well as sequestering new carbon every year. And the value of the peat was four times more than the value of the gold taken out from that area and the gold was also being stolen from First Nations, frankly. Because as we lose peat, you – you can't reclaim a river or an area where the peat has been destroyed because it takes thousands of years to build up enough peat to sequester to store that much carbon. So, you might end up with a pond or a river or something there afterwards, but it isn't going to be storing carbon. So, it's something like the Ring of Fire becomes very, very serious.

The loss of the biodiversity that goes with the loss of these ecosystem services is incredible. So that kind of thing really matters. Not to mention the impacts on people's health from when their livelihoods are taken away (P2).

These concerns arise from significant problems, including the depletion of peatlands, escalating climate-related concerns, the erosion or reduction of Indigenous rights, and public health issues. The substantial loss of peat is crucial and holds great importance for numerous participants. A recurring theme that emerged from this research was the link between peat loss and subsequent loss of biodiversity, which could have a significant impact on climate change due to the depletion of carbon sinks. According to participants, if we remove peat and other pertinent key environmental determinants of climate change, the increased emissions would likely far surpass the goals Ontario has set out for the energy transition. Worldwide, peatlands store three times as much carbon as boreal and tropical forests combined with the Hudson Bay Lowlands, which provide one-tenth of the cooling effects of the world's peatlands, sequestering more than 12 megatons of carbon dioxide each year (Gamble, 2017). The peatlands are the world's cooling mechanism and without these, we are likely to see significant increases in heat at a much quicker rate. Not only does this pose significant threats to the climate, but also the immediate health of surrounding communities. As found in the above quote, not only will the concern for climate change be exacerbated with the removal of carbon storage, but people's health, especially Indigenous health, could be severely impacted by the loss of livelihoods and country foods such as fish, moose and other game.

A director within the Government of Ontario was not opposed to extraction in its entirety while seeing the value it has, but had proposed another lens on how this could potentially occur in the future. There were other participants who shared similar viewpoints, hinting that the 'green' energy transition may not be so green after all:

Obviously mining has a footprint, and it depends what you're mining. But those industries produce greenhouse gas emissions, and they also influence the landscape as well. So, I think, you know, there's concern about the impact on the peatlands and Northern Ontario if we do open up Ring of Fire, and also the development of those transportation corridors and their impacts on the natural environment and what that will do to the health of the other peatlands and associated greenhouse gas, methane emissions in particular, but so there's concerns about disruption about both sensitive ecosystems. Mining operations use a lot of fossil fuels, they use diesel, primarily in remote locations for generation of electricity to

support their operations. There's trucking and rail and transportation associated large quantities of the material, those all have an impact on greenhouse gas emission profiles, and then the processing, you know, which is more energy intensive, the crushing and smelting and eventual transformation industries into usable product. So those all have global impacts. So, there's no doubt that those are significant. It's a significant industry with a significant environmental footprint and significant impact on greenhouse gas emissions. So yeah, and I mentioned the flip side of it as well, which is that, you know, a lot of those minerals and materials are going to be needed to develop the products that are going to be part of the solutions to climate change (P1).

As this participant indicated, while mining plays a role in the green energy transition, it also has negative impact on our climate and ecosystems. Some mineral mines in Ontario have in fact begun to transition to 'greener' mines by utilizing electrification in their equipment such as the Borden mine, located northeast of Chapleau, Ontario. By electrifying their machines, it is said this process creates a more operationally efficient mine while improving health and safety performance and reducing its environmental footprint (The Mining Association of Canada, 2021). In addition, MAC said this will eliminate all GHG emissions associated with movement of ore and waste rock, which contributes to about 50% of the total GHG emissions on site, an equivalent of 5,000 tonnes of CO₂ per year (The Mining Association of Canada, 2021). Even with this transition to fully electric mines, there still will be major emissions from diesel to support electricity in the mine itself, as noted by one participant working in a public health unit. In addition, ecosystems will be destroyed to mine the materials needed for the transition which house the most crucial ability for our planet to reduce carbon that is currently in the atmosphere, which was a concern raised by the participants in this study. The impact that the changing climate, environmental degradation and ecosystem loss may have on the health of the population is tremendous, according to many participants in this research.

Moreover, some participants suggested that not only does the mining industry have large implications for climate change and health, but Ontario does not appear to have the infrastructure to support the transition to green energy the government is attempting to make. For example, a manager from an NGO organization with over 23 years in his field, commented:

Ontario actually doesn't have enough transmission capacity along the 401 to increase the EV charging stations by more than about half. So I think they've got eight charging stations at each of those pit stops along the 401. And there's not enough electricity there to go above 20. This is fast-

charging stations. So again, just sort of illustrates the that there is a significant demand being created, that has other implications (P3).

One of the main concerns that participants of this study shared during the research was the destruction of land through mining and how this contributes to the climate crisis. When participants spoke about the Ring of Fire, it was mentioned how climate change and mining are intrinsically related. A Project Manager with over 4 year's experience in this current role, from northern Ontario showed concern for the impact that mining has on the landscape and how many of these sites get to the point of no return:

I have nothing good to say about our Premier's decisions regarding the far north, and the boreal shield being torn apart for the Ring of Fire. So, I think that for me, Kirkland Lake is an example. And it's continuing on to make more developments and more developments. But I think that there is a point of no return. And that if the Webequie supply road does go forward, which I'm sure it will, in 10 years time, there will be a direct pathway to the north, and we'll end up in a situation that's currently happening to northern Alberta right now (P4).

Comparing the situation in Ontario to northern Alberta, P4 spoke about how the oil and gas industry in northern Alberta has impacted the land so drastically that they have begun to experience earthquakes, which were never a previous concern. She discussed how the muskeg was taken, trees were stripped and laid out in 'little matchstick piles' with a two-mile reclamation area and deemed as 'good enough'. This led to an increase of worrying about the future of Ontario if the proposal were to go ahead for the Ring of Fire. Participants also noted how some of the smaller towns in northern Ontario would not exist without mining taking place. Although they are prosperous for economic development, the towns seem to experience a 'boom and bust' type of cycle as mines come and go. This has been noted as potentially problematic by participants as the development is implicated in other health concerns such as an increase in substance abuse, and many diseases such as cancers and cardiovascular issues, potentially related to the increased usage of smelters causing higher rates of air pollution. A Director in the Government of Ontario discussed the connection between health impacts gaining traction for change:

And, you know, nothing generates public outrage like health issues, as we've seen, and attention. So, if the extractive industries are found to be having an impact on health, then, you know, boy, that creates political attention and media attention. And I mean, you look at Grassy Narrows - that's related to pulp and paper, but, you know, the mercury contamination up there. And that's just been ongoing. For years. But it's been the last few

years that it's had even more public attention, even though it's from the 1970's. So, there's, there's definitely a connection there. But it does seem to be like an indirect one to me at the moment. It's like, health issues get identified. They get publicized, and then that puts pressure on the government to regulate and to do something about it. So, I don't know, maybe we should be working more closely with this (P1).

This participant was not the only one to identify the relationship between public health and the mining industry in Ontario and the potential role of bringing health assessments to the forefront within extractive work. There appears to be a trend within industries where plans move ahead with little regard for the impact on people's health. This led to further discussions with multiple participants regarding where health *could* or *should* be situated within mining projects. Findings from this research exemplify how putting health at the forefront may reduce the number of health-related deaths and illness that accompany mining industries. Furthermore, participants observed that by taking health impacts into account from the outset of a project, there is a potential for both the improvement and reduction of health issues following its implementation. Participants discussed how climate change contributes to negative health outcomes, therefore the connection with health may be a key proponent in avoiding further adverse implications from industry related matters.

Although the Ring of Fire may very well increase income and employment opportunities for Ontarians, the Sustainable Development Goals Report from 2022 explicitly states that: "Unsustainable patterns of production and consumption are the root cause of climate change, biodiversity loss and pollution. Our reliance on natural resources is increasing, rising over 65% globally from 2000-2019" (United Nations, 2022a). The SDGs discuss how an increased dependence on natural resources impacts human health and the economy, and we need to increase our resource efficiency and regulatory measures and efforts to dematerialize economic growth while reducing our usage (United Nations, 2022a). The outlook portrayed by the United Nations is seemingly in line with how participants view resource extraction, in particular related to the Ring of Fire. The frustration was felt from this Project Manager who lives and works in northern Ontario. You could feel her passion when discussing the negative implications that mining has on *her* communities.

It just really frustrates me because I know that it's a finite thing. Like after the Ring of Fire. There'll be other sites, it just continues on until there's

nothing left. And then what do we have to show for it? A legacy of just tearing apart the far north (P4).

The view this participant takes appears to be directly in line with the vision of planetary health – “a solutions-focused, transdisciplinary field and social movement focused on analyzing and addressing the impacts of human disruptions to Earth’s natural systems on human health and all life on Earth” (Planetary Health Alliance, 2023).

Participants frequently voiced their frustrations regarding society’s excessive reliance on natural resources to sustain the lifestyle we have cultivated. One participant, a director of an NGO in Ontario, working within a climate crisis-focused organization for over 20 years, expressed apprehension about the implications of developing the Ring of Fire in relation to climate change and the ongoing energy transition.

Ontario's put a lot of emphasis on the Ring of Fire, but it requires a massive road to be built. That would cost probably close to \$3 billion. And that would be borne by the taxpayers. And that doesn't take into account the cost to the peat and the carbon and then the cost to the people, the Indigenous peoples and then the cost to the biodiversity. And so why would we want to spend so much money on an industrial road, to access some nickel and maybe some cobalt when we can get nickel and cobalt and other places in brownfield that already exist? Because from what I can see, everything is critical from their perspective. Like Canada seems to have kitchen sink their list, right? Whereas I think we need to have a bit of a differentiation process and say 'OK, what do we really want to specialize in, in Canada? Where can we do it with the least amount of impacts and the best benefit to Canadians, to Indigenous peoples, the least impact to our environment?' We need to have a bit of a more of a discussion on that because right now it just seems a little bit too amorphous and anybody can say 'electric vehicle batteries' and try and justify any mine anywhere (P5).

Numerous participants, as exemplified in the aforementioned quote, discuss how the government has situated itself to be a powerhouse in the role of EV generation. Through these discussions emerged strong sentiments of distrust and perceived dishonesty towards the government, resulting in a tendency for the government to justify its actions without due consideration for broader health and climate implications.

However, there appears to be different ways to access resources without further disturbing the landscape. Brownfield areas were described by P5 as areas that had already been disturbed by previous extractive industries or human intervention. They may be contaminated, have roads built throughout or had been subjected to mining activity where there would be excessive dust and

quarry pits. In contrast, greenfield areas refer to undisturbed pieces of land that remain unaltered, encompassing intact watersheds and forests. Although the industry positions itself as delivering solutions, most participants felt that it was doing the opposite:

Right now, the mining industry is trying to position itself to be a deliverer of solutions, especially as related to the green economy transition. So, in terms of these metals and minerals that we're going to need to transition to a cleaner economy, they're currently positioning themselves to be an essential solution to that by saying you need us to do more mining to get us out of climate change. You can't mine yourself out of climate change. You can't do that (P5).

The role that mining plays in exacerbating or reducing climate change seems to be contradictory. This director(P5) notes how mining could not be an essential solution to climate change because of the negative implications mining development will have. P4, a project manager in an NGO in northern Ontario, further sheds light on the potential adverse health consequences that could arise from mining activities:

There are health impacts that are implicated in those things even like hyperactivity disorder, attention deficit disorder, other types of health issues that kind of converge. So, I mean, I'm not a doctor, I'm not going to just say, 'Oh, what's causing everything', but I just think that when we pollute our environment, we pollute ourselves. And that's not good (P4).

Exemplified through this quote is how the relationship between environmental destruction and health are intrinsically related. P4 notes the relationship to health impacts, whereas literature discusses how lead is a factor in mining operations and smelters, which has been associated with Attention-Deficit/Hyperactivity Disorder, linking severe toxicological impact to ecosystem and human health (da Silva-Rêgo et al., 2022; Donzelli et al., 2019). We can not talk about climate change without talking about health. The connection this has with the mining industry is undeniable as mining is inherently a destructive activity and one, as underlined by participants, that is required to be revamped to include a health lens.

4.3 Summary

This chapter examined the interplay between mining, public health and the Ring of Fire, a controversial development in northern Ontario. It has outlined findings both in favour of and against moving ahead with the Ring of Fire. Participants shed light on the positive and negative

outcomes of moving ahead with the proposal, which exemplify how complicated a topic this truly is. There are competing views and benefits with regard to economic prosperity and environmental degradation outweighing the benefit to one another. The government of Ontario has positioned itself in favour of moving ahead with the proposal, but not without raising some serious red flags from environmentalists, public health professionals and those living in the north. In addition to the climate and health concerns raised from participants, it appears that Ontario faces further challenges in terms of the existing infrastructure's capacity to support the government's desired transition and pace. It is clear that public health, industry and government should look at new ways to collaborate in order to meet the high demand on both ends, while coming to a shared understanding of citizen concerns. As we attempt to untangle this web of uncertainty and potential calamity, it will be crucial to gain insights into global and domestic efforts concerning current policies and guidelines related to climate change and mining. This next chapter will examine the climate change and mining objectives set by the government, as well as the government's approach to addressing the ongoing concerns raised by participants. In addition, it will outline existing reports that explore strategies to achieve climate change goals and details the government's proposed actions as documented in relevant policy materials.

Chapter 5: Role of Government Policy in Climate Initiatives and Mining

Globally, there are agreements, goals, policies and frameworks which have been adopted by a number of countries, aiming to increase climate action. These policies have a shared goal of decreasing climate change related concerns. This next chapter will briefly touch on some of these policies and discuss how they are contributing to climate action. It will describe how climate change goals and policies are positioned within Canada and Ontario, in relation to the mining industry and population health. This will be addressed by critically examining and understanding the position of the government policy, then diving into how participants of this study presented their views on current perceived government action.

5.1 Canadian Climate Reports

Climate change was not necessarily at the forefront of the agenda of many politicians in Canada until roughly 2018. At that point, climate change rhetoric and concerns became louder and strategies throughout the country started to appear, as we can see from the number of reports established at this time. There are reports within Canada that describe different aspects and goals of climate change for the country. All of these contribute to how the government is addressing climate concern, which help to moderate industry or put stipulations on negative impact to the environment and climate such as how GHGs are emitted. The Healthy Environments and Climate Change Guidelines assists boards of health in developing approaches that promote healthy built and natural environments, to enhance population health and mitigate environmental health risk (Ministry of Health and Long-Term Care, 2018). Within this guideline, boards of health monitor impacts of climate change within their jurisdiction and use indicators such as the number of heat and cold alerts, smog air health advisories, extreme weather events requiring public health intervention and the number of climate change adaption measures implemented (Ministry of Health and Long-Term Care, 2018). This guideline clearly lays out how approaches to healthy environments and climate change are to be adapted to meet standards for population health assessment, healthy environments and climate change. The Healthy Environment strategies put focus on living standards such as housing conditions, temperature control in rental housing, and restrictions on wood burning stoves, with a goal to improve health outcomes and address impacts of the social determinants of health (Ministry of Health and Long-Term Care, 2018). The climate change adaption portion of this guideline links to the Ontario Climate Change and Health Toolkit

from 2016 in order to assess health vulnerability status of communities through rising temperatures, vector-borne illness, food and waterborne illness, forest fires, and air pollution (Ministry of Health and Long-Term Care, 2018). In addition, the environmental exposure section outlines how health boards shall consider planning and implementing public awareness to address environmental exposures of impacts such as solar ultraviolet radiation, radon and other region-specific environmental exposures (Ministry of Health and Long-Term Care, 2018). These guidelines appear to be a starting point for how the government plans to address concerns raised within communities.

Prior to the COVID-19 pandemic, the government of Canada released a report titled “Causes of Climate Change”. It discussed how human activity is the main cause of climate change due to people burning fossil fuels and converting land from forests to agriculture (Environment and Climate Change Canada, 2019). The report delineates further human-induced factors and clarifies our role in shaping the changing climate through alterations to the Earth’s surface and the release of diverse substances into the atmosphere, resulting in a combination of warming and cooling effects (Environment and Climate Change Canada, 2019). Finally, the report states that “global warming can only be stopped by reducing global emissions of carbon dioxide from human fossil fuel combustion and industrial processes to zero, but even with zero emissions, the global temperature will remain essentially constant at its new warmer level” (Environment and Climate Change Canada, 2019). This report has essentially laid the ground for how difficult the topic of climate change is, and by reducing our emissions to net zero now, we are still at risk for remaining at the new, warmer limit of 1.5°C, which may continue to pose health threats to the population through adverse climactic events such as increased wildfires, droughts, and melting and thawing of permafrost. These climate concerns led the government to create supplementary goals to reduce impact on climate change.

In 2021, the Environment and Climate Change Canada division of the government announced recommendations to assist with meeting climate change goals. Plans outlined were to plant two billion trees and to better manage, conserve and restore natural spaces in order to help cut pollution, clean the air, and create thousands of jobs (Environment and Climate Change Canada, 2021a). This report builds on the Pan-Canadian Framework on Clean Growth and Climate Change, which was announced in 2016 as Canada’s first-ever national climate plan (Environment and Climate Change Canada, 2021a). Part of this new report discusses how the shift to zero-

emission vehicles are expected to benefit urban and other traffic-heavy areas in the short term, while also lowering GHG emissions, “benefiting everyone” in the medium to long-term (Environment and Climate Change Canada, 2021a). Initially, the Pan-Canadian Framework on Clean Growth and Climate Change discussed how climate change is negatively impacting our society and how it alone could cost Canada \$21-43 billion per year, by 2050, if no action is taken (Environment and Climate Change Canada, 2016). Some solutions which have taken place to date, in part due to this framework, include Ontario becoming the first jurisdiction in North America to phase out coal as a source of electricity, and Ontario implementing a carbon trade system versus other provinces within Canada that have additional taxes on carbon (Environment and Climate Change Canada, 2016). There were some further pieces to this framework which discuss how agriculture and extraction of forestry resources account for about 10% of Canada’s emissions in 2014, and emissions and removal from carbon sinks can fluctuate with natural disturbances (i.e. forest fires), but further actions to increase carbon storage and reducing emissions could be taken (Environment and Climate Change Canada, 2016). Furthermore, this framework clearly identifies the role that carbon sinks play in maintaining the health of our environment. The report notes that “forests, wetlands, and agricultural lands across Canada will play an important natural role in a low-carbon economy by absorbing and storing atmospheric carbon” (Environment and Climate Change Canada, 2016, p.22). The framework outlines:

“Forests, wetlands, and agricultural lands can be enhanced as ‘carbon sinks’ through actions such as planting more trees, improving forest carbon management practices, minimizing losses from fires and invasive species, restoring forests that have been affected by natural disturbances, and increasing adoption of land management practices like increasing perennial and permanent cover crops and zero-till farming. Protecting and restoring natural areas, including wetlands, can also benefit biodiversity and maintain or enhance carbon storage” (Environment and Climate Change Canada, 2016, p.22).

Both of these excerpts from the Pan-Canadian report identify the crucial role that protecting and restoring natural areas play in reducing climate impact. From these quotes, we can see how the government puts emphasis and importance on increasing reduction strategies while protecting precious land and contributing to the growth and restoration of carbon sinks within Canada.

The government has proposed the use of impact assessments as a protector to reduce climate impact. The province of Ontario released a climate change impact assessment in 2020,

with the expectation that it would assist the province, municipalities, Indigenous communities, and local partners in making well-informed decisions regarding planning and infrastructure development, thereby ensuring the safety and well-being of communities (Environment, Conservation and Parks, 2020). The Climate Risk Institute took part by conducting climate change impact assessments and reviewing climate data, land use patterns and socio-economic projections helping to combat climate change and reduce GHG emissions (Environment, Conservation and Parks, 2020). Ontario's provincial climate change impact assessment claims it will:

“Evaluate climate change impacts at a provincial scale, as well as focus analysis at a regional scale that takes into account the unique geographies, economies, municipalities and communities of those regions. The assessment will also examine the impacts on a number of key themes, including infrastructure, food and agriculture, people and communities, natural resources, ecosystems and the environment, and business and the economy. The assessment will ensure that municipalities have access to the most up-to-date information about the regional impacts their communities will be facing, now and into the future. Ontario has also finalized an emissions performance standards program for large, industrial emitters to ensure polluters are accountable for their greenhouse gas emissions and proposed to begin transition to higher renewable content in gasoline in the coming years, without increasing prices at the pump. Ontario has played an important role in fighting climate change and has already shown strong leadership by taking steps to significantly reduce its greenhouse gas emissions since 2005. Almost all of Canada's progress towards its 2030 Paris Agreement target has been driven by Ontario” (Environment, Conservation and Parks, 2020).

This quote identifies how the government in Ontario is thoughtfully working with partners across the scientific community to ensure that communities are kept up to date about key health and environmental impacts created by climate change. In addition, Ontario is illustrated to be a leader in reducing GHG emissions and on track to meet the goals of the Paris Agreement. This IA clearly indicates its role in a multi-sectoral approach, in line with policies and frameworks outlined in this paper so far.

Along with the climate change impact assessment, Ontario prides itself in its thorough EIA process. Ontario's Environmental Assessment Act (EAA) was first created in 1990. The purpose of this act is for “the betterment of the people of the whole or any part of Ontario by providing the protection, conservation and wise management in Ontario of the environment” (Government of Ontario, 1990). The Act is forthcoming in describing that nothing shall step in the way to abolish

or insult the existing “*Aboriginal and treaty rights of the Aboriginal peoples of Canada as recognized and affirmed in section 35 of the Constitution Act, 1982*” (Government of Ontario, 1990). As of May 1st, 2018, the EAA was renewed, with the Act defining that planning and decision-making processes are updated so that potential environmental effects are considered prior to the start of a project, which applies to provincial ministries and agencies, municipalities, and public bodies such as conservation authorities with projects including public roads and highways (Ministry of the Environment, Conservation and Parks, 2017b). Exceptions are however made to the private sector where the Environmental Assessment process generally does not apply, but private firms are required by a regulation or may voluntarily go through an environmental assessment process (Ministry of the Environment, Conservation and Parks, 2017b). At this point, the Minister can either decide to exempt a project or set out requirements that must be met.

A newly assessed and modernized environmental assessment process in Ontario was established in 2022, stating that “*governments and public bodies consider potential environmental effects before an infrastructure project begins*” (Ministry of the Environment, Conservation and Parks, 2017a). However, the refurbishment of the Act proposed changes that allow for focusing on high-impact projects, cutting the average review time in half for larger enterprise, granting infrastructure activities to move forward more quickly (Ministry of the Environment, Conservation and Parks, 2017a). This cutback was also described as a way to reduce administrative burden, which places power in public agencies rather than affected communities (Harris et al., 2015). The Act goes further in depth by explaining the rehabilitation process of disturbed land through mining activities where the Ministry of Northern Development and Mines states they ensure there are no delays in rehabilitating sites where there is the possibility of hazardous contaminants being discharged into the environment or causing threat to personal or public safety (Ministry of Environment, Conservation and Parks, 2021). Within this Act are variations of what may or may not be included under this process.

The reports listed above are only some of the main actions the government has taken to combat climate change. The frameworks and regulations outlined thus far, exemplify how the government has begun to be a climate leader, especially within Ontario. In addition to signing the Paris Agreement, the Federal Government have put measures in place to reduce GHG emissions and have started to look at specific industries that have a larger impact on climate related activity. Both the Federal and Provincial Government has looked to the mining industry to be a supporter

of green technology, helping to aid the energy transition to a cleaner and greener economy. Ontario's mineral strategies are an example of how the government seeks to further address climate change through the exploration and production of minerals and metals.

5.2 Canadian Mining

5.2.1 Government Perspective

Canada's mining sector is an important job creator and a significant economic contributor. The Mining Association of Canada (MAC) is the voice of the Canadian mining industry and seeks to generate awareness and impact of reclamation and partnerships from mineral exploration, to mining, smelting, refining and semi-fabrication (The Mining Association of Canada, 2023a). The sector directly employs over 377,000 people, with an additional 315,000 indirectly, across the country in mineral extraction, smelting, and fabrication, and is the largest employer of Indigenous people, providing over 16,500 jobs (The Mining Association of Canada, 2023a). Within Canada, there is the Canadian Minerals and Metals Plan, governed by the Canadian regulatory system at the federal level, which describes in depth how mines within the country operate. There is a vision of this plan in which Canada commits to a continual reduction of mining's footprint, a circular economy where mine waste is transformed into useful products and where environmental liability is reduced and sites are planned to be environmentally reclaimed, all resulting in protection of Canada's natural environment in a responsible, yet still competitive industry (Natural Resources Canada, 2022). While climate change is addressed within this plan, its focus is primarily on the mine site's adaptation to existing climate issues rather than its contribution to climate change concerns. It explains how mines need to adapt and strategies such as environmental assessments require analysis to ensure, for instance, that permafrost conditions have been properly considered in the lifespan of the mine.

More recently the Federal Government developed the Canadian Critical Minerals Strategy. It lists five core objectives to their strategy, with one to promote climate action and environmental protection (Government of Canada, 2022a). This second objective to their strategy provides guidance on how they will help to meet climate change goals within the country and their approach to doing so:

“Recognizing that sustainable critical mineral development is indivisible from our net-zero objectives, Canada wants to advance ‘nature forward’

approaches, which seek to incorporate practices that prevent biodiversity loss, protect species at risk and support nature protection” (Government of Canada, 2022a).

The government is not bewildered by the fact that mining creates a footprint and contributes to some of the devastating impacts of climate change. By noting this, they appear to be incorporating accountability into their actions and addressing environmental concerns that go along with the industry. Objective two also notes the role industry has in nature and biodiversity-related commitments so as they are upheld by limiting their environmental footprint of mining activities in their environmental, social and governance (ESG) standards, including conservation and reclamation practices preventing the loss of biodiversity (Government of Canada, 2022a). In addition, through the reports, it is described how government plans to reduce emissions through deployment of green technologies and low-emission industrial processes, in line with Canada’s Emissions Reduction Plan (Government of Canada, 2022a). Finally, they discuss their waste reduction strategy and how Indigenous Knowledge is respectfully incorporated into considerations for sustainable, critical mineral development (Government of Canada, 2022a).

In the Canadian Critical Minerals Strategy, it is explained how the government recognizes that while mining responsibly is vital, complex regulation within this industry may hinder its economic competitiveness and increase investment risk for proponents (Government of Canada, 2022a). With this in mind, the Federal Government remains committed to sustainable economic development and environmental protection which includes collaborating with Indigenous peoples, provinces and territories, as well as collaborating on IAs, informing the public and welcoming their participation in critical mineral projects (Government of Canada, 2022a). The Mining Association of Canada (2021), however notes that it is critical that implementation of an IA be adjusted to avoid diminishing Canada’s mining investments, and hampering development of Canada as a reliable source of critical minerals needed for low carbon technologies. The strategy also acknowledges that better coordination and harmonization is needed across all government and throughout IA and regulatory processes in order to respectfully uphold UNDRIP. The Mining Association of Canada (2021) also notes how UNDRIP is not to veto government decision making. The Act states that Indigenous peoples have the right to self-governance in matters related to their internal or local affairs and the right to determine strategies for use of their land (United Nations,

2007). This translates to MAC interpreting UNDRIP to mean that Indigenous Nations do not have the right to block mining development on their lands.

Climate change goals within the Canadian mining sector, however, took a backseat to the global COVID-19 pandemic, with the blessing of Federal and Provincial Governments. Once the height of the pandemic began to settle, we started to see more reports published regarding the state of the climate in Canada. During this time, certain services such as mining were deemed essential to allow for the economy to continue to thrive. This is where the country began to see a large shift in how the extractive industry was viewed through the eyes of other stakeholders and how government further positioned the industry as one that was essential to economic prosperity. The above findings have suggested that both the Federal and Provincial Government's have done their due diligence to support climate action to meet the goals of the Paris Agreement. They have acknowledged the need to protect the environment and slow GHG emissions all while continuing to contribute to Ontario's greening economy through the EV supply chain. This position also elucidates how difficult it is to regulate a private industry, such as mining, without creating upheaval to economic competitiveness and risking global, financial investment. Participants had opposing viewpoints to the government perspective on how they claim to participate in industry related activities. This next section will explore the findings from participants of this study and describe how their viewpoints appear to refute the government's position within this industry, in relation to the climate.

5.2.2 Participant's perspectives

Most participants in this study seemed to find it difficult to understand how the government's role in the mining industry is contributing anything but negatively to climate change, the environment and people's health. In addition to the confusion around the rollback of policies and Acts, participants were failing to see the lack of government follow through to the loose regulations currently set. Many participants spoke about the political turmoil that has come along with permitting more mines and how a priority for the current government, especially within Ontario, has been a push to increase mineral production, which has created more uncertainty and concern than ever before.

Participant's concerns about the government's climate change solutions regarding the green energy transition equated to causing excessive harm due to biodiversity and ecosystem loss. These

discoveries are also in line with many recent CBC newspaper articles. In addition to participants feeling the calamity around negative impacts of mining, news articles seem to support this view and give a fuller perspective of local community members, stakeholders, activists and those directly impacted by mining within their communities. P5, a director of an environmental NGO in Ontario who holds a diverse role and is very knowledgeable in the areas of environmental protection, Indigenous rights and the mining landscape mentioned:

More consumption is not necessarily the answer here, and that's where a lot of these industries are saying we just need to consume more trees. We just need to consume more mines and minerals. We need to do more base metals and that will help us get to climate. Not necessarily. That's not necessarily true and it's not supported by the evidence either. So, we need a bit more of a thoughtful approach there and the policies being written seem to be more about that green washing than they are about true data and evidence. And, you know, being defensible (P5).

She touches on a thought-provoking point which has been alluded to in some of the other interviews. In line with the government reports, it is understood from this quote that the Government of Ontario is indeed positioning itself in a way where more consumption is the answer. This participant seems skeptical of this approach being one that is truly transparent and not only opportunistic for those who hold power, but is potentially creating collusion. The concept of 'slow violence' and environmental disaster was discussed by Kramarz (2022) whereas the impact on communities and dominant discourses around climate disaster negate forms of environmental violence and deflect accountability from the offenders. Kramarz (2022) also discussed how this concept is intentionally practiced on those who have the least amount of power to contest and resist, along with little recourse to respond which further marginalizes communities. Indigenous communities are frequently the target of these discussions concerning the mining industry, as the industry often operates in remote areas that are adjacent to or intersect with lands inhabited by First Nations peoples, resulting in attempts to utilize or share those lands. Although discussed in many of the reports of the duty to consult and gain knowledge and insights from Indigenous communities, participants generally felt that the consumption of minerals were overpowering the need to communicate with impacted communities. Participants noticed that the need for critical minerals often ignored Indigenous views and pushed them aside with less regard for their perspective on how mining development impacts surrounding land. Based on the reports reviewed in this research, the government seemed to address their relationship-building with these

communities and further deem minerals as critical, leading to the importance of proceeding with mine sites.

Ontario's critical mineral strategy is discussed by the government as the way out of climate change, and proposed as a major solution to the issue. P2 voices her concern with how consumption of non-critical minerals goes against the government's plan for EV's:

One of the things that happens in Ontario is although they're talking about critical minerals and the need for electric batteries, mines they're actually permitting are almost all gold mines. Gold is not a critical mineral. We could get all the gold we need from cell phones that we throw away (P2).

As the province considers what is deemed as 'critical' or not, more consumption for minerals that are not necessary for the 'green' transition will be important factors in considering the need for utilizing these resources at all. Participants voice their concerns in monopolizing on resources that are not required and how further mining in these areas remain a serious flaw in the plan to move ahead with clean technologies. In addition to the above quote, the same participant also discusses how a shift in societal view point and changing the rhetoric around vehicle consumption may provide further benefits:

The whole critical mineral strategy that has been developed in this province and others by the Federal Government is being driven by rhetoric around climate change. So that has an enormous – as a mining activist – this is something that I see very seriously. I think climate change is a real problem I'm certainly not for one-minute saying that it isn't. But the kind of response we need to it is more things like public transit and more physical opportunities for bike lanes and stuff like that but mostly public transit and not in electric vehicles. And so, the emphasis on more consumption for more cars is a very serious problem from my point of view (P2).

The lack of regard for the environment and people's health was heard loud and clear throughout these interviews. Although not always explicitly stated by participants, there was an underlying concern lurking about the government's position and how the greater interests of people are not necessarily kept in mind. This led to a theme emerging from this research as lack of trust within the government due to their response [or lack of] to climate action. One of the concerns mentioned was how the decisions made in southern Ontario bring lasting, negative implications to the north. There is an absence of regard for northern Ontario and how decisions made will transpire for those who are *actually* living and working within communities:

Down south is Doug Ford and the Conservative Party. And all of the decision-making powers interest and including Toronto's tech investment, exchange, TSX is all down south. And those decisions have long lasting implications for Northern people. So, I think it just, it really pisses me off that I hear him [Doug Ford] saying, 'Oh, it's intergenerational wealth, and Ontario is going to be the mining superpower of the world' (P4).

This view is in line with the argument for more consumption without regard for those impacted. This participant, an Associate Professor with 16 years experience, describes similarly how the impact by those making decisions are not necessarily felt, and the negative outcomes fall back on the communities who are personally impacted by the mine:

It's like, we're going to take the value from this place for the benefit of these people that live over here with no mind to the people who lived in the place we extracted the thing from. So that's how I think about extractivism. So, you know, how is mining extractive? Well, it depends on what logic is undertaken. It's typically undertaken according to have to extractive logic that is that shareholders of a company, far away from a place should benefit from minerals that are taken from that place without much regard for the costs imposed on the people who lived in the place the mineral was taken from. Mostly that's how mining happens, in my view (P6).

The disregard for people and communities living in the area poses potentially long-term health and environmental impacts related to the degradation of climate. As the majority of the population living within the prospective mine sites are predominantly Indigenous, this poses further health concerns. Along with the environmental cost that comes with mining, it also has serious implications for how those living on the land are impacted. Residents rely on wild meat such as moose, caribou and geese as sources of food. Residents of Webequie First Nations reserve are living on an annual income of less than \$12,000 dollars and face an alarmingly high unemployment rate, reaching up to 95%, where the main supply road is proposed (Gamble, 2017). The news article sheds light on further health implications and impact to basic resources such as water, where many school-aged children in these areas have lived under 'boil-water' advisories for most of their lives (Gamble, 2017). As mining continues to degrade the environment and pose climate concerns, there are questions about how current practice will contribute to reclamation of sites that have been destroyed. The relationship with climate change was discussed by P7, a manager in a public health unit in Ontario with 20 years of experience working in the field:

Yes, I think it is related very strongly [climate change and mining], as I've said, the water as we know, water works as a cycle. So mining, most of the

time will mean clearing the habitats, and getting rid of the trees, you know, changing the landscape, creating I think erosions. So that may bring I think, impact. And so, adding to the carbon, if you're getting rid of the trees, it's not some other way of deforestation, which is a link to, I think, what we as the same, we know that deforestation is a big participation of that. You know, dead trees, and you know, all that biomass on one side, you can compact it. But the other side, there are some methane also may be released (P7).

This discussion of the impact to the environment and reclamation led to further themes that emerged from this research which discussed the role of environmental impact assessments within Ontario and how they are currently utilized. Many participants noted how there were significant rollbacks taking place over the past few years, which have contributed to further environmental degradation and greater concerns for the climate. The concerns recognized through these conversations led to in-depth discussions of the environmental assessment process in Ontario, and how terms have been modified to the point of being fairly non-existent. Connection between the need for an intact environment in order to meet climate change goals outlined by the government and Paris Agreement, posed additional distress:

When pandemic lockdowns were first being announced in March 2020, Ontario declared mining to be an essential service and pass the extension of time and exclusion of time policies which granted companies up to an additional year to conduct work on mining claims. Communities were not given any extra time to submit comments to environmental impact assessments. These measures directly contravened guidance from Ontario's Ministry of Indigenous Affairs, which advised delaying or deferring non urgent projects that impact First Nation treaty rights during the pandemic. Exploration work in the area meanwhile, has been disruptive with the use of heavy machinery and drilling technologies that cause lasting damage to local ecosystems. Only a few months later, the disproportionate power held by the mining companies was again bolstered when Provincial Government introduced the COVID-19 Economic Recovery Act. The Act introduced dramatic changes to the environment impact assessment, with lawyer Kate Kenton describing it to CBC News as 'gutting the Environmental Assessment Act' removing a bunch of protections. Several Indigenous nations prepared a legal challenge to the Law. A Chief of First Nation's argued the government was attempting to use the COVID-19 global pandemic as a smokescreen to ignore the constitutional duties to First Nations. That's only a small spiel to basically say that we're seeing drastic health impacts on communities in our region. And there are a multitude of determinants of health that have to be addressed here, along with climate change, which obviously is making it worse (P12).

This Health Promoter and climate change expert from a public health unit in Ontario (P12), with 2 years of experience working in this role, described the shift to rollback environmental and health protectors when the pandemic began, which was seen by many of the participants as an excuse by the government to negate their promises. In addition to the issues that arose with protectors due to the pandemic, the same participant also discussed how promises of the industry are not something that can be relied upon:

But so far, what I've seen promised and I hate to go off the promises of industry. As we both know, that's never a great thing to do. But what I've seen promised from for instance, the Crawford project, it is promising, it looks great on paper because what they're saying is 'yes, like we are going to answer every single comment that was made that impact assessment. Yes, we are going to aim for a net zero and possibly even below through carbon sequestration'. But those studies aren't there yet. None of the studies that were mentioned in that detailed project description have been fully completed to a point where I would say 'yes, I trust that process, that that will lead you to a net zero' because I still see diesel combustion is going to be used for a large majority of that mine life. So, I can't give you one gold standard answer here, unfortunately. But I can give praise to some of the steps that the mining industry has taken whether forced or not, in the right direction, to be more conscious of sustainability in our communities (P12).

The general consensus between participants that arose was that the industry and government can not necessarily be trusted to follow through with the acts and policies in place. The claw backs to these processes although from the government perspective are improving the process, is actually viewed as further harming anything that is not directly tied to the financial gain of the industry:

One of the bi-products of the climate change – of the government's response to climate change is trying to mine ourselves out of the – mine out of the problem. And in Ontario particularly industry has seen this as an opportunity to push for more mines. To cut environmental assessment projects. Frankly Ontario doesn't do environmental assessments on mines. It's pretty hard to cut it anymore (P2).

The EIA process was discussed in length by a number of the participants, as they voiced their concerns for further cutbacks – even though the process is voluntary within the province of Ontario. An article by CBC News' Logan Turner shed light on these concerns participants

recognized by bringing to the forefront how the Federal Government announced they would initiate a regional assessment of the Ring of Fire case in February of 2020, under the new Impact Assessment Agency (Turner, 2022a). In addition, the article discussed how Chiefs of five impacted First Nations communities in northern Ontario said the terms are fundamentally flawed in scope, purpose and legitimacy, promoting recklessness and danger, and that the terms should be deemed insufficient as more time will not help, as the terms of reference 'are so broken' (Turner, 2022a). P4 discussed the following about the lack of environmental regulations and reclamation:

*When there is open pit mining, they don't fill the hole back in. Like, they'll just leave it wherever the f**k it lays, so to me, like, and then they say, 'Oh, it's too expensive' to do, you know, the fill back. But at the same time, the geographic area of impact is so much wider because of the tailing of the debris more than anything, like it's not even really the hole, it's the pile of rocks. So, when you're digging, like two kilometers deep into the earth, like put it back! Instead of filling it with water, which is basically a common closure practice that what's going on. And every time I brought that up, it turns into, 'we can't reverse that because it's too expensive'. And that same narrative of it's more costly, we might as well not even dig it up to begin with (P4).*

This quote exemplifies deeper concerns with the lack of reclamation that occurs with many of the mineral mining projects, in addition to the EIA process being exceptionally flawed. Although the government and industry reports allude to reclaiming sites, participants have voiced concern over the lack of reclamation that actually takes place and the cost to the environment in the meantime. Solutions proposed by government such as tree planting take years and may not reduce carbon quickly enough. This participant, a manager from a public health sector in Ontario with 15 years of experience within their unit, shared examples from the province of Nova Scotia and has seen similarities to how this relates to Ontario:

So I do come from the East Coast, where we had a steel plant as well and we have the tar ponds and you know, lots of unusable space for a very long period of time given the waste that was created by the steel plant. So over the years, they've reclaimed that space, and they made it into a park. But that took thirty years to get to that process (P8).

Not only does the reclamation process take a number of years, but it has immense health and socioeconomic impacts on those who are within the community. With mining seen by government as positively contributing, it has led to serious health impacts due to companies not mandated to comply with stricter laws:

Because all levels of government tend to see mining as a positive thing, whether it stands up to analysis doesn't affect that. That assessment. And so, you know, so we've seen the most recent approval was the Marathon Palladium mine in Marathon which was acknowledged to have significant environmental impacts on freshwater fish on the on the Indigenous communities and on the caribou and was deemed to be justified under the circumstances by jobs estimates that the company had provided that that were never even tested. So we'd ask them, given the employment situation, where are you going to get those people from? They're not going to be local people, because the local people are employed. At least the ones who are qualified for those jobs. And the mine is not going to be there for long enough to get too many people qualified into new positions. I think it's just sort of an ideological and political influence that the industry has. But the same goes for in terms of like, water quality. There's essentially no enforcement of water quality regulations. So, government's, sort of takes the view that the companies should be asked to comply, rather than forced (P3).

Participants commonly understood that the government perceived mining to positively impact society and surrounding communities, a view often contradictory to their own. They expressed their discontent with how mining negatively impacted local people not only economically, but also the implications mining has for the use of surrounding land. Participants described how past mine sites proposed had seen environmental devastation and the EIA processes had not appeared to assist in changing the outcome. A northern Ontario resident discussed how the far north Act has 'been decimated' to make room for new roads and does not protect lakes and rivers. She described how we are going backward in our approach and none of the priorities are being actualized. Further to this viewpoint, it was commonly spoken about how the EA process within Ontario, pertaining to mines is 'a joke', 'non-existent', and how there is an extreme lack of public health commentary able to contribute to these proposals and plans. One participant viewed this as a way for the government to further exercise their power over communities and pit one another against each other in a divide and conquer tactic. With funding for collective negotiation between communities being cut, this was described as a strategy to deal with individual reserves, rather than collectively. It was noted by a participant as a way to make it more appealing for individual reserves to move forward with discussions and explained this as 'dangling a golden ticket to communities that are desperately underfunded'. Further dividing these communities, participants recognized the Premier as placing consideration only on the fiscal bottom line. In viewing this as an economic gain, health and environmental related concerns seem easier to be

cast aside in the ‘need’ for electrification within our current society. This remains problematic as participants believed activities to create that shift is inherently destructive, but pushed the agenda for those already exercising an extreme amount of power over others. In relation to climate change, this continued to perpetuate the ideology that we can ignore ethical considerations in lieu of economic prosperity, as described by participants. As an underlying theme identified throughout this research, the consensus seemed to be that we will not only maintain, but promote the destruction of our climate by wreaking havoc on the land. Participants felt that this will be a blatant disregard for health concerns especially for those who are the most underprivileged, impacted and unable to exercise their voice against a dominant industry that is supposedly exempt from rules when it is deemed appropriate for economic gain.

5.3 Summary

There is a stark contrast between the discourse among the government, public health professionals, activists and other stakeholders, and the findings derived from the analysis of policy documents and interview data. All groups, from their perspective appear to be ‘doing the right thing’ and taking action on their part to ensure we transition to a better, more just economy in a way that fundamentally contributes to a prosperous nation. Both the Federal and Provincial Governments have outlined their plans to ensure this just transition to meet the goals of the Paris Agreement and a rapidly changing climate. Yet, participants express frustration and doubt with the government’s plans and lack of initiatives to slow climate change and ultimately protect human and environmental health. These opposing outlooks can continue to clash and cause discontent between communities, or they can be seen as an opportunity to make immense changes in a way that may create consensus between these contending parties. Ultimately, one goal remains the same between all groups – to meet the changing demands of our climate and slow the destruction so we may live harmoniously and slow the wicked problem of climate change.

Chapter 6: Role of Public Health in Climate Change Initiatives and Mining Regulation

6.1 Current Role of Public Health in Ontario

Participants frequently made a distinction between Public Health Ontario, the organization, and the broader field of public health, which underwent an evolution throughout the course of the interviews. Some discussions with participants encompassed a broader perspective on the role of public health within Ontario, while others specifically centered around PHO as an organization and its potential role, contingent upon how participants perceived the connection with health. With additional probing, some of the discussions also led to speaking about both PHO and the role of public health, more generally within the province. A portion of the participants perceived PHO as a scientific entity, capable of contributing to the dissemination of knowledge and information, while others did not perceive a direct role or connection between PHO and climate change and mining. Others, however, when asked about the role of PHO seemed confused and perhaps not understanding the connection because of the multiple divisions of public health responsibilities across the province and municipalities, or not being aware of the role that PHO holds. Those more familiar with public health seemed more confident of the role of PHO and its potential contribution. Overall, all participants (after further probing and discussion) did see how mining contributes to climate change, and how climate change impacts health. With the thought process that mining is a contributor to climate change whether through environmental degradation (i.e., destruction of peatlands) or GHG emitters, there were fruitful discussions about the potential roles that both public health, generally speaking, within Ontario and PHO could have improving health issues and disparities that come from this industry in relation to climate change. This chapter will discuss some of the barriers that were voiced by participants in relation to implementing their proposed ideas or solutions.

Four public health units in Ontario participated in this study. All discussed their current role in regard to climate change initiatives, and also their role within the mining industry, if any. With their perspectives, I was able to better understand the current role of public health units in making decisions that impact population health and the climate.

A recurring finding throughout the study highlighted concerns regarding the lack of advocacy and transparency from both government and the mining industry in terms of their

practices, such as conducting IAs and accurately incorporating input from health units, if at all, in relation to various projects. It was highlighted particularly by one public health unit that their role in health protection often comes after a major crisis or emergency, and they have little to no input prior to a project being implemented. This poses concern for current practice and their lack of involvement from the beginning of a project. This Coordinator, working in environmental health within public health, with 13 years' experience in this role, suggested some potential areas for improvement while also noting some positive steps in the right direction thus far, for the industry and health working together:

We know that there are going to be limits to different emissions and things like that. So really, we're hoping to have government to really hold to those limits, if we're putting a limit in place, or we're lowering a limit. Knowing that there's the potential for greenhouse gas emissions, and that the outcome is to lower limits, really having that public comment open and available, involving public health and holding companies accountable to these levels. So not allowing for a site-specific standard that's higher, so that it buys company time to bring the levels down, when if elsewhere in the world, it's possible and the technologies out there, these companies should be held accountable to achieve those standards (P10).

The participant further discussed what this idea of accountability meant to her, as a public health professional:

*So, for me, accountability is when there is a regulated. What's the word I want, like a regulated? I'm thinking levels, because I'm still thinking about, like, I'm still thinking about site specific standards. But when there's a regulated standard, that is accountability is meeting that. I mean, *name omitted* might talk more about, you know, beating it [emissions], but for me, it's – you have to meet the regulations. That's me coming from an enforcement background (P10).*

Once probed further on regulation of emissions, the participant gave the following example to explain how it applies to public health context:

And then I think if we're dealing like in situations where we're dealing with particulate matter emissions, you have to meet the numerical value that was assigned to maximum emissions. If we're dealing with a chemical runoff into wastewater, that's eventually making its way to the stream. It has to - it can't exceed runoff emissions levels and things like that (P10).

There was importance placed on handling GHG emissions and the consequences to exceeding those limits from a public health standpoint. It was discussed that further emitting past

safe regulations could have negative health implications, such as higher rates of cancers and asthma within highly polluted areas. This was also discussed in association to mining processes such as the aftermath of disease from smelters. In addition to this, we discussed how this further contributes to climate change and the depletion of the atmosphere, which in turn negatively impacts health of the population. This conversation transpired into what this health unit would like to see enforced further within industries that are inherently destructive and impact population health and wellbeing:

So downstream measures, we want to see that enforcement, we want to see that they're strictly enforced to and there's higher penalties for people who are consistently breaking those standards that are put out in the regulation. Because sometimes I'm not going to lie when we see the fines that are put out for breaking these standards, sometimes not at all. We're seeing that's not enforceable, because you're not reinforcing why the standard is there, you're not reinforcing that it should be at the expense of that industry and or that specific client to make amends for the impacts they're putting upon those communities. At the upstream and the midstream levels, we also want to see accountability in different ways. So we're looking at transparency in the tracking of their environmental impacts, as well as being held accountable to public comment. So for instance, if we're noticing that Indigenous, traditional hunting grounds aren't being respected, then what is their public commentary doing to this, this mine? Is it impacting the way that they're processing, the way that they're using that land in any way? Should it be? Absolutely. Right? We want to see that accountability. At the higher level. When we look at like Federal Government, we're looking at - I mean, international affairs we're looking at not only are we meeting our Paris Agreement, can we be meeting UNDRIP too can we be installing that in our communities because we've made those promises with Indigenous communities in our area. Why haven't we been instigating more? United Nations Declaration on the Rights of Indigenous Peoples. Why haven't we been implementing that? Why aren't we being held more accountable to that? And furthermore, in our international relationships, why aren't we putting these measures on other neighboring countries with good relationships, to make sure that they're held accountable to the same measures that we are, and we're making sure that everyone is benefiting from that in the same way. So there's, there's different levels, I can't really get into the international side, because I don't work in that. But at least at the provincial level and the municipal level, we want to see that accountability through transparency and transparent decision making as well as spending to make sure that okay, when we say we're holding this mining organization to the standards, they're being held to those standards, and we're not providing more funding, if they're consistently breaking those standards when it comes to climate impacts (P12).

Downstream measures are a key determinant in health outcomes and are brought up within this discussion to understand how they contribute to important aspects of this dialogue. A downstream measure is defined by the National Collaborating Centre for Determinants of Health (2022) as an intervention and strategy sought to address immediate needs and mitigate negative impacts of disadvantage on health at an individual or community level, commonly occurring at the service or access-to-services level. P12 appeared to emphasize that if the goal of public health is to fundamentally protect the health of the population, then the connection made between upholding those standards is pertinent in moving ahead with how public health is perceived within industries that go against those crucial elements. During the interview, there was a more comprehensive exploration of the additional rights of Indigenous peoples and the profound effects of land devastation on their livelihood. Some interviews explicitly or implicitly referenced the colonial implications of land appropriation for the benefit of others. It is necessary to highlight UNDRIP and its contribution to upholding responsibility within this thesis, although not discussed in detail. UNDRIP is crucial to addressing the need for accountability and transparency within the industry related to public health and all involved in its conservation, as outlined by many participants in this study.

Further to discussing the role of UNDRIP and upholding promises, other participants also touched on the difficulty of having consistent solutions across the industry. The mining industry is extremely difficult to regulate globally, due to the complicated relationship Canadian companies have with low and middle-income countries, and other countries owning mining shares within Canada. Participants noted that all countries appear to have differing rules and laws regarding the role mining can have within a community. Even within Ontario, mines seem to be operating under different regulations regarding variations in equipment (i.e., electrical versus manual mines, old technologies versus new), which changes mine operations and its perceived impact on climate. Participants noted this discrepancy and were aware of the difficulties this causes within extractive industries. It therefore would be challenging to create the same standards across the province, let alone the country or globally, given the extreme variation in operating standards and procedures. Interviewees communicated their thoughts on these disparities throughout the interview process and attempted to understand what *could* be done within Ontario to help rebuild this process and relationships.

Many participants shared a similar view in discussing the role of health within this realm. Rather than perhaps seeking a one-sized-fits-all approach, it may be favourable to create more consistency with how health is integrated into the process of IAs. This Medical Health Officer with over 40 years experience, discussed the role of health within IAs, and how this plays a meaningful part in the process:

I've always said very clearly, it's so important for health to be involved, right from the beginning, not waiting until an environmental assessment statement is done. And then looking at it and commenting it actually being there, to be able to look at what those initial plans are, for the proponent, look at in terms of what aspects they'll be looking at from the environmental assessment (P9).

He further described how an IA similar to that from the Ministry of Health in New Zealand could be applicable in Ontario. This was discussed in relation to the Māori Indigenous people and how they have implemented a health impact assessment from a quality policy perspective and showing the impact on Indigenous people:

The next step that would work in places like Northern Ontario, or in Ontario or Canada as a whole, would be to say, 'we want a health impact assessment from the perspective of climate change'. Right? And in a way, so, you know, that'd be a policy approach to say, let's look at any legislation to say, 'Okay, what impact does that positively or negatively have?' And it might be for some policies, it just be a checkmark saying 'no impact'. But there may be others in which, oh, well probably mean, people travel more or do this more and more that same thing would be with impact assessment as it relates to policy but also to mining activities (P9).

Findings from this research suggest that IAs within Ontario are lacking in strength and support for those most impacted. It can be assumed through unpacking participant stories, that by implementing stronger IA processes within Ontario, we may also see a greater shift toward trust within the industry. Furthermore, it may also provide benefit to the industry if public health is able to monetize some of these health and environmental implications and create a stronger argument for the need to assess projects, as outlined by participants of this study. This participant, a manager from a public health unit in Ontario with over 16 years of experience working in his role, discussed potential adverse reactions from the industry and noted the importance of delivering solutions in a way that describes this impact:

From the mining companies' perspective, you have to be able to say that this will be the benefit to society and to you and you guys will look good,

and – and do wonderful things, but you’re gonna have to come to them saying “you’re a big part of the problem” and by the way, they’ve got the stats to say that they aren’t part of the problem. You know – espe – especially when you take petroleum mining product. In Canada, some of the key mining and gas uh climate control gas production is in things like the oil sands. They’re technically mines. So, a guy doing nickel mining here says “Hmmm? Alberta’s not doing screw all!”. They want the money coming in (P11).

The idea behind completing a cost-benefit analysis was mentioned by another participant as well, outside of public health units. This approach seemed to be in line with proposed solutions to bring to the industry in order to make a better-informed health decision on how to proceed with the mine. In some contexts, it was described as a way to potentially stop the mine from going ahead, while in others, a solution to give the best health advice available to make improved decisions at all stages of development and the lifespan of the mine. When P2 was asked about how public health could become more involved in the mining process she suggested the following:

There was uhm, a mine stopped in British Columbia called the Ajax mine – that was largely stopped uhm because they were able to monetize the cost in terms of public health and governance in a municipality. Near Kamloops. And uh one of the people there was an expert on air pollution and asthma and managed to monetize the costs in terms of – of increased asthma from the – from the mine if it went ahead. [...]

I can’t tell you what public health should do but I certainly think they have a responsibility to protect people. And it – they should be commenting on Ring of Fire and its potential health impacts. They should be engaging in environmental assessments – Health Canada does, and occasionally does some fairly good work around that – I am not sure that Ontario Public Health ever intervenes in these processes. Uhm ... I think they should do maybe pull in together some of the data around – around health impacts in mining affected communities. Like people did for the Ajax mine environmental assessment. Like in Indigenous community they did their own – did their own environmental assessment and one of the things they looked at was health impacts (P2).

This quote exemplifies the impact that community solidarity could have in working with a public health advocacy group to encourage the inclusion of health at the beginning of a project, while considering public health and governance aspects in the decision-making process regarding mining projects. It highlights the importance of gathering and analyzing data on health impacts in mining-affected communities, including the Indigenous communities’ own environmental assessments.

This individual from a public health unit also described the more impactful role their units could potentially have, especially those situated near mining communities:

*This is education we [the public health unit] could provide. Rather than that I look at a national Collaborating Center. So the National Collaborating Centre for Public Health Policy, for instance, or Healthy Public Policy that you do have, okay, how do you build healthy public policy? How do you build that with the municipality? How do you comment? How do you build a policy brief thing of that nature, which are relevant to mining industry? Because when we come back to it, if we're making those, again, if we make those decisions with the municipality, or with the Provincial Government through advocacy, we can have those impacts on the mining industry. Now, going back to your question, it's what are the barriers faced to improving public or policy formation with Public Health Ontario and the Ministry? I think those are clearly laid out in those documents from National Collaborating Center. So we're looking at problems with equity, justice, effectiveness, unintended effects, cost feasibility, and acceptability. So just to give you an example of one, *location omitted* most of our communities exists, because at one point, the mine started up here. So when we make barriers for that mine, our community acceptance is lower. Right? So if you have a large population of miners and a community, and you're the one person saying, 'hey, maybe this mine isn't going to be the best thing for our community, because of the economic, the social, the environmental impacts that it will have, that will largely lead to detrimental health in our community', you're not going to probably win that suit, you're not going to be like, 'oh, yeah, we love what you're saying, Yes, we're gonna go with you'. Instead, what you're going to be met with is animosity. So what we try to do from a public health perspective is we try to say, 'hey, here are the things that you could change to make your mine better to make your mine more conscious of the environmental, economic, social, health impacts that it will have on our community'. And that is why what you've heard consistently through this interview processes, we need that transparency, we need that held accountability, because if they're not taking it in our commentary, not taking it to a decision making and saying, 'Yes, we have an informed decision making process from public health, we're going to move ahead with their recommendations', then we're left at the same place where we started where it's the mining community saying, 'Yep, no, this is what we're going to do'. And they have the funding to say that, unfortunately, we don't have the funding and capacity to say, 'Yeah, let's counteract that' (P12).*

Participants saw the need for further strengthening of the IA process while working together with companies to create reinforced partnerships. This relationship building was framed by participants as a way to improve communication between industry, public health and government agencies and increase progress toward a shared understanding of need. Interviewees

were hopeful that this would be a way to bridge the industry with health. Whether or not participants held personal values and beliefs that mining was acceptable or not, there was a shared consensus of the need to adapt the current processes in place. Again, the idea was not to form a further divide between industry and all involved, but to somehow come to a shared consensus on what *could* be done to improve the processes already taking place. It became apparent throughout most interviews that participants were truly seeking solutions that would work between industry, health and attempt to combat climate change. Many times, this did come back to funding for health and discussions regarding the power that the industry has along with its government ties.

Participants expressed concerns about the interplay between financial gain and decision-making processes regarding whether to proceed with a particular site or project. They highlighted how focusing on monetary value often overshadowed considerations of health and well-being. Even if a participant saw value in mining, there were still concerns raised for how economic prosperity negates health considerations:

I think that economic feasibility should not be a justification of not doing the most advanced methodologies out there. And if there is any advancement in mining practices, or whatever, that the uptake needs to be immediate, and committed, because I do think we need mining, I'm not opposed to mining entirely. I think it has a lot of value. But it's more that there's always the cheapest way, the ways to save money, how are we making this more efficient? What is going to give our investors the most by give back? So I'm not interested in how much money millionaires are making, I'm more interested in what practices are going to mitigate the impacts of the most. So I'm tired of reading what is economically feasible in any technical reports (P4).

This speaks to the challenge posed by designating certain minerals as ‘critical’ and perhaps explains why some efforts to strengthen the IA process have gone unnoticed, fostering a lack of trust within extractive industries in Ontario, and across Canada. The voluntary nature of the IA process gives reason for the industry to avoid taking part in IAs in the first place and allows for potential health and climate issues to be concealed and ignored until a disaster takes place. This causes further concern for communities severely impacted by eradication of surrounding land which poses further threat to the climate. A lurking concern to this approach is leaving health matters up in the air and distinctly not being held accountable for destructive action when it could have been prevented or more closely monitored from the beginning, as participants alluded to in

our discussions. Reflecting on how to improve this process, one participant from a public health unit in Ontario commented:

I would say, harsher enforcement on the proposals itself. So for instance, when we read over a initial project description, or even a detailed project description, the consistent phrase that is used is 'we will look into this, if we are required to have an impact assessment, we will think about this if we require to have an impact assessment'. The trouble with that is when you look at public commentary, we're not able to comment on that until that impact assessment comes out. So looking at a timeliness as well as predicted impacts, like we know, we've commented on the site, there's a reason we've brought these issues up. Before it gets to that detailed project description, we want to see as much information in there as possible, and holding those organizations accountable to that matter, to prepare a full and comprehensive, detailed project description, so that when I from a public health standpoint, look at a detailed project description, I should see as much socio-economic and health related context in that detailed project description as possible. I don't want to see, 'we'll look at this when we get to it'. Or 'we'll have a community organization to throw money at the problem when we get to it based on what the community thinks is vital'. Because sometimes that A. doesn't happen B. at that point, the issue has progressed too far, because you've already begun your construction, or things of that nature or plans and agreements with municipalities that were too far gone, we're now back at this step one box one where we can plan for the unintended consequences, plan for equity provisions plan for cost, and create a better solution then where we're at if we just progressed business as usual (P12).

This further contributes to the viewpoints and proposed solutions expressed by other participants, emphasizing that incorporating health considerations into the IA process from the outset has the potential to not only enhance collaboration between industry and public health units, but also prioritize health as a focal point from the beginning. By bridging this gap, participants noted not only the probable climate benefits, but how this may also contribute to other social determinants of health. Another participant, an environmental expert, described how his health unit is not necessarily involved, other than in a consulting and advocacy role. This public health unit does provide consultation on what health impacts of certain activities may be and what hazards this may create and are *sometimes* asked to comment on how to proceed. It was not explicitly discussed if this was in relation to mining, but the implication was that this was more in line with different industry related activities.

When participants were asked to describe potential solutions to mitigate climate change in relation to the mining industry, this individual discussed the importance of health involved right from the beginning of the process. This question often led participants back to IAs and their current role within Ontario, but also in discussing how we can improve the very ill-defined process:

One is within the environmental assessment looking at the environmental assessment from the idea of 'Yeah, what impact is it climate change?' So move environmental assessment, boundaries one step further, to include environmental change from a climate perspective. And then the other aspect is for those places that are operating, or they, you know, they might have. Then 10 years down the line technologies change. And, you know, there's other advantages to do. So there could be things like using surface lease agreements. So when a mine gets approval from an environmental impact assessment, they get approval from the Ministry of Environment, they then go and get various permits, etc. And sometimes one of the permits that has been used has been surface lease agreements. The mining company will, will lease that land for their resource extraction. And part of the lease agreement is financial trends, and that thing, but it's also been used for things like what expectations are there, or the hiring of local people? The hiring of Indigenous people, the hiring of women it could be in terms of what resources how much funding do you put into monitoring includes including things like social monitoring, and you could. So using those as examples, you could also put in things about climate change determinants, determinants of climate change, monitoring. So that if five years and maybe having a generating a report every five years about that, and that would allow opportunities for if new technologies came that you could. So you're hoping that the mining industry wouldn't put in place - something that's good today. But 10 years from now, relative to other technologies for climate prevention, climate change, prevention, would be outdated (P9).

The description of health in IAs according to this Medical Health Officer, outlined how involvement from the outset can provide potential solutions to negative outcomes in the future. For example, the IA process has shifted over a number of years and evolved. P9 placed emphasis on the need to re-address IAs with each individual project because of the changing life-cycle of mines, materials and other health and environmental impacts which occur. This reassessment may be overlooked among other stakeholders such as the Ministry of Environment; however, their input is crucial within this jurisdiction. By integrating health considerations from the initial stages along with other pertinent resources, it became evident that establishing effective communication channels could greatly strengthen the IA process in relation to health and climate change.

Further solutions proposed were discussed in regard to giving health units more time to comment on issues when asked by the industry. Given that the involvement of health units in this industry appears to be a relatively recent development, there were discussions of what appears to be a lack of guidance from ministries on how to navigate this further. Additionally, participants believed that public health units in northern Ontario lack sufficient resources. Additional support was suggested from organizations like Public Health Ontario in regard to their scientific knowledge base:

So I guess, I guess we're I'm kind of thinking of additional support from Public Health Ontario. In terms of their knowledge base, they have the ability, and they have some amazing staff on staff right now. But they also have the ability to bring in other professionals from industry that can come in and help provide comments. So maybe there's an opportunity there for more involvement, even at a higher level before it gets to public health, like local public health, or assist in public health right from the beginning, so that it's not public health, necessarily reaching out with specific questions, but that engagement process to assist right from the get go. So from my standpoint, I've seen Public Health Ontario assist us in other situations, not mining, but other kind of hot topics that we've had. And they've been amazing. They've had they have amazing staff on, available to them. But it's public health reaching out to them saying we need your help. What can you do and, and you know, we're at a disadvantage, too, because we can't just meet in person. And there's, like, we're just so far north from everything. So I guess when I'm thinking about Public Health Ontario being more involved, it might be at the, at the front end, when we see these things popping up in and in terms of resources, or in terms of knowledge support, maybe (P12).

It was discussed how public health currently navigates decisions surrounding mining and their role in protecting health of the population. Resources were suggested for public health units and how we may be able to make changes that support the needs of health units and reinforce their ability to provide assistance and conclusions about health:

So usually, it is the mine reaching out to us as the proponent from the impact assessment at the federal level. And I'm being very specific here. Because it's a larger project, it's relatively new. And it wasn't like, there was any preparation from a ministry from any sort of guidance document created about this for public health units to have the capacity to make those comments on it. That becomes particularly important because when you look at capacity and understanding of mine processes, our health units are focused on health. So we can say, okay, like, the runoff would probably cause this contamination into the soils might cause this. But when you look at a smelting process, for example, will, we have a full understanding of

that process? Probably not so requires some time and knowledge on our end to understand the full process of mining, understand the safeties that are in place, go back, we'll look at what the socio-economic impacts would be as well, and then go into the determinants of health as well. So there's, there's a lot to it than just 'Oh, yeah, we can just make comments on that right off the bat'. So it was kind of like a not only is it sprung on us, not only is there limited capacity, especially among a smaller health unit. But there's also that look at the federal versus provincial level, right. So at the federal level, yes, we've been requested to comment at the provincial level we're not. So when we look at the environmental registry, for Ontario, we actually will comment on things only because we go out and search it out. So for instance, site specific standard request, we have to find out that it's happening in our area, and then go out and make public comment on that register on it, if we choose to do so. And that's not taking into consideration that no one's really put in place to do that. As a health promoter for climate change, I take it upon myself, because obviously, that will have impacts on our community. We are primarily a mining focus community and extractive industry focused community. So it makes sense for us to comment on those big natured items. But that's not my only focus of my position. So if we had more capacity, it would be of greater benefit for the public health in our area (P12).

This quote also exemplifies the difficulty with not having a public health lens on some of these larger projects. This participant appeared to be almost baffled by not have a health unit commenting on issues that could so heavily impact health of the population, yet, it is not apparent that they are being sought out for their expertise. Participants often noted this as problematic and thus sharing the desire for health to be brought into these processes.

Another participant, an Associate Professor, also mentioned the potential for PHO to become involved in this process:

I think Public Health Ontario could try to document the impact of the mining industry on people's environmental health in Ontario. And try to use that to lobby, do you lobby if you're within the government? I don't know if that's the right word, influence decision makers to put stricter environmental controls on mining companies (P6).

Participants more disconnected to health sometimes found it difficult to see the role of PHO in these potential changes; however, it was noted that as a scientific body, they could be beneficial in providing evidence-based research into the impacts the industry may have on environmental and population health. This further includes social determinants related to employment and income. PHO could also help to provide data and information on the health implications of a mine

on the community and environment. Although other government organizations such as the Ministry of Environment and Climate Change appear to be the main body involved when constructing evidence regarding the environment, participants shared how it would still be important for health to be included in these discussions and decisions and therefore have some body of public health involved.

6.2 Summary

This chapter has exemplified and discussed how public health and PHO are currently involved in climate initiatives in the mining industry in Ontario. Participants view the lack of PHO involvement as being substantially flawed within the province and country. Seemingly, it is not apparent that health units within the province currently provide meaningful advice that incorporates determinants of health within the mining industry or in relation to climate change. Further, public health does not play a role in preventing issues that may arise from negative implications on environmental destruction. This becomes a difficult topic to breach as there are many different stakeholders involved in the decision-making process for protection of land, health and also pushing the agenda of the government and deeming minerals as critical for the green transition. Barriers to implementation include the divide between monetary gain and health impacts while also considering the seemingly strained communication and multiple, differing opinions. Also discussed were resource barriers between small and large public health units, with differing capacity limits to create change. It was vocalized by smaller public health units that PHO could have a greater role in providing solutions because of their capacity and broader teams. Solutions have been proposed to strengthen the IA process in two main ways. The first, being that health must be brought into consideration in order to safely move ahead with mining projects while considering climate change. Second, would be to strengthen the EIA process and ensure a sounder approach when considering the implications of creating a mining site. This research suggests the need for stronger regulations in place along with concern for trust and transparency from industry to health.

By strengthening relationships between industry and those involved in the decision-making process, we could be assured that health is seen as a priority in this process which, as participants have discussed, may lead to stronger relationship and support for the government's agenda and

critical mineral strategy. Although mining is not seen strictly as positive for health, the climate and economy, from the views of these participants, it should be noted that this could be presented as a starting point to increase the understanding and lines of communication between many opposing views.

Chapter 7: Discussion

This qualitative research study explored the role of public health in climate change initiatives in the mining industry in Ontario, Canada. The findings looked at Ring of Fire as an example to understand the context of perceived tensions between the mining industry, government and external stakeholders in Ontario in regard to the ‘green’ energy transition. It sought to understand the role of public health in Ontario by reviewing policy documents and grey literature and how they are currently utilized and implemented within the province, in relation to climate change initiatives in the mining industry. Findings from this study revealed the vastly opposing viewpoints on the energy transition and its impact on climate change through mining, between government and other stakeholders such as public health, environmental and mining activists. The study desired to understand ongoing barriers and solutions to further policy implementation that could aim to put health at the forefront of the industry, contributing positively to climate change initiatives. It examined how relationships between government, industry and stakeholders are complex yet intertwined, while seeking solutions to construct shared goals which undoubtedly contribute to human and environmental health.

The mining industry has very few ties to public health, as expressed by participants, unless directly needing to collaborate with a local public health unit due to an exposure concern. Because of this, there does not appear to be much shared knowledge or partnership between the mining industry, public health and PHO. By not having these established relationships, it could make it more difficult for the industry to be mindful of additional health impacts of project development. Creating this relationship may allow for direct connection and dialogue to further introduce and establish health as a priority within the mining industry. With a focus on the preservation of the ecosystems and biodiversity, which significantly impact the climate, there are potential avenues to integrate policies that enforce more stringent environmental and health regulations. The problem becomes a much larger political debate where economic prosperity continues to hold the utmost priority while overconsumption is encouraged.

A high number of participants concerningly mentioned politics as a barrier to implementation. Problems arise where a company’s right to profit supersedes government regulation, making it difficult to impose any further rules or laws. It may be important to have public health advocate for impacted communities, yet also provincially to become a leader in

climate sustainability. As we continue to see this push toward a neoliberal society, the government then becomes more able to provide greater economic freedom, potentially leading to high economic value for the country. Power relations continue to impact those underrepresented and most affected by climate change such as women and Indigenous populations, inflicting harm and leading to further inequalities and normalization.

One of the key findings in this study was the opposing viewpoints of how the government's position of deeming minerals 'critical' is the only way to transition to a 'green' economy by mining our way out of the climate crisis. Participants found this to be quite problematic and counterproductive. While the government is ramping up for further green technology developments and increasing their presence at sites such as in the Ring of Fire, participants noted this as causing detrimental harm to the environment, climate and health. The government's intention to promote sustainable development and address climate change, are seemingly contradictory to the observed negative impacts on the aspects they aim to protect. This contradiction raises concerns about the effectiveness of the government's actions and their ability to balance economic development with environmental and public health considerations. As noted throughout this research by participants and news articles, it seems counterproductive to invest additional funds to protect and aid in climate concern while tearing apart some of the world's most valuable carbon sinks that already work to reduce emissions in the atmosphere. Removing these established peatlands could actually counteract declining emissions, as it takes years to reproduce natural carbon sinks, holding the largest amounts of carbon globally (Wildlife Conservation Society Canada, 2021).

Research has found that the natural environment and ecosystems are important drivers in human health (Berry & Schnitter, 2022). The impact to health is significant when these ecological determinants fundamental to human health are altered through GHG emissions. The extraction and burning of fossil fuels effect life-sustaining resources and supplies (i.e. food, water, oxygen) all associated with climate change and negatively influence human health (Brisbois et al., 2019; Canadian Public Health Association, 2015; Hancock, 2020; World Health Organization, 2022). Peatlands, for example, should be seen as vital to combatting climate change. Priority should be placed on keeping them intact as a way to tackle climate challenges. These peatlands are essential to reducing susceptibility to wildfires producing GHGs and storing carbon for thousands of years, and therefore should be protected in order to address climate change and biodiversity loss to meet

Canada's targets of keeping below the 2°C pre-industrial warming level (Wildlife Conservation Society Canada, 2021).

Although the government appears to be greening the mining industry by promoting electrification of mines and remediation tactics, participants described how climate change and health are still being ignored or underserved. The main theme that appeared consistently throughout this study were concerns around accountability and transparency within government and industry failing to cultivate positive relationships with health and environmental sectors. A lack of trust was evident regarding the mining industry's handling of health concerns. For example, when an industry partner would exceed their air quality allowance, fines are to be issued for their overuse. Many times, however, these fines did not appear to have any significant effect on the industry, seemingly making it easy for extractive industries to continue to neglect their duties to positively contribute to a zero-carbon future. Further, when it comes to reclaiming the land after a site is closed, participants found that mining companies were not being held accountable to follow through with their plans or to the extent needed to revitalize the demolished landscape. Participants described this as creating distrust with the government. As found in this research project, in line with an article by MiningWatch Canada, Canada's critical mineral strategy emphasizes value-added manufacturing and high standards for Indigenous rights, environmental and human rights protection, yet there is no meaningful implementation and recognition of the Paris Agreement's commitments to address the climate crisis or planetary limits (Kneen, 2022).

Further implications from mining move beyond direct climate impact. It poses significant health threats exceeding that of air quality, such as the extreme environmental degradation, biodiversity and ecosystem loss and an increase in poverty (Gamau et al., 2015). It was consistently noted the role that peatlands have in protecting our climate and contributing to the solution of climate change.

In exploring the lack of transparency further, I found that several participants were unsettled by feeling as if plans for mine exploration and development went ahead regardless of the cost to the climate, health or social determinants of health. Health impacts were deemed to be of lesser importance than the economic gain to the province or country. Findings from participants' accounts, in line with this transpired into further discussions of IAs and the extreme lack of their occurrences within the province. With EIAs being voluntary within the private sector, participants noted them as often being disregarded. In accordance with research and participant views, bringing

health into IAs and making them mandatory could lead to considerable positive health and climate impacts, while engaging with members of the public affected by a proposal, helping decision-makers to find alternative improvements to prevent disease or injury and promote health and strengthen trust between industry partners and community (Harris & Haigh, 2015; World Health Organization, 2023). The Canadian Environmental Assessment Agency (2019) does provide an overview of the Impact Assessment Act and discusses “one project, one assessment” in order to reduce duplications and meet requirements of all jurisdictions. However, the evidence from this research demonstrates a deficiency with regard to follow-through and actual implementation. I suggest this as a desirable starting point to add to the robustness of an already existing procedure by mandating impact assessments for all projects and incorporating a health and climate change perspective. Along with adapting the current process to add this health and climate change lens, policy development may also benefit from utilizing such frameworks of Planetary Health, Eco-Health and One-Health, as a way to view these inextricably linked phenomena. As mentioned in a newspaper article by CBC News quoting Dayna Scott, research chair in environmental law and justice and associate professor at Osgoode Hall Law School and the Faculty of Environmental Studies at York University, aligned with the perspective of participants, Scott noted: “what Minister Guilbeault should do, is pause the process and sit down with all affected and interested First Nations in the area to discuss how they can proceed forward with a comprehensive impact assessment that includes consideration of sustainability and climate impacts” (Turner, 2022a).

In addition, findings from the literature and documentary analysis show that it is contradictory to remove environmental protectors in light of climate change in order to produce something that the economy may not be able to support. With the shift to EVs and further green technology, statements of participants note their concern for the current infrastructure within the province and its inability to support what is proposed for future developments. Participants often times mentioned the benefits of increasing public transit systems as opposed to increasing personal vehicle use as a tool to alleviate further emissions, while benefiting the planet by leaving minerals in the ground.

Despite the inclusion of government reports, policies and Acts claiming to address their need for adaptation in a changing climate, a significant portion of these efforts appear to revolve around industries adapting to the consequences of climate change, rather than implementing strategies to mitigate or reverse its effects. Global, federal and provincial reports are a step in the

right direction to signal the need for change, but it is clear from this research that there is still a way to go. Participants of this study were able to identify differing junctures where climate change was brought into focus, yet also came to a halt due to impacts from the COVID-19 pandemic. This poses the question of how we are able to navigate a changing system and adapt in times of need. There appears to be a lack of positive change, where the opposite is occurring with the reduction of IAs within the province. Competing priorities have made it evident that when fiscal and economic gain are distinctly on the agenda, health and environmental protections takes a back seat. This is and will continue to be problematic in not only mining, but for any industry with a larger carbon footprint.

Security for a livable and sustainable future has a rapidly closing window of opportunity as it relates to climate change, human well-being and planetary health (IPCC, 2023). Health in Canada is not always seen as a priority especially when it interferes with financial gain. Research on Kingdon's 'window of opportunity' or 'multiple streams framework' (Mannheimer et al., 2007) could therefore be applied to this study to incorporate solutions for change. As outlined in the literature, disaster creates opportunity for change, whether formal or informal, and when a public health problem is well received by the public, it can make it a politically viable reason for revision or development of policy (Amri & Logan, 2021; Birkmann et al., 2008; Brundiers & Eakin, 2018). In accordance with participants from this study, when a health issue creates public outrage, it draws political and media attention, opening up the window of opportunity. This framework suggests merging society's problems with policy solutions and politics could very well place health and climate change at a higher level of importance (Amri & Logan, 2021; Mannheimer et al., 2007). Furthermore, by drawing on previous disaster and sustainability literature, we can create conditions for change utilizing both bottom-up and top-down approaches which create an opportunity to reset or rebuild a system for the better (Brundiers & Eakin, 2018). This is where the role of public health, drawing upon a HiAP approach would be beneficial. With performance indicators of "Towards Sustainable Mining" (TSM), outlining their commitment to corporate biodiversity conservation, accountability and communications, biodiversity planning and implementation (Lucas, 2020), health bodies could work with government organizations similar to TSM to create a shared understanding of health within sustainability in this industry.

In exploring the role that public health has in climate initiatives in the mining industry, I found that many participants were sometimes unsure of the role that health could have. There were

strong connections to the impact of mining on health with issues such as increased cancer rates, water contamination, food insecurity, and other social determinants of health such as income, job insecurity, and structural conflict. When it came to the role in climate change initiatives however, it was more difficult to sometimes see the connection. With more probing and discussion, participants saw how health could be brought into already existing policies and Acts, such as EIAs. The role therefore of public health or PHO, amongst this very convoluted process, could be one where the focus as a health professional may be to help build and mend relationships between industry, government and health. Their role could be to advocate for action at the local level first, and use a research body such as PHO to strengthen their scientific evidence. In addition, solutions proposed include bringing health to the top of the priority list, utilizing vulnerability, climate and health assessments, greater communication with public health and accompanying bodies and initiating further transparency between industry. Public health could play a role in this by negotiating how to bring health into the assessment process, and by attempting to make this a priority alongside other governing and necessary bodies, such as the Ministry of Environment. Public health therefore could be called upon to adopt an ‘Eco-social’ approach to health, which puts public health at the center while focusing on population health, social, economic and ecological change (Canadian Public Health Association, 2015). This would allow for issues outside of carbon emissions to be focused upon in the forming of health policies by which mining impacts climate change. By building frameworks such as HiAP and Planetary Health into the policy process, there would be opportunity to put health at the forefront of proposals before they go ahead, which consider the combined impacts of environmental degradation such as ecosystem and biodiversity loss, and its implications on the climate and health.

One proposed solution was to look globally at countries who have successfully amplified health and made it their top priority across sectors to include in impact assessments. Research from New Zealand shows how through the use of planning and policy-making, health impact assessments can be used to assist in reducing health inequalities, allowing policy makers to enhance positive and reduce negative effects of a proposed policy (Ministry of Health, 2007; Public Health Advisory Committee, 2007). If we adopt solutions and find a way to work in cooperation with, rather than dispute across sectors, we find workable recommendations in a timely manner that suit the needs of groups and individuals involved and impacted by this rapidly changing climate. As outlined by participants of this research, health often becomes an afterthought

once proposals are well underway, making it much more difficult to reverse and implement solutions once a crisis or disaster has already occurred. Findings from this research as outlined by participants, can help us to understand how by putting health at the beginning of IAs, we may be able to reduce or eliminate many health concerns related to climate change. In addition, it may provide other impactful health benefits as they relate to the social determinants of health and sustainable development goals, such as increased food security, sanitary water, decreased pollution and wildfires.

Public Health Ontario has put together a case study series, providing technical advice and support to health care and the Government of Ontario. Its purpose is to share diverse environmental health issues and further encourage dialogue with health and environmental concerns (Ontario Agency for Health Protection and Promotion, 2015). By leveraging their scientific expertise, PHO could make a valuable contribution when examining climate change strategies in connection to the mining industry. For example, one particular report discusses chromite mining and processing and how it can contribute to negative impacts on health and the environment (Ontario Agency for Health Protection and Promotion, 2015). Research shows that cleaner energy sources are needed to reduce climate change, while also helping to save lives threatened by pollution (Patz & Thomson, 2018). Tensions arise when attempting to avoid, eliminate, or mitigate negative impacts while maximizing project benefits and opportunities without marginalizing the project economically (Krieger et al., 2010). Regardless of economic opportunities, many participants shared feelings of needing to strengthen the IA project and bring health into consideration. Although even well-crafted impact assessments do not currently consider health, literature cites that people impacted by the project should be solicited to help further understand health impacts and mitigation, along with environmental factors (Jones & Bradshaw, 2015; Nowacki et al., 2014).

Overall, it is evident that public health has a crucial role to play in climate change initiatives within the mining industry. Public health professionals are well-equipped to comprehend the intricacies and magnitude of how climate change affects physical, emotional, spiritual and mental well-being (Sanderson, 2022). This study offers valuable insights into challenges faced with competing priorities and systems of power, while bringing light to negative health implications from climate change within destructive, yet invaluable industries. My findings highlight the current and conflicting processes that take place throughout Ontario with regard to climate change and mining practices, while acknowledging the need for an industry to bring positive

transformation to our economy. My suggestions moving forward would be to create a more open and shared dialogue between governing bodies, while seeking to shift perspectives from strictly economic prosperity to one which exemplifies the need for the health of the planet. By encouraging accountability and transparency, themes brought up throughout this research, one can hope that we begin to see stricter enforcement for two inseparable dynamics. By proposing health be introduced into the IA process and making this mandatory versus voluntary, we would have the opportunity to lead impactful change and contribute to a greening economy in a way that is more efficient, safe and secure for all people and the climate we live in.

Despite this research providing a qualitative depiction of the potential role of public health in climate change initiatives in the mining industry in Ontario, there are some limitations. The scope of this topic extends beyond what has been outlined, and the examination of public health's connection to climate change only offers a glimpse into some of the concerns associated with the mining industry. There are other significant health issues posed by the industry and climate change that this research was unable to discuss in depth. I attempted to capture a subset of the issues discussed by participants and convey them in a manner that highlights the need for additional research in this domain. Indigenous populations should be highly represented in this area of research as they are one of the groups most impacted by these activities. Although an extremely important topic, this research was limited in its ability to conduct an in-depth analysis, and more focused attention is necessary to dive into this intertwined and divisive topic. This study was unable to address the colonial roots associated with the mining industry that require attention. In line with Indigenous viewpoints, reconciliation will never occur unless we are also reconciled with the planet. Indigenous insights may offer alternative solutions, contributing to a holistic lens of climate change which is perhaps along the same trajectory as discussing an eco-centric, planetary health lens.

An interesting observation can be made regarding which participants chose to be involved in this study and who did not. One notable finding from this research was the limited interest and sense of responsibility among key stakeholders in this domain. Many government bodies, which have a role in health and/or environmental protection or are directly related to mining declined to participate. They either considered it to be outside of their scope of expertise and redirected to others whom they believed to be more suitable, or declined to take part. Furthermore, I made efforts to capture the perspectives of the industry itself, but responses indicated that they do not

engage in studies of this nature. Other not-for-profit, environmental industries also declined to participate, citing the sensitive nature of the topic and their non-advocacy stance. These dynamics highlight the complex landscape and challenges in obtaining a comprehensive representation of all relevant stakeholders.

In addition to exploring other areas of impact, it is important to acknowledge that this study would have greatly benefited from a larger and more diverse sample size. Despite considerable efforts, my attempt to recruit participants from the mining industry and government were unsuccessful. Having greater diversity in this study would have allowed for a more in-depth picture of these stakeholders would have provided a deeper understanding of how government entities and ministries, specifically in relation to mining, perceive the connection to health. Relying primarily on grey literature limited the range of perspectives included in this study. Those who did choose to participate were more likely to hold views that prioritize health and exhibit a more critical stance towards mining. To obtain a more comprehensive and balanced view, it would be valuable to have a broader range of perspectives represented in future research. Regardless of this participation, it brings me to conclude that health is indeed absent and not yet connected to the larger picture, putting economic gain at the forefront of the industry. That being said, industry funding was not looked at in depth given the scope of this project. It would be beneficial to understand mining financing, and how this drives the way the mining industry considers health.

This study, rooted in a critical realist ontology and epistemology, sometimes presented challenges in terms of interpreting the interviews without a particular agenda. Being a public health student, my focus was first and foremost to pay close attention to how this topic impacts the health of the population and environment, with a critical eye on climate change. A formal scoping review may also be beneficial to further assess reports, Acts and regulations currently in place.

Chapter 8: Conclusion

The mining industry serves an important function in our society. To account for greener technologies however, mineral extraction contributes to consequential health and climate impacts. This study aimed to understand how public health could become involved in this sector in order to help slow climate change impacts while bringing a critical lens to health and the environment. By assessing policies, Acts and regulations in place, I was able to understand gaps in current practice and seek solutions to this problem. My findings attempt to fill this gap in the literature in an Ontarian context, which may also be applicable elsewhere in Canada and broadly within extractive industries. Recommendations derived from the literature and participants exemplify the need for health to be a main priority in the mining industry and make adjustments to policy and frameworks in order to minimize the repercussions of climate change and meet the 1.5°C goals of the Paris Agreement. The need for immediate change is here. We cannot afford to continue to put the health of people, environment and the planet aside any longer. With the support of current literature in health and climate change and any prospective studies, the findings from this research may be useful to help implement further and stricter policies which may be adhered to in the future of the mining industry in Ontario, or elsewhere in Canada. With this, the mining industry has potential to become a leader in climate change initiatives while contributing to positive relationship building amongst government and stakeholders, with a shared goal in mind to protect and enhance the world we live in. Furthermore, the industry has the ability and the option to lead with best interests of health, the environment, and ecosystems in mind, while putting aside the need for extreme economic gain. I will conclude with this quote from the Canadian Public Health Association (1992): “The harm that we are doing to this living planet – and thus to ourselves, should move us to sadness, perhaps to anger, but most of all, to action ... it is the greatest challenge public health has ever faced.”

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Appendix A - Recruitment Information



UNIVERSITY OF
WATERLOO

FACULTY OF HEALTH
School of Public
Health Sciences

Hello,

My name is Nicole Hutchuk and I am a Master's student working under the supervision of Dr. Elena Neiterman in the School of Public Health Sciences at the University of Waterloo. As part of my Master's degree, I am conducting research which aims to understand the role of public health in Ontario, in mitigating impacts of the province's mining industry on the environment and people's health as the industry expands with the call to supply minerals for a green energy transition. Given your role/role of your organization, I feel you may be well suited to provide insight on this topic.

If you decide to volunteer for this study, your participation will consist of a one-on-one semi-structured interview that will take approximately 45 minutes of your time. During the interview you will be asked questions about your knowledge about climate change policies or initiatives in relation to extractive industries. With your permission, I would like to audio record the interview to ensure accurate transcription and analysis.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board (ORE #44683).

Please read the attached Letter of Information and Consent Form for more details regarding what participation will involve. If you would like to participate, or you require additional information to assist you in reaching a decision about participation, please do not hesitate to contact me at nhutchuk@uwaterloo.ca. You may also contact my supervisor, Dr. Elena Neiterman, at eneiterman@uwaterloo.ca or (519) 888-4567 ext. 48221.

Sincerely,

Nicole Hutchuk

Student Researcher
School of Public Health Sciences
University of Waterloo
LHN 3721, 200 University Ave West
Waterloo, ON N2L 3G1
Email: nhutchuk@uwaterloo.ca

Appendix B - Recruitment Poster



UNIVERSITY OF
WATERLOO

FACULTY OF HEALTH
School of Public
Health Sciences

School of Public Health Sciences
University of Waterloo

PARTICIPANTS NEEDED FOR RESEARCH IN PUBLIC HEALTH AND CLIMATE CHANGE INITIATIVES AND THE MINING INDUSTRY IN ONTARIO

We are looking for volunteers to take part in a study on
climate change initiatives in relation to the mining industry in Ontario.

If you volunteer to be in this study, your participation will consist of one, 45-minute semi-structured interview online, via telephone, or in-person to talk about the type of initiatives public health could integrate in collaboration with the mining industry in Ontario to combat climate change.

For more information about this study, please contact:

Nicole Hutchuk, School of Public Health Sciences
at

E-mail: nhutchuk@uwaterloo.ca

You may also contact my supervisor, Dr. Elena Neiterman at eneiterman@uwaterloo.ca or (519) 888-4567 ext. 48221.

**This study has been reviewed by, and received ethics clearance
through a University of Waterloo Research Ethics Board.**

Appendix C - Interview Guide

Interview Guide A – Organizations

1. Can you please describe the organization you work for?
2. Can you describe your position and role within your organization and how long you have been working there?
3. Could you speak about the role your organization might or currently plays in climate change initiatives?
4. Do you know of any global, national or local initiatives which focus on climate change mitigation?
5. What is your general knowledge of extractive industries in relation to climate change?
6. Can you describe how you view the mining industry and climate change in relation to one another, if at all?
7. Are you aware of any current global policies in relation to climate change and extractive industries? [If yes: please describe]
8. Are there any policies or initiatives you are aware of in regard to climate change and extractive industries in Ontario, Canada? [If yes: please describe]
9. [If yes to previous questions] – How do you think these policies or initiatives could be assessed [used] to suit climate change initiatives in Ontario?
10. What might be some barriers faced to improving policy formation within Public Health Ontario and the mining industry?
11. How could we incorporate potential solutions to mitigate climate change in relation to the mining industry if there were no barriers?
12. How could the mining industry work more collaboratively with stakeholders to create a shared understanding of industry need (i.e. greening technology) and health implications?
13. How do you think Public Health Ontario could become more involved in the mining industry in Ontario in relation to climate initiatives?
14. Is there anything else you would like to discuss or add?

Interview Guide B - Researchers and Academics

1. Can you describe your position and role within your organization and how long you have been working there?
2. Can you describe your position and role in relation to climate change initiatives and/or the mining industry?
3. Could you speak about the role your organization might or currently plays in climate change initiatives?
4. Do you know of any global, national or local initiatives which focus on climate change mitigation?
5. What is your general knowledge of extractive industries in relation to climate change?
6. Can you describe how you view the mining industry and climate change in relation to one another, if at all?
7. Are you aware of any current global policies in relation to climate change and extractive industries? [If yes: please describe]
8. Are there any policies or initiatives you are aware of in regard to climate change and extractive industries in Ontario, Canada? [If yes: please describe]
9. [If yes to previous questions] – How do you think these policies or initiatives could be assessed to suit climate change initiatives in Ontario?
10. What might be some barriers faced to improving policy formation within Public Health Ontario and the mining industry?
11. How could we incorporate potential solutions to mitigate climate change in relation to the mining industry if there were no barriers?
12. How could the mining industry work more collaboratively with stakeholders to create a shared understanding of industry need (i.e. greening technology) and health implications?
13. How do you think Public Health Ontario could become more involved in the mining industry in Ontario in relation to climate initiatives?
14. Is there anything else you would like to discuss or add?

Appendix D - Letter of Information and Consent Form



August 10, 2023

Dear Participant:

This letter is an invitation to participate in a research study titled '*Exploring the Role of Public Health in Climate Change Initiatives and the Mining Industry in Ontario, Canada*'. The purpose of this study is to understand what role public health could play in Ontario in mitigating climate change impacts of the province's mining industry on the environment.

This study will be undertaken by Nicole Hutchuk, a Master's student at the University of Waterloo in the School of Public Health Sciences, under the supervision of Dr. Elena Neiterman.

What you will be asked to do:

Participation in this study is voluntary. It will involve taking part in a semi-structured interview that will take approximately 45 minutes to complete.

Depending on your preference and the logistics of scheduling, the interview will be conducted over an online platform, [such as Zoom, Microsoft Teams, or over the phone]. Zoom and Microsoft Teams has implemented technical, administrative, and physical safeguards to protect the information provided via the Services from loss, misuse, and unauthorized access, disclosure, alteration, or destruction. However, no internet transmission is ever fully secure or error free. University of Waterloo researchers will not collect internet protocol (IP) addresses or other information which could link your participation to your computer or electronic device without first informing you. Depending on COVID-19-related restrictions, the interview may also be offered in person.

With your permission, the interview will be audio and video-recorded to facilitate the collection of information, and later transcribed for analysis. You may choose to have your video turned off for the duration of the interview. During the interview, you may decline to answer any of the interview questions and/or share your personal information with the student-researcher. Further, you may withdraw from this study at any time during the interview by advising the researcher. You can withdraw your consent to participate and, if you wish to do so, have your data destroyed at any time during data collection and analysis. If you request to withdraw, we will erase the interview transcript and all the research notes that were taken during the interview process. You will not be

able to withdraw consent once the final project paper has been submitted or findings are shared with the public, which will occur in approximately June 2023.

Confidentiality:

Your identity will remain confidential. Any quotations from transcripts used in papers, reports, publications, or presentations from this research will remain anonymous and may be presented with only the information of the participant that is important to the topic being discussed. Your name or any other personal identifying information will not appear in any research papers or publications resulting from this study. However, if stating your role does not hinder your ability to be identified, this may be used with your permission. Your name and contact information will be stored separately until the end of the project, approximately August 31st, 2023. To protect your confidentiality, we will erase the recording of the interview right after we transcribe it, but the transcription which will be assigned a pseudonym will remain. The stored audio/video file up until deleted, will be encrypted. The consent form that you signed will be stored separately from your anonymized interview transcript and research notes will be stored as a separate encrypted file on a password-protected computer of the researcher and will only be accessed by the research team. The dataset without identifiers may be shared publicly. The files will be kept for a minimum of one year. All records are destroyed according to University of Waterloo policy.

Benefits and risks of participating in this study:

Participation in this study may not provide any personal benefit to you. We hope the data collected will advance our understanding of how public health can further contribute to climate change initiatives within extractive industries in Ontario. There are no anticipated risks to you participating in this study.

Research Ethics clearance and further questions:

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board (REB #44683). If you have questions for the Committee, contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or reb@uwaterloo.ca.

For all other questions regarding this study, or if you would like additional information to assist you in reaching a decision about participation, please contact Nicole Hutchuk by email at nhutchuk@uwaterloo.ca or Dr. Elena Neiterman, at (519) 888-4567 ext. 48221 or by email at eneiterman@uwaterloo.ca.

I look forward to speaking with you and thank you in advance for your assistance in this project.

Yours Sincerely,

Nicole Hutchuk
Student Researcher
School of Public Health Sciences
University of Waterloo
LHN 3721, 200 University Ave West
Waterloo, ON N2L 3G1
Email: nhutchuk@uwaterloo.ca

CONSENT FORM

By agreeing to participate in this study, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

I have read the information presented in the information letter about the study being conducted by Nicole Hutchuk and Dr. Elena Neiterman, School of Public Health Sciences, University of Waterloo. I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and any additional details I wanted.

I am aware that I have the option of allowing my interview to be audio and/or video recorded to ensure an accurate recording of my responses.

I am also aware that excerpts from the interview may be included in the project paper and/or publications to come from this research, with the understanding that the quotations will be anonymous.

I was informed that I may withdraw my consent at any time during the interview by advising the student researcher. This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board (REB #44683). If you have questions for the Committee, contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or reb@uwaterloo.ca.

For all other questions contact Elena Neiterman at (519) 888-4567 ext. 37221 or eneiterman@uwaterloo.ca

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

YES NO

I agree to have my interview audio/video recorded.

YES NO

I agree to the use of anonymous quotations in the course project papers and any other publications based on this research.

YES NO

I agree to be identified by role (e.g. manager, government agency, position title) in the course project papers and any other publications based on this research.

YES NO

I give permission for my de-identified data to be made available in a repository for future research.

YES NO

I agree to be contacted by the researcher after the interview to be sent information or be asked follow up questions.

YES NO

Participant Name: _____ (Please print)

Participant Signature: _____

Witness Name: _____ (Please print)

Witness Signature: _____

Date: _____

Appendix E - Verbal Consent Form

Exploring the Role of Public Health in Climate Change Initiatives and the Mining Industry in Ontario, Canada

Oral Consent Script

Introduction:

Hello. I'm Nicole Hutchuk and I am a Master's student working under the supervision of Dr. Elena Neiterman at the University of Waterloo's School of Public Health Sciences in Waterloo, Ontario. I am conducting research about the role public health can play in introducing climate change initiatives to the mining industry in Ontario.

I located/found your name by researching organizations that have an understanding of public health, climate change or the mining industry in Ontario.

Study procedures:

I am inviting you to do a one-on-one interview [in person, over phone, or through an online platform of the participant's choice such as Skype, Zoom, or Microsoft Teams] that will take about 45 minutes. I will ask you questions about your understanding of climate change initiatives globally and within Ontario, your understanding of the role extractive industries play in climate change processes and your understanding of potential barriers to policy implementation within these industries. I can ask you such questions as 'Describe how you view the mining industry and climate change in relation to one another, if at all', or, 'What might be some barriers faced to improving policy formation within Public Health Ontario and the mining industry?', or 'What is your general knowledge of the mining industry in relation to climate change?'. With your permission, I will take notes to record your answers as well as use an audio recorder to make sure I don't miss what you say. We can set up a time and place that works for us both.

Are there any risks to doing this study?

There are no anticipated risks to this study.

During the interview, you may decline to answer any of the interview questions and/or share your personal information with the student-researcher. Further, you may withdraw from this study at any time. If you decide to withdraw, we will erase the interview transcript and all the research notes that were taken during the interview process. Your identity will remain confidential. Your name or any other personal identifying information will not appear in any research papers or publications resulting from this study. However, with your permission, we will share the anonymized interview transcript with the members of the research team. To protect your confidentiality, we will erase the audio recording of the interview right after we transcribe it, but the transcription which will be assigned a pseudonym will remain.

Benefits:

It is unlikely that there will be direct benefits to you, however, we hope the data collected will advance our understanding of how public health can further contribute to climate change initiatives within extractive industries in Ontario.

Voluntary participation:

- Your participation in this study is voluntary.
- You can decide to stop at any time, even part-way through the interview for whatever reason, or up until the thesis is submitted, as it will no longer be possible for participants to withdraw their data.
- If you decide to stop participating, there will be no consequences to you.
- If you decide to stop, we will ask you how you would like us to handle the data collected up to that point.
- This could include returning it to you, destroying it or using the data collected up to that point.
- If you do not want to answer some of the questions you do not have to, but you can still be in the study.
- If you have any questions about this study or would like more information, please refer to the full information letter or you can contact Nicole Hutchuk at nhutchuk@uwaterloo.ca Dr. Elena Neiterman at (519) 888-4567 ext. 48221 or eneiterman@uwaterloo.ca.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board (REB #44683). If you have questions for the Board, contact the Office of Research Ethics at 1-519-888-4567 ext. 36005 or reb@uwaterloo.ca.

Consent questions:

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

YES NO

I agree to have my interview audio/video recorded.

YES NO

I agree to the use of anonymous quotations in the course project papers and any other publications based on this research.

YES NO

I agree to be identified by role (e.g. manager, government agency, position title) in the course project papers and any other publications based on this research.

YES NO

I give permission for my de-identified data to be made available in a repository for future research.

YES NO

I agree to be contacted by the researcher after the interview to be sent information or be asked follow up questions.

YES NO

- Do you have any questions or would like any additional details? [*Answer questions.*]
- Do you agree to participate in this study knowing that you can withdraw at any point with no consequences to you?

Participant Name: _____

Researcher's Signature: _____

Date: _____

[If yes, begin the interview.]

[If no, thank the participant for his/her time.]

Appendix F - Feedback Letter



August 10, 2023

Dear Participant,

I would like to thank you for your participation in this study entitled “*Exploring the Role of Public Health in Climate Change Initiatives and the Mining Industry in Ontario, Canada.*”

As a reminder, the purpose of this study is to understand what role public health could play in mitigating climate change impacts of the province’s mining industry on the environment.

We hope the data collected will advance our understanding of how public health can further contribute to climate change initiatives within extractive industries in Ontario.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board (REB #44683). If you have questions for the Committee, contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or reb@uwaterloo.ca. For all other questions, please contact Dr. Elena Neiterman at (519) 888-4567 ext. 48221 or eneiterman@uwaterloo.ca or Nicole Hutchuk at nhutchuk@uwaterloo.ca.

Please remember that your identity will be kept confidential. Once all the data is collected and analyzed for this project, we may share this information with the research community through seminars, conferences, presentations, and journal articles. If you wish to receive the results of the study, please provide your email address and, when the study is complete, Dr. Neiterman will send you the information.

Yours Sincerely,

Nicole Hutchuk

Student Researcher
School of Public Health Sciences
University of Waterloo
LHN 3721, 200 University Ave West
Waterloo, ON N2L 3G1
Email: nhutchuk@uwaterloo.ca

Elena Neiterman, Ph. D.

Associated Professor, Teaching Stream
School of Public Health Sciences
University of Waterloo
LHN 3721, 200 University Ave West
Waterloo, ON N2L 3G1
Telephone: (519) 888-4567 ext. 48221
Email: eneiterman@uwaterloo.ca

Appendix G: Ring of Fire Timeline

2003: Noront began using two frozen lakes as landing strips for exploration, even when concerns voiced from Marten Falls Webequie First Nations (Garrick, 2010).

2007: Discovery of Ring of Fire, announced by Noront Resources to include platinum, palladium, nickel, and copper (Reynolds, 2008; Sudbury Mining Solutions Journal, 2011).

2009: Joseph Carrabba, Cliffs Natural Resources President, claimed “world-class deposits” and potential to produce 1-2 million tonnes per year for more than 30 years (Northern Miner Staff, 2009).

2010: Purchase of Ring of Fire finalized (Ontario Ministry of Northern Development and Mines, 2013).

2011: Environmental Assessments by Federal and Provincial Governments in Canada began for Cliffs Natural Resources & Noront Resources’ Eagles nest project, both agreeing to make projects subject to Environmental Assessment under Ontario Environmental Assessment Act (Government of Ontario, 2014).

2012: Cliffs Natural Resources announced \$3.3 billion investments to build chromite mine, transportation corridor and processing facility in Ring of Fire – smelter would be located in Sudbury, Ontario (CBC News, 2012).

2017: Ontario Premier, Kathleen Wynne, pledged support for construction of year-round road from Nibinamik and Webequie First Nations to Ontario Highway 599 at Pickle Lake to help facilitation of Ring of Fire (*Bob Rae on Ring of Fire Talks*, 2013). Government working toward creating equal partnership to develop chromite deposit with First Nations communities (*Bob Rae on Ring of Fire Talks*, 2013).

2019: Noront Resources Ltd. had the most holdings and claims in Ring of Fire – Noront issues 300,000 shares to Marten Falls First Nation and 150,000 shares to Aroland First Nation as part of their project advancement agreement (NetNewsLedger, 2019).

2020: Challenges arose facing development of Ring of Fire with access to the remote region with infrastructure deficits such as roads, and First Nations land rights and environmental issues (Rocha & Guttsman, 2013). Ceremonial signing took place in March 2020 to solidify partnership between two First Nations and Ontario government to develop all-season road infrastructure and move forward with developments (Northern Ontario Business Staff, 2020).

2021: Provincial Government volunteered \$1.6 billion to address road access issues to connect First Nation regions by ground (Sommerfeld, 2021). Australian company, Wyloo metals acquired control in Noront Resources, with Wyloo Metals sale taking place for \$616.9 million of the Ring of Fire (Burgos, 2021; Northern Ontario Business Staff, 2022).

2022: Marten Falls and Webequie First Nations began leading provincial and federal EIA process for proposal Marten Falls access roads and Webequie supply roads. Approved in October 2021 by provincial environmental assessment (Government of Ontario, 2022).