THE ROLE OF MINING IN COMMUNITY SUSTAINABILITY IN NEWFOUNDLAND AND POLICY IMPLICATIONS

A CASE STUDY OF BAIE VERTE

By

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Abstract

The island of Newfoundland is very important to the Canadian mining industry. It houses some of Newfoundland and Labrador's (NL) major mining operations and exploration activities. Commercial mining, which began in 1864 on the island, has historically impacted the sustainability of communities. Using a mixed methods case study approach, the study first employed a three capitals sustainability assessment model, the 'Telos framework', to assess the current state of community sustainability in the Town of Baie Verte. The study then examined the impacts of mining on the assessed state of sustainability in Baie Verte and explored the role of government and corporate policies in these impacts.

The study findings indicate that the Town of Baie Verte has had two mining eras (the old era from1960s-1996, and the new era from 2010-present). The mining operations in the old era, on the one hand, made significant contributions to the economic and socio-cultural capital of Baie Verte, but were environmentally destructive with adverse impacts on health and safety. The mining operations in the new or current era, on the other hand, seem to have good environmental performance so far, but have made fewer contributions to the economic and socio-cultural capitals of Baie Verte compared to the previous era. In terms of the role of policy, overall, both government and corporate policies seem to have played more of an environmental role than an economic or socio-cultural role in enhancing the sustainability of mining communities in NL; but in the case of Baie Verte, corporate policies have made significant socio-economic contributions as well. Two recently launched federal and NL provincial government sustainable mining policy initiatives, namely the Canadian Minerals and Metals Plan (CMMP) and Mining the Future 2030, a Plan for Growth in the NL Mining Industry, have the potential to supplement other existing policies and plans and to enhance the overall sustainability of mining communities

in NL, including Baie Verte. In order to achieve this, collaboration will be needed between stakeholders in government, industry, and local communities for implementing these plans.

Keywords: Sustainability Assessment, Telos Framework, Baie Verte, Newfoundland, Mining Policy

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Dedication

I dedicate this thesis to my beloved mother, Hajia Hausatu Awudu and the loving memory of my late father, Mohammed Osman (A.K.A Skipper).

Table of Contents

List of Tables

List of Figures

List of Acronyms

AMD	Acid Mine Drainage (AMD)
CMMP	Canadian Minerals and Metals Plan
CNA	College of North Atlantic
CSR	Corporate Social Responsibility
EA	Environmental Assessment
FCM	Five Capital Model
GMI	Global Mining Initiative
ICMM	International Council on Mining and Metals
ICMC	International Cyanide Management Code
IIED	International Institute for Environment and Development
IBAs	Impact and Benefit Agreements
ICSP	Integrated Community Sustainability Plan
ICME	International Council on Metals and Environment
IRMA	Initiative for Responsible Mining Assurance
MAC	Mining Association of Canada
MMSD	Mining, Minerals and Sustainable Development
NAOMI	National Abandoned and Orphaned Mines Initiative
NHS	National Household Survey
NL	Newfoundland and Labrador
NRCan	Natural Resources Canada
PDAC	Prospectors and Developers Association of Canada

PWC	Price Waterhouse Coopers
SD	Sustainable Development
SLO	Social License to Operate
SBS	Sustainability Balance Sheet
TBL	Triple Bottom Line
TSM	Towards Sustainable Mining
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Program
WCED	World Commission on Environment and Development
WMI	Whitehorse Mining Initiative
WMC	World Mining Congress

List of Appendices

Chapter 1: Introduction

1.1 Background

Mining, the means by which minerals and metals are extracted from the earth's crust, is an indispensable industry in the global economy (MAC, 2017). The industry provides raw materials used in the production of commodities such as automotive equipment, electrical and electronic appliances, construction materials, etc. (Azapagic, 2004). About 43 million people are directly employed in both the large and small-scale sectors of the mining industry globally, and approximately 250-300 million people in the world generally rely on mining for a livelihood (MMSD, 2002). The industry's contribution to global GDP has been estimated to grow by 4% per year in the coming years, which is faster than the projected average growth rate of the global GDP of about 3% (PWC, 2018; IMF 2019). The majority of the industry's production comes from top producing countries like China, Australia, Russia, USA, Canada, Brazil, and South Africa (WMC, 2018).

The Canadian mining industry is one of the largest and most important in the world. It is globally ranked first in the production of potash and among the top five global producers of cobalt, diamonds, gold, nickel, platinum and uranium (NRCan, 2019). The mining industry has made Canada the hub of global mining finances with about 50% of the world's public mining companies enlisted in two of its exchange markets, namely the Toronto Stock Exchange (TSX) and TSX Venture Exchange (MAC, 2018). These exchange markets accounted for about 57% of global mining equities raised in 2016 (MAC, 2017). The mining industry also plays an important role in the economic development of Canada as a nation. In 2018, the industry accounted for $47 billion in Canadian minerals production, in turn contributing $97 billion or 5% to Canada's

nominal GDP and providing direct and indirect employment to about 626,000 people (NRCan, 2019). Minerals exports were valued at $105 billion for the same year, representing 19% of Canada's total exports (NRCan, 2019). The provinces of Ontario, British Columbia, Quebec, and Saskatchewan are the major drivers of the industry's production; but some significant contributions also come from Newfoundland and Labrador and the Northwest Territories- two areas currently experiencing increasing minerals exploration and development activities (MAC, 2018).

Newfoundland and Labrador (NL), the province within which the study is focused, is the fifth largest mining jurisdiction in Canada (MAC, 2018). The NL mining industry plays a significant role in the development of the Canadian mining sector. The province contributes about $3.0 billion annually to Canada's minerals production through the production of minerals like iron ore, gold, copper, zinc, and lead (NL Department of Natural Resources, 2018a; MAC 2018). The industry in the province accounts for about 46% of Canada's annual iron ore shipments (NL Department of Natural Resources, 2018a). With a total of 11 active producing mines, the NL mining industry contributed approximately 6.4% to the provincial GDP in 2017, as against 1.4%, 12.8%, and 14.4 % contributions of the fisheries, construction, and oil and gas industries respectively (Government of NL, 2019a). As at 2018, the NL mining industry also provided direct employment to about 4,800 people (NL Department of Natural Resources, 2018a). Between 2017 and 2018, the industry generated about $90 million in mining taxes and attracted about $2.3 billion mining capital investments in the province (NL Department of Natural Resources, 2018a).

Canada produces about 60 minerals and metals in close to 200 mines spread in communities across its provinces and territories (NRCan, 2019). The mining sector has over the

years impacted the economic, socio-cultural, and environmental sustainability of these communities in Canada and others around the world (Veiga et al, 2001; Bowes-Lyon et al, 2009) (discussed further in chapter 2). For instance, since commercial mining commenced in NL in 1864 it has had mixed impacts on the sustainability of communities in the province (Rennie, 1998). The impacts of mining on communities in Newfoundland, the island portion of the province that is the focus of the study, will be discussed further in chapter 3, and in the results section of this thesis in relation to the mining Town of Baie Verte as a case study.

Due to the varied impacts of mining on communities around the world, the concept of sustainable development in the context of mining has received global attention and recognition (Hilson, 2000; Azapagic 2004). Governments in several jurisdictions have devised strategies for addressing the sustainability challenges facing the mining industry in their respective jurisdictions (Ranängen & Lindman, 2017). In Canada, the federal, provincial and territorial governments, as well as the mining industry itself, have developed a number of policies and initiatives for advancing the course of sustainable development in the mining sector (Hilson, 2000). For instance, both the federal and NL provincial governments have developed various environmental legislation and regulations like the Fisheries Act, the Environmental Protection Act, the Water Resources Act, the Mining Act, etc., and other sustainable mining policy initiatives like the Minerals and Metals Policy, the National Orphaned and Abandoned Mines Initiative (NOAMI), the Minerals and Metals Plan, Mining the Future 2030 Plan, etc. The Canadian mining industry has also developed other sustainable mining policy initiatives like Towards Sustainable Mining (TSM), and e3 Plus. These government and industry policy initiatives and their contributions to sustainable mining in Canada in general, and in Newfoundland more specifically, will be discussed further in chapter 3.

The focus of the study is to explore the impacts of mining on community sustainability on the island of Newfoundland (also referred to as Newfoundland in this thesis) using the town of Baie Verte as a case study. The study also seeks to understand whether and how government and corporate mining policies have helped to reduce mining's negative impacts and enhance the positive ones. The mainland portion of the province (Labrador) is not included in the study because most recent studies on the impacts of mining on communities in the province have focused mainly on it (Storey, 2011; Rodon & Lévesque, 2015; Procter, 2015; Keeling & Sandlos, 2015; Sandlos & Keeling, 2016; Belayneh et al., 2018), creating a gap in the literature in relation to the island. Another reason why Labrador is not considered in this study is because it is home to a significant number of Indigenous peoples (mainly Inuit and Innu). The connections of these Indigenous groups to their lands and natural resources and their related legal rights and titles make them characteristically different from the mining operations in settler communities located on the island (Tanner, 1998) and, hence, beyond the scope of the study.

1.2 Problem Statement

As discussed above, mining developments usually have mixed impacts on the sustainability of communities, and communities in Newfoundland are no exception to this. Some of the impacts of mining on communities in Newfoundland that will be discussed further in chapter 3 have included job creation, revenue generation, infrastructural development, population fluctuation, environmental degradation, and health and safety issues. Despite the impacts that mining has had and continues to have on the sustainability of communities in Newfoundland, little research has been done on this topic in recent times (Skeard, 2014). In fact, no known research has used a sustainability assessment framework to study the impacts of mining on

communities in NL or tried to assess the role of mining policies in this regard. The only existing research in Canada that has used a similar kind of assessment framework to study the impacts of mining on a community was done on the Quebec Labrador border, and was done in relation to a community well-being indicator model (Klinck et al, 2014). There is, therefore, a gap in the literature on the impacts of mining on the sustainability of communities in Newfoundland and the role of policy in those impacts. The study aims to fill this empirical gap and contribute to the growing body of knowledge in the literature on mining and community sustainability. The study seeks to achieve this by using a sustainability assessment model called the Telos framework (to be discussed further in Chapter 4), to assess the impact of mining on the sustainability of the case study town of Baie Verte, Newfoundland.

1.3 Purpose and Objectives of Research

As outlined above, mining developments have historically impacted the sustainability of communities on the island of Newfoundland, notable among which are communities on the Baie Verte peninsula- the first commercial mining region on the island of Newfoundland (Rennie, 1998). Baie Verte, a small town located on the peninsula, has a mining history dating back to the 1950s. The characteristics of Baie Verte as an active mining town on the island of Newfoundland make it a good fit for a case study research that seeks to explore the impacts of mining on community sustainability in Newfoundland.

In the light of the above discussion, the objectives of the study are to:

- Identify the sustainability vision and goals of Baie Verte as defined by the municipality and residents.

- Identify the strengths and weaknesses of Baie Verte from a sustainability perspective, using the Telos Framework.
- Examine the impacts of mining on community sustainability in Baie Verte in relation to how it has been defined by the municipality and perceived by residents.
- Identify mining related policies (government and corporate) being used or which could be used in the future to enhance community sustainability in NL in general, and in Baie Verte specifically.

In order to achieve these research objectives, the study employed a mixed method approach, using both qualitative and quantitative research techniques (to be discussed further in chapter 4). Consequently, the study obtained research data from primary and secondary sources such as: municipal sustainability documents, government and industry policy documents, government and industry reports, a resident survey, and semi-structured interviews of industry and community stakeholders. An internship with the Baie Verte Town Office also enabled a component of lived experience to be brought into the study.

1.4 Significance of the Study

The NL mining industry plays a significant role in both provincial and national economic development. For example, the industry contributes about 6.4% to NL's GDP and accounts for about 46% of Canada's annual iron ore production (NL Department of Natural Resources, 2018a). The industry is growing at a very fast pace, as its revenue generation to the province in the form of mining taxes and royalties increased from 1.7% of the total generated revenue in the 2017-2018 fiscal year to 6.5% in 2018-2019 fiscal year (Government of Newfoundland and Labrador, 2019). The provincial government seems determined to develop the industry even

further. This is illustrated by the recent launch of 'Mining the Future 2030: a Plan for Growth in the NL Mining Industry' as a strategic plan to increase the industry's production by the year 2030 (NL Department of Natural Resources, 2018a). In attempting to further develop the NL mining industry, the sustainability of communities that currently host or could potentially host mining developments in the province is also a very important consideration, given their key role in the development of the mining industry. This study, which focuses on the impacts of mining on community sustainability in Newfoundland, using the town of Baie Verte as a case study, could potentially serve as a reference point for a better understanding of the sustainability challenges and opportunities of other mining communities in the province. The study makes both policy and academic contributions. It could serve as a useful source of information to policy makers, as it illustrates how existing government and corporate mining policies are impacting the sustainability of communities in Newfoundland and Baie Verte specifically, and also recommends other policies and initiatives that could be used in the future to enhance the sustainability of mining communities in the province.

The study is the first research attempt to use a sustainability assessment framework and a case study approach to examine the impacts of mining on community sustainability in Newfoundland, and indeed in Canada, according to the results of the literature review undertaken. The study thus aims to fill the empirical gap identified in the literature mentioned in section 1.3 above. The study also makes further contributions to the literature on community sustainability assessment and mixed-methods case study research approaches, which could be useful for studies in other areas with similar settings.

1.5 Organization of Chapters

The thesis is organized in seven different chapters each speaking to specific aspects of the study. The organization of the chapters is as follows: Chapter 2 provides the conceptual foundation of the study by reviewing the literature on the sustainable development concept and how it applies to mining. The chapter further explores the literature on the sustainability of resource dependent communities and of mining communities specifically within that general literature. Chapter 3 gives a background of the historical development of mining on the island of Newfoundland and its impacts on communities. The chapter then describes the policy responses from the Canadian federal government, the NL provincial government, and the mining industry towards sustainable mining and how they apply to the sustainability of communities. Chapter 4 focuses on the research design and methods used in the study. Chapter 5 and 6 discuss the research results pertaining to community sustainability in Baie Verte and mining's impact on it. Chapter 7 discusses the research results related to the role of mining policy on sustainability in Baie Verte. The chapter then discusses general conclusions and policy recommendations and recommends areas for further research.

Chapter 2: Literature Review

This chapter discusses the key concepts and ideas guiding the study. It first gives an overview of the literature on the conceptual underpinning of the study - Sustainable Development (SD). This is followed by discussions from the literature on how SD applies to mining, including the various ideologies or perspectives, frameworks and initiatives that have evolved around the applicability of the concept in mining in general. The chapter then explores the literature on the sustainability of resource dependent communities and positions the sustainability of mining communities in that more general resource community sustainability literature. This aspect of the literature review focusing on the impacts of mining on community sustainability is organized using the three pillars of SD (economic, socio-cultural, environment), which are also aligned with the analytical framework (Telos Framework) used in the study. The review of the global literature on the impacts of mining pays particular attention to the Canadian context where possible. The literature on the impacts of mining on communities on the island of Newfoundland, which is the focus of the study, will however be discussed in chapter 3.

2.1 Overview of the Sustainable Development Concept

The study is underpinned by the concept of Sustainable Development (SD). SD as a concept emerged in the early to mid-1980s, "... as an attempt to bridge the gap between environmental concerns about the increasingly evident ecological consequences of human activities, and socio-political concerns about human development issues" (Robinson, 2004, p. 370). The emergence of SD as a concept, was more or less a follow-up of the 1960s to the early 1980s (preservationist and conservationist) debates in the environment literature. The preservationist side of the debate argued that natural resources must be preserved in their pristine

form. The conservationist side, on the other hand, argued that natural resources should be utilized by humans, but conserved in a manner that will still make them available for future use. The conservationist side, thus, led to the development of SD as a concept (Robinson, 2004).

Sustainable Development (SD) as a concept was first popularized by the World Commission on Environment and Development (WCED) or the Brundtland Commission in 1987 (Mebratu,1998). The concept became widely used after the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992 (MMSD, 2002). In its landmark report, 'Our Common Future' or 'the Brundtland Report', the WCED defined SD as, *"*development that meets the needs of the present without compromising the ability of the future generations to also meet their needs" (Brundtland Report, 1987, p. 43). It was emphasized in the Brundtland Report that no single blueprint exists for sustainable development (Cowell et al., 1999), and that the ways by which SD could be achieved will depend on the economic and political systems prevalent in an area at a given time (NRC, 1995). At the UNCED in Rio de Janeiro, SD was identified as having three 'pillars' or 'dimensions'- social, economic, and environment (MMSD, 2002). These three pillars, which Elkington (1994) then used for his Triple Bottom Line (TBL) model, were considered to be the main areas of attention for SD (Lins & Horwitz, 2007).

Despite the popularity of the Brundtland definition of SD above, it remains a highly debated, 'fuzzy' concept (Robinson, 2004). Several attempts have been made to clarify the meaning of SD both in the academic literature (Robison, 2004; Williams & Millington, 2004; Rogers et al., 2012; Reid, 2013; Holden et al., 2014; Carley & Christie, 2017; etc.), and by advocacy groups and organizations (Mebratu, 1998). Mebratu (1998) suggests that these attempts have resulted in three main categories of definitions for SD, namely the institutional definition,

the ideological definition, and the academic definition. As expounded by Mebratu (1998), the institutional definition of SD is based on 'needs satisfaction' as masterminded by organizations like the International Institute for Environment and Development (IIED), and the World Business Council for Sustainable Development (WBCSD) – which contributed to the Millennium Development Goals, and now focuses on the role of businesses in the attainment of the Sustainable Development Goals (WBCSD, 2018). The ideological definition on the other hand is based on 'green ideologies' like Eco-theology, Eco-feminism, and Eco-socialism; and the academic definition is based on 'academic disciplines' like environmental economics, ecology, and social ecology. The environmental economics definition of SD identifies the undervaluing of ecological goods as the source of environmental problems (Andersen, 2007; Fiala, 2008; Hussen, 2012), the ecology definition identifies human dominance over nature as the problem (Morelli, 2011; Colloca et al., 2013), while the social ecology definition identifies societal dominance over nature as the problem (Hill, 2005; Ungar, 2011; Lejano & Stokols, 2013).

In addition to the three pillars or TBL of SD identified in Rio de Janeiro in 1992, several scholars have over the years proposed the addition of more pillars as a means to address the gaps associated with the TBL (Segura-Salazar & Tavares, 2018, Elkington, 1997). Consequently, pillars like 'governance' (Glavič & Lukman, 2007), 'ethics' (Raitu et al. 2015), 'technology' (Jovane et al., 2008), and 'time' (Lozano, 2008) have been proposed as essential additions. In addition to the TBL model, assets or capital-based models have also been used to conceptualize SD (Segura-Salazar & Tavares, 2018). The first capital-based model to measure sustainable development was by Pearce and Atkinson (1993). Even though the model has been identified as a 'weak' sustainability model, it incorporates the idea that the overall level of a capital stock should be non-decreasing. The 'Five Capital Model' (FCM), which identifies five forms of

capital (natural capital, man-made capital, human capital, social capital, and cultural capital) as important to SD, is mostly considered as an alternative to the TBL model (Segura-Salazar & Tavares, 2018). The main difference between the TBL and FCM is that the latter divides the social dimension of SD into an individual aspect (human capital) and a group aspect (social capital). This division also clearly shows the aspect that is related to the artificial environment or manufactured capital (Segura-Salazar & Tavares, 2018).

Another way that the definitions of SD have been categorized in the literature is through the notion of 'strong sustainability' and 'weak sustainability' (Neumayer, 2003; Ekins, 2003; Williams & Millington, 2004; Wilson et al, 2007; Kuhlman & Farrington 2010; Davies, 2013; etc.). According to Meadowcroft (2017), sustainability implies "the adjustment of societal development trajectories so that they remain within an envelope that the environment can support" (p.45). The two notions of sustainability mentioned above are similar to the preservationists and conservationist debates discussed earlier as they are also based on the relationship between humans and nature (Williams & Millington 2004). Weak sustainability is perceived as taking a more 'techno-centric or human-centered' approach, implying a decline in natural capital and an increase in human capital over time (Dasgupta, 2004; Dasgupta, 2007). Solow (1953) started the discussion on weak sustainability by speaking about the possibility of the substitution of depleted natural capital by produced man-made capital. Strong sustainability on the other hand, is perceived as rather taking a more 'eco-centric or nature-centered' approach, implying a stability in natural capital while there is an increase in human capital over time (Dasgupta, 2004; Dasgupta ,2007). The notion of strong sustainability emerged as a result of the impossibility of Solow's substitution concept, and the realization that natural capital and man-made capital are complementary rather than substitutable (Dasgupta, 2007).

Resilience is yet another concept being recognized as a key element in recent sustainability thinking (Folke et al. 2002; Fiksel, 2006; Magis, 2010; Redman, 2014; Marchese et al. 2018; etc.). Resilience has been defined by Walker et al. (2004) as "the capacity of a system (including environmental, economic, and social systems) to absorb disturbances and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks" (p.2). The emergence of resilience, as a concept in the sustainability literature, is largely the result of the continuous efforts of emergency response agencies and non-governmental organizations (NGO) to create a future that has both an enhanced quality of life and a resistance to adverse impacts following environmental threats like storms, droughts, climate change etc. Thus, like sustainability, resilience also focuses on the survivability of a system (Marchese et al. 2018). The concept of resilience has been applied in a number of areas including community development (Murray & Zautra, 2012; Lew et al., 2016), economic geography (Martin, 2011; Martin et al., 2015), social ecology (Smith & Stirling, 2010; Folke et al., 2016), and disaster risk reduction (Cutter et al., 2008; Alexander, 2013; Cutter, 2016).

This thesis takes its position from the strong sustainability perspective, as it utilizes an analytical framework (Telos framework) that defines SD as a balanced increase in all the three components or the TBL of SD (see chapter 4). The next section of this literature review chapter will explore the literature on how SD, as a concept, has been applied in the context of the minerals and metals or mining industry. The section that follows it will also utilize the TBL model of SD, which is similar to the analytical framework used in this study (to be discussed in chapter 4) to explore global literature on the impacts of mining developments on the economic, socio-cultural, and environmental sustainability of communities around the world, and particularly in Canada, where possible.

2.2 Sustainable Development and the Mining Industry

2.2.1 Background and Perspectives on Sustainable Development in Mining

The Brundtland Commission, in its landmark report Our Common Future, provided a solid foundation for sustainable development (SD) through its popular definition of the concept (Hilson, 2010). The commission, however, did not provide any outline that industries can follow towards the pursuit of SD (Hilson & Murck, 2000). As a result, many experts from government, industry, and academia have made attempts to explain how SD applies to mining and minerals-based economies (Hilson, 2010). These attempts have resulted in a proliferation of scholarly literature on SD and mining (Tilton, 1996; James, 1999; Hilson & Murck, 2000; Hilson & Basu, 2003; Eggert, 2006; Horowitz, 2006; Shen et al., 2015; etc.).

Scholars have mostly viewed the SD concept in the context of mining from two perspectives (Segura-Salazar & Tavares, 2018). The first perspective is based on the management and use of mineral resources - 'resource sustainability', and the second perspective is based on the reduction of impacts associated with the production of mineral resources - 'mines sustainability' (Hilson, 2001, McLellan, 2009). The scholars in support of the 'resource sustainability' perspective have often reflected on the non-renewable or exhaustible nature of mineral resources, and the need for mineral production to be done in such a way as to sustain both the current and anticipated future demands for the resources (Brown, 1993; Auty and Warhurst, 1993; Mikesell, 1994; Tilton, 1996; Auty and Mikesell, 1998). For instance, Auty and Mikesell (1998), proposed two approaches for attaining sustainability with depleting mineral resources. The first approach is to conserve mineral assets so as to extend the lifespan of reserves. This, they indicated as attainable through the implementation of policies to restrict the exploration and extraction of resources in order to make them available to future generations

(Hilson, 2000). The second approach is to only permit mineral extraction based on market demand, and at the same time prevent its depletion from affecting capital consumption. This they also indicated as attainable through the investment of portions of mineral revenue to compensate for any loss that may occur due to resource depletion (Hilson, 2000).

The second group of scholars in support of the 'mine sustainability' perspective, are of the view that mineral developments must be done in such a way as to reduce any negative impact on the environment, and at the same time improve the socio-economic quality of life of people (Crowson, 1998, James, 1999; Labonne, 1999; Eggert, 2000). Segura-Salazar and Tavares (2018) in their literature review on Sustainable Development (SD) and mining, for example, identified the sustainability challenges faced by the mining industry as having to do with preserving the natural environment, ensuring human and social well-being, ensuring economic prosperity, ensuring good government and corporate mining governance, and inventing and utilizing sustainability-driven technologies in operations. Crowson (2002) and Richards (2005) have merged the two perspectives into a single definition of SD in mining to mean the non-wastage of resources and the development of resources in a socially, economically, and environmentally responsible manner.

Along with the two main perspectives discussed above, some scholars have viewed the applicability of the SD concept in mining from additional perspectives (Segura-Salazar & Tavares, 2018) such as:

- Product and mine life cycle perspective (Cowell et al., 1999; Azapagic, 2004; McLellan et al. 2009; Fleury & Davies, 2012; Birat, 2014; Pimentel, 2016)
- Timescale perspective, with regard to the variation of mining's impacts from present to future generations (McLellan et al. 2009; Moran et al., 2014)

- Space or geographical perspective, with regard to variation of mining from local scales to global scales (Giurco & Cooper, 2012; Bond, 2014, Moran et al., 2014)
- Climate change perspective, with regard to the industry's impact on climate change (Ali et al. 2017, Sharma, 2017, Odell et al. 2018).

This thesis takes its position from the mine sustainability viewpoint in that it uses the Town of Baie Verte as a case study to assess the impacts of mining on the sustainability of communities in Newfoundland, taking into account social-cultural, economic, and environmental considerations. The thesis further examines the policy measures being used to address those impacts.

2.2.2 Sustainable Mining Frameworks and Initiatives

Mining has historically been a source of economic wealth to several nations; however, social and environmental concerns have constantly been raised with regard to sustainability in the industry (Tost et al., 2017). Consequently, several frameworks and initiatives for ensuring sustainability in the mining industry have been developed since the 1990s to address these identified challenges. Most of these frameworks and initiatives were spearheaded by industry stakeholder groups on global, regional, or national scales (Segura-Salazar & Tavares, 2018). Some of the global industry, non-government and government frameworks are discussed below, and the Canadian frameworks in particular will be discussed in chapter 3.

The first global attempt to champion the course of sustainability in the minerals industry was through the formation of the International Council on Metals and Environment (ICME) in 1991 (Segura-Salazar & Tavares, 2018). ICME was a non-governmental organization that sought to promote among its member companies "the development and implementation of sound

environmental and health policies and practices in the production, use, recycling and disposal of non-ferrous and precious metals" (UNESCO, 2000, p.1). The launch of the Global Mining Initiative (GMI) in 2000, through a collaborative effort between top mining companies and the World Business Council on Sustainable Development (WBCSD), represented a second attempt to conceptualize the SD concept in the mining industry (Tost et al., 2017, Segura-Salazar & Tavares, 2018). This was followed by a global study, the 'Mining, Minerals and Sustainable Development (MMSD) Project', led by the International Institute for Environment and Development (IIED) between 2000 and 2002. The MMSD Project generated a comprehensive report on sustainable mining - 'Breaking New Grounds' (Salazar & Tavares, 2018). According to this report, SD in the mining industry should be based on socio-economic and environmental integrity and effective governance systems. The report defined SD in mining as follows:

> One of the greatest challenges facing the world today is integrating economic activity with environmental integrity, social concerns, and effective governance systems. The goal of that integration can be seen as 'sustainable development'. In the context of the minerals sector, the goal should be to maximize the contribution to the well-being of the current generation in a way that ensures an equitable distribution of its costs and benefits, without reducing the potential for future generations to meet their own needs (IIED 2002, pg.16)

The group working on the GMI and MMSD led to the formation of the International Council on Mining and Metals (ICMM) in 2001 (Tost et al., 2017), as an improved version of the ICME (Segura-Salazar & Tavares, 2018). Inspired by the MMSD project, the ICMM as an industry body developed a set of SD principles for the mining industry in 2003 (Levesque & Paraszczak, 2014). ICMM has, since its inception, collaborated with several communities within its member states along with international organizations on the sustainable mining agenda (Segura-Salazar & Tavares, 2018). One example of such a collaborative approach to sustainable

mining is the partnership between ICMM and the Global Reporting Initiative (GRI) to develop a set of sustainability guidelines (ICMM-GRI) to be adopted by ICMM member companies in their sustainability reporting (Petrie, 2007, Levesque & Paraszczak, 2014).

In 2002, the International Institute for Environment and Development (IIED) and the World Business Council for Sustainable Development (WBCSD) commissioned a report that examined the performance of the mining industry in relation to SD and the identified ways by which the industry's performance could be improved (UNDP, 2018). The report led to the development of voluntary international responsible mining standards such as: the ICMM Sustainable Development Framework, the Initiative for Responsible Mining Assurance (IRMA), the Standard for Responsible Mining, the Responsible Jewellery Council (RJC) Code of Practices, the International Cyanide Management Code (ICMC), the Aluminium Stewardship Initiative (ASI), the Bettercoal Code (BC), etc. (see table 2.1 for details). According to UNDP (2018), such voluntary industry standards have now become "… part of the normative framework in mining" (p.49), as the actions of mining companies are guided by them.

Table 2. 1: Global Responsible Mining Standards

1. ICMM Sustainable Development Framework - adopted in 2003 as a key part of the International Council on Mining and Metals (ICMM, previously ICME). The framework has a set of 10 principles which cover governance, social and environmental performance of the mining industry. For details see https://www.icmm.com/en-gb/members/member-commitments/icmm-10-principles	**2. Initiative for Responsible Mining Assurance (IRMA) Standard for Responsible Mining** - a standard, first adopted in 2014 and revised in 2016. The standard defines good practices for what responsible mining should look like at the industrial scale. The standard measures the performance of mining companies based on four requirements: Business Integrity, Planning for Positive Legacies, Social Responsibility, and Environmental Responsibility. For details see https://responsiblemining.net/what-we-do/standard/

3. Responsible Jewellery Council (RJC) Code of Practices - a standard adopted in 2009 and revised in 2013. It is applicable to companies along the jewelry value chain, including diamond, gold and precious metals. It covers ethical, social and environmental practices and respect for human rights. For details see https://www.responsiblejewellery.com/files/RJC_Code_of_Practices_2013_eng.pdf	**4. International Cyanide Management Code (ICMC)** - developed by a multi-stakeholder Steering Committee under the guidance of UNEP and ICME (now ICMM), a voluntary industry program for gold and silver mining companies. The objective of the code is to improve the management of cyanide used in gold and silver mining and assist in the protection of human health and the reduction of environmental impacts. For details see https://www.cyanidecode.org/
5. Aluminium Stewardship Initiative (ASI) Performance Standard - is a standard adopted in 2014 applicable along the aluminium value chain. Defines environmental, social and governance principles and criteria to address sustainability issues along the value chain. See https://aluminium-stewardship.org/asi-standards/asi-performance-standard/	**6. Bettercoal Code (BC)** - adopted by Bettercoal, an organization set up in 2012 by major European utilities. It is applicable to coal mining companies. It covers issues of ethical conduct, social and environmental responsibilities. The code provides incentives to mining companies that adhered to it as European utilities companies more likely buy coal from them. For details see https://bettercoal.org/

Source: Adopted from UNDP (2018)

In addition to the global sustainable mining initiatives discussed above, Peck (2011) in his background document to the United Nations Environment Programme (UNEP) on sustainable mining, has also identified other forms of initiatives that are regional and national in nature. The regional initiatives are either Africa focused (e.g. Africa Mining Vision - AMV), Latin America focused (e.g. Science and Technology for Development - CYTED), or Asia-Pacific focused (e.g. Asia-Pacific Economic Cooperation - ASEC). The national initiatives were mostly spearheaded by developed mineral resource-based jurisdictions like Canada (e.g. Towards Sustainable Mining- TSM, National Abandoned and Orphaned Mines Initiative - NAOMI, e3 plus, etc.) and Australia (e.g. Leading Practice Sustainable Development Program - LPSDP). These Canadian initiatives, which are the focus of this research, will be discussed further in chapter 3.

In addition to the frameworks and initiatives discussed above, Corporate Social Responsibility (CSR) and Social License to Operate (SLO) are two important concepts that have emerged in the sustainable mining literature (Jenkins, 2004; Prno & Slocombe, 2012; Yakovleva, 2017; Moffat et al., 2018). CSR is a voluntary corporate practice that extends above and beyond

the legal requirements binding business operations (Vogel, 2005). CSR has been defined by Jenkins and Yakovleva (2006) as relating to "the activities (voluntary) of businesses, particularly in terms of their contribution to achieving economic, social and environmental sustainability" (p. 272). CSR is, thus, the means for operationalizing sustainable development at the corporate level (Bansal, 2005). In the context of mining, CSR is about how mining companies create a balance between the development demands of communities and the need to protect the environment, along with the increasing need to earn profit for the business (Jenkins, 2004). CSR calls for mining companies to respond to both their shareholders and an array of stakeholders, such as local communities affected by their operations (Hamann, 2003). The literature is replete with examples of CSR strategies and initiatives being implemented in the mining sector in different jurisdictions (Government of Canada, 2015; Siyobi, 2015; Ross, 2016). Despite the highlighted importance of CSR as a means for ensuring sustainability in the mining industry, the implementation of sound CSR initiatives, that appeal to key industry stakeholders, such as local communities, has been noted in the literature as a challenge faced by mining companies (Mutti et al., 2012; Dobele, 2014; Bice, 2014).

Social License to Operate (SLO) emerged as a concept in the context of the extractive industry (Wood & Thistlethwaite, 2018). SLO has been defined by Thomson and Boutilier (2011) as "the ongoing acceptance and approval from local communities and other stakeholders" (p. 1779), relating specifically to nontechnical issues associated with a project (Smits et al., 2017). In the context of mining, "SLO is based on the idea that, in addition to government permits, mining companies also need permission or consent from the public to conduct their business" (UNDP, 2018, p.94). The adverse environmental and socio-economic impacts associated with mineral development, coupled with the need for increased stakeholder participation and

involvement in mineral development decision making processes (Prno & Sclombe, 2012) have made SLO an important concept in the mining industry (Mercer-Mapstone et al., 2017). Consequently, local communities by virtue of their proximities to mining projects have become key arbitrators in the SLO processes and also influential actors in minerals resource development (Prno & Sclombe, 2012).

The importance and critiques of CSR and SLO as key concepts in the sustainable mining discourse, as deduced from the literature has been considered in this thesis. This will be highlighted further in the results section (Chapter 6) in discussing the views of community stakeholders on the impact of mining on community sustainability in the case study area of Baie Verte. The contributions of CSR initiatives of the mining companies operating in the area on community sustainability will also be discussed in Chapter 7.

The literature on mining and sustainability also addresses various issues of community sustainability, an aspect of the 'mine sustainability' viewpoint (Crowson,1998; James, 1999; Labonne, 1999; Eggert, 2000), which advocates for the development of minerals resources in such a way as to provide fewer negative environmental impacts and more socio-economic benefits to local communities (Hilson, 2001). To add context to this, the literature on the sustainability of mining communities, which are defined in this thesis as "ones whose population are significantly affected by a nearby mining operation" (Veiga et al. 2001, p. 192), is first positioned as part of the resource dependent communities' literature. This is followed by a review of literature pertaining to mining communities more specifically.

2.3 Sustainability of Resource Dependent Communities

Resource dependent communities are communities that "generally share an economic orientation on a single-industry and whose economies are overwhelmingly natural resource-dependent, with the result that they suffer with the fluctuating global demands and prices for their resource commodity" (Halseth & Sullivan, 2003, p.133). Such communities, as stated by Randall and Ironside (1996), have "… an unbalanced labour and industry profile, wherein resource sectors overwhelm employments in all other sectors" and where resource employment is at least as large as the traditional "core of public-service jobs" (p.24-26). Clemenson (1992) states that such employment should make up 30% or more of the total labour force in those communities classified as resource dependent. Between the 1970s and 1980s, the literature on the relationships between natural resources and the socio-economic well-being of resource-dependent often rural communities, mainly in North America, gained prominence (Lawrie et al., 2011). This body of literature focused on themes such as the life cycle of resource dependent communities (Lucas, 1971; Bradbury, 1979) and the social impacts of downturns and industry closures (Bradbury & St-Martin,1983). The focus later included themes like: the link between commodity prices and community well-being (Freudenburg,1992), the implications of rapid growth of the resource sector (Smith et al., 2001), the distribution of income in resource communities (Leatherman & Marccouiller, 1996), poverty in resource communities (Randall & Ironside, 1996; Wilson, 2004), Indigenous rights and the resource sector (O'Faircheallaigh & Corbett, 2005; Lertzman & Vredenburg, 2005; Sawyer & Gomez, 2012; Parlee, 2015), and the political economy of the resource sector (Hayter & Barnes, 2001).

As stated by Lawrie et al. (2011), much of the resource communities literature highlights the challenging relationship between minerals extraction and community well-being. This literature

has identified three reasons for the attention to resource communities and the consequent proliferation of related literature in the 1970s and 1980s. The first reason was that resource towns, mainly in the USA, Canada, and Europe, were at the verge of socio-economic collapse due to a limited resource base, growing international competition and global economic disruptions (Himelfarb, 1976; Bradbury & St-Martin 1983). The second reason was that the development of energy boomtowns, mainly in USA, as a result of the 1970s Arab oil ban, had led to an increased interest in the problems associated with rapid growth (Little, 1977; Krannich, 1979; Wilkinson et al., 1982; Brown et al., 1989). The third reason was that some scholars became interested in building on the research that examined the prevalence of poverty amidst resource abundance that had been observed in minerals dependent developing economies (e.g. Frank, 1967), which was later referred to as the 'resource-curse thesis' (Auty, 2002).

The literature on resource dependent communities can be categorized in two parts (Lawrie et al., 2011). One part focuses on the socio-economic implications of resource-driven rapid growth (Kohrs, 1974; Gold, 1974, Gilmore & Duff, 1975; Gilmore, 1976; Little, 1977; Weber & Howell, 1982; Brown et al., 1989), and the other part focuses on the impacts of downturns and industry closures (Bradbury & St-Martin, 1983, Neil et al., 1992; Freudenburg, 1992; Wilson, 2004; Halseth, 2005). The first body of literature that focuses on the implications of resource-driven rapid growth, highlights the 'social disruption or dysfunction thesis'[1] (Lawrie et al., 2011) related to rapid economic and demographic changes in communities associated with resource development. Socio-economic problems, such as: crime and violence, mental health problems, drug and alcohol abuse, marital breakdown, loss of community connectedness

[1] Social Disruption or Dysfunction' thesis refers to the social and psychological dislocation and breakdown of established social structure in communities (Smith et al., 2001), as a result of rapid societal growth caused by resource developments.

and social cohesion, low educational attainment, high rates of poverty and unemployment and high dependence on welfare benefits, are attributed to resource dependent communities or boomtowns, especially those in remote rural areas (Gilmore, 1976; Little, 1977; Weber & Howell, 1982; Elo & Beale, 1985; Rushen, 1995; Freudenburg & Wilson, 2002). Opponents of the social disruption thesis (Nord & Luloff, 1993; Randall & Ironside, 1996; Wilson, 2004; etc.), however, argue that social dislocation is not a universal trait that affects all resource dependent communities, because such communities are very heterogeneous in terms of economic characteristics, development trajectories, and governance arrangements. Wilson (2004) clearly explains this in her case study research of selected mining communities in the Midwestern part of USA. She does this by linking the different experiences of mining communities to what she termed as 'a resource roller coaster' on which "…the rides of all communities will not be identical, some may experience a wild ride while others may feel only a little dip or bump from time to time" (p. 266). Similarly, other scholars (Greider et al., 1991; Labonne, 1999) also noted that resource-driven rapid growth was not entirely problematic. The socio-economic disorder often associated with boomtowns is mostly restricted to only the period of rapid growth, and rarely affects all segments of the local population where such boomtown experiences occur (Greider et al., 1991; Wilson, 2004). Smith et al. (2001) amplified this point in their study that re-surveyed four boomtowns a few decades after their boom periods. They realized that the negative impacts attributed to the rapid growth in those boomtowns had lessened or completely disappeared over time. In fact, Labonne (1999) and Wilson (2004) observed that, in some communities, resource companies were not only engaged in resource extraction, but also had partnerships with local governments, community organizations, and state agencies in the resolution of community developmental problems.

These partnerships, as indicated by Lawrie et al. (2011), sometimes result in a form of 'joint governance' that helps in addressing the needs of both resource companies and local communities.

The second body of resource dependence literature highlights the vulnerability of resource communities to downturns and industry closures due to their single industry dependence (Lawrie et al., 2011). This single industry dependency has been highlighted by Freudenburg (1992) as mostly leading to "a form of regional economic 'addiction', in which the short-term consequences of a boom period 'include the very kind of 'shot in the arm'… and the longer term instead proving to be 'a bitter pill to swallow'" (p. 327). The 'bitter pill to swallow' in this sense was noted as involving two things. The first is the vulnerability of resource communities due to the single industry dependency (Wilson, 2004) and the lack of development of other sectors. The second is the social and economic upheavals experienced by resource communities as a result of downturns or industry closure, after resource exhaustion (Lawrie et al., 2011). Thus, examples in the literature have identified socio-economic issues like high rates of unemployment, poverty, and other social vices as attributes of resource dependent remote rural communities after the shutdown of industries on which they depend for their economic prosperity (Bradbury & St-Martin, 1983, Neil et al., 1992; Halseth, 2005).

Studies on community resource dependence have varied across different jurisdictions over time. In the case of Canada, Teitelbaum et al. (2018) identified three traditions or approaches to the study of community resource dependence, namely: Staples Research Approach (Hutton, 2007; Hayter, 2008; Carroll et al., 2011; etc.); Rural Development Approach (Picot & Heath, 1992; Randall & Ironside, 1996; Bullock, 2013); and Sustainability Studies Approach (Parlee, 2015; Parkins et al., 2001; Berkley et al., 2007). Scholars of the staples research approach have

emphasized the macro structural forces shaping resource economies. Scholars of the rural development approach, on the other hand, have concentrated on describing and analyzing the processes and social dynamics of resource communities. And scholars of the sustainability studies approach have focused on analyzing the progress of communities towards socio-economic and environmental sustainability. Some of these scholars (e.g. Ommer, 2007; Varghese et al., 2009; Lyon & Parkins, 2013) have also related sustainability to resilience. The concept of resilience, which is also assuming space in recent sustainability thinking as noted earlier, has been applied in studies of resource dependent communities in Canada, such as coastal communities (Ommer, 2007), forest-based communities (Varghese et al., 2009), and mining communities (Gibson & Klinck, 2005).

This thesis focuses on the sustainability of mining communities - one particular form of resource dependent community. Veiga et al. (2001) defines a mining community as "...one where the population is significantly affected by a nearby mining operation. The community may be associated with the mining venture through direct employment, or through environmental, social, or economic or other impacts" (p. 192). Veiga et al. (2001) further classify mining communities in terms of size, and as either: a) a city serving as a base for distance Fly-in/Fly-out (FIFO) workers, or as a centre for mining supplies and financing, or b) a village or remote rural area that relies mainly on local mining. Ballard and Banks (2003) noted that many of the world's mining communities fall under the later category, as they are mostly located in the remote resource-rich regions of Sub-Sahara Africa, Asia-Pacific, Australia, South America, and North America, including Canada. In Canada alone, there were approximately 198 mining communities identified before the year 2000 (NRCan, 1999).

Fly-in/Fly-out (FIFO) is a phenomenon whereby a local or resident workforce in remote resource communities is supplemented by a Long Distance Commuting (LDC) workforce due to shortages of skilled labour at the local level. This has become a common practice in the mining industry since the 1980s (Hoath & Haslam McKenzie, 2013; Haslam McKenzie et al., 2013), and there is a growing body of literature on FIFO in Australia (Storey, 2001; Atkinson & Hargreaves, 2014; Perry & Rowe, 2015) and Canada (Storey, 2016; Vodden & Hall, 2016). Commuter work arrangements such as FIFO have become a preferred cost-effective means for obtaining skilled labour in the mining industry (Storey, 2001). Some scholars have, however, noted that the reduction in local or resident workforce due to FIFO and influx of newcomers that results from FIFO can have adverse effects on the socio-economic sustainability of mining communities (Pick et al., 2001; Haslam-McKenzie et al., 2009; Newman et al., 2010). Drive-in/Drive-out (DIDO) is another LDC arrangement that has gained popularity in the mining industry (Di Milia & Bowden, 2007). Just like FIFO, the impacts of DIDO on the sustainability of mining communities have been highlighted in the literature (Perry & Rowe, 2015). The focus of this thesis is on the impact of mining on the sustainability of the case study area of Baie Verte, a community, which is mainly a mix of DIDO, FIFO, and local employments.

As observed in the resource dependency literature, most mining communities, even though different in terms of geography, culture, and governance, have common characteristics like being overly dependent on a single industry with limited opportunities for diversification (Veiga et al., 2001), and being socially and environmentally impacted by mining operations (Hilson, 2001). In view of this, such communities are usually faced with several challenges in seeking sustainability (Veiga et al., 2001). For mining communities to be sustainable there is the need for the communities "… to realize a net benefit that will last from the introduction of

a mine through to the closure of a mine and beyond" (Veiga et al., 2001, p. 192). That is to say, in order for mining communities to be sustainable, George Francis's three requirements of sustainable societies, namely: 'ecological sustainability'; 'economic vitality'; and 'social equity' must be met (Francis, 1999 cited in Veiga et al., 2001). These three requirements correspond with the three pillars of sustainable development and the three components of the analytical framework used in this research (see chapter 4 for details); hence, the next section will review the literature on the impacts of mining on communities, along those lines.

2.4 Impacts of Mining on Communities

This section discusses the global literature on the economic, socio-cultural, and environmental impacts of mining on communities, with a particular emphasis on Canadian literature, where studies were available. The discussion is presented along the lines of the analytical framework of the study (discussed further in chapter 4), which is similar to the way that discussions on community impacts are often organized in the literature.

2.4.1 Economic Impacts

This section discusses the literature on the economic impacts of mining on communities. These include impacts on labour market, knowledge infrastructure, economic structure, and physical infrastructure.

a. Labour Market: Mining creates employment opportunities and wage earnings in local communities (Bowes-Lyon et al., 2009; Rodon & Lévesque, 2015). Cordes et al. (2016) classified the employment opportunities created by mining into three main categories, namely direct employment, indirect employment, and induced employment. Direct employment includes

both the part-time and full-time jobs created within mining companies and jobs created by onsite contractors. Indirect employment is comprised of three components: 1) jobs created by offsite contractors working on a mining project; 2) jobs created mainly by suppliers and subcontractors who are connected to mining operations; and 3) jobs created by social investment activities (such as local business development) that mining companies have contributed to (ICMM, 2011; Cordes et al. 2016). In Canada, given that 409,000 direct jobs and 217,000 indirect jobs were generated by mining as of 2018, it can be suggested that approximately 0.5 indirect jobs are created for every direct job within the mineral sector (NRCan, 2018).

Induced employment, according to Cordes et al. (2016), refers to jobs created as a result of the spending effects of the direct and indirect employment, such as in shops, transportation, public services, etc. Cordes et al. (2016) note that there is often a greater number of jobs created in mining communities as a result of induced effects than from direct and indirect effects. For example, a study by McPhail (2009) identified up to 50,000 induced jobs as against 5,000 indirect jobs in a mining area in Ghana. Two Canadian studies, however, indicate lower figures. Dungan and Murphy (2007) in a study of a representative mine in Ontario identified up to 536 induced jobs as against 440 direct jobs and 846 indirect jobs. In British Columbia, 21,112 direct jobs in the mining sector were estimated to have created 16,590 indirect and 8,001 induced jobs in 2010 (PwC, 2011).

The mining industry has been noted in the literature as having a high wage structure, which makes it attractive for many workers. In Canada, for example, as of 2017, the average annual salary in the mining sector exceeded $117,000, by-passing that of other sectors like forestry, manufacturing, construction, and finance (MAC 2018). This high wage structure has been noted as causing deficits of the needed skills in other industries in mining areas (Evans &

Sawyer, 2009). For example, a longitudinal study by Lockie et al. (2009) in Australia discovered that coal mining operations resulted in a shortage of skilled labor in industries like agriculture in some mining regions in Queensland. Other studies have also highlighted how recent trends in the mining industry, like technological advancement (e.g. use of automatic machines) and outsourcing (Martinez-Fernandez & Wu, 2007) have, however, resulted in reduced job availability in the industry (Bellany & Pravica, 2011). Further, recent practices of Fly-in/Fly-out (FIFO) and Drive-in/Drive-out (DIDO) in mining have led to reduced employment opportunities for local mining workers in some communities, as they compete for jobs with workers from other regions (Kotey & Rolfe, 2014).

Some studies in the literature (Slack & Jensen, 2004; Black et al., 2005) have focused on the 'boom-bust' nature of mining developments to depict the impacts of mining on local labour markets overtime (Deller & Schreiber, 2012). Black et al. (2005), for example, in a study of coal production in the Appalachian region found a converse relationship between the boom years and the bust years of mining developments in the region. They observed that the negative spillovers of employment loss in the bust period of mining were considerably higher than the positive spillovers of employment gains in the boom period. Not surprisingly, that the local labour market of mining communities often suffers deterioration after the shutdown of mining operations (Deller & Schreiber, 2012). The development of mining relevant skills within the labour force of mining communities is another related impact of mining on the local labour market that is well documented in the literature. This will be discussed further in the next paragraph on knowledge infrastructure.

b. Knowledge Infrastructure: It is well documented in the literature that the presence of a mine in an area usually attracts several local people into obtaining the relevant training and skills needed to gain employment in the mines (Bowes-Lyon et al., 2009, Scott et al., 2012). Nonetheless, Azapagic (2003) noted that inadequate technical knowledge and skills at the local level result in the outsourcing of high-level mine positions in most areas (a very common practice now with the prevalence of FIFO and DIDO, as discussed above). Perhaps this explains why some studies, like that of Bowes-Lyon et al. (2009) in Nunavut, highlight the need for governments to support the establishment of appropriate training infrastructure (including institutions and relevant programs) that will enhance the development of competitive skills sets at the local level. Other studies (e.g. MMSD, 2002, Azapagic, 2004) have called on the mining industry to make communities more sustainable by building the capacities of local employees through the provision of transferrable skills training programs that will enhance their capacities and enable them to obtain employment in other local industries after the mine's closure.

c. Economic Structure: The mining industry is noted in most parts of the literature as having positive economic impacts on local communities. These impacts are mainly in the form of revenue generation (not only for workers, but often for local governments and organizations through taxes and royalties and/or other financial contributions as well), and the provision of direct and indirect local employment opportunities (Rawashdeh et al., 2016; Lévesque, 2015). The mining industry is also noted as creating spin-offs of other supporting businesses and services, boosting the economies of local communities (Kotey & Rolfe, 2014). In fact, Evans & Sawyer (2009) and Garnett (2012) stated that mining usually results in the development of small and medium enterprises (SMEs), such as retail and service businesses in communities. This

assertion has been confirmed in several case studies, including that of Petkova et al. (2009) which observed a high demand for local goods and services by mining companies in Australian mining communities.

At the same time, the literature also suggests the lack of economic diversification as one of the negative economic impacts of mining on communities. Mining communities, like other resource dependent communities, were noted as overly depending on the mining industry, with little or no room for economic diversification (Innis, 1956; Kuyek & Coumans, 2003), as discussed above. Most of the new businesses created by the mining industry are dependent on it (Petkova et al., 2009), and are, thus, not sustainable after the industry shuts down. Some studies, especially on mines closures, conducted in different regions, highlight how the lack of economic diversification in mining communities made them vulnerable (Haney & Shkaratan, 2003; Andrews-Speed et al., 2005; Rixen & Blangy, 2016). The often temporary nature of mining and its resulting impact on the economic sustainability of local communities, have contributed to the proliferation of the literature on the need for economic diversification strategies for ensuring sustainability in mining communities (Kuyek & Coumans, 2003; Nel et al., 2003).

d. Physical Infrastructure: Physical infrastructure like roads, water and sanitation facilities, housing, medical facilities, educational facilities, communication networks, etc. are essential in all stages of mining developments (Johnson, 2017). In fact, the availability of good quality infrastructure is noted as having a bearing on the viability of a mining project (Johnson, 2017). Mining companies thus often invest in the development of physical infrastructure, which is then shared with local communities (Rolfe et al., 2010). Examples exist in the literature of how the development of physical infrastructure by mining companies in Australia has enhanced the

quality of life in several remote mining communities (Rolfe et al., 2010, Hajkowicz et al., 2011, Petkova et al., 2009). Other examples exist of how the mining industry often degrade local infrastructure in some areas without compensation (MMSD, 2002). Johnson (2017) also identified instances where challenges faced by mining companies, such as the high cost of infrastructure development and maintenance and lack of government support, often deter them from supporting local infrastructure. Hence, some mining companies have now been noted as focusing on paying their taxes and leaving local infrastructure developments in the hands of governments (Kotey and Rolfe, 2014).

Table 2. 2: Summary of Literature on Economic Impacts of Mining

<table>
<tr><th colspan="2">1. Labour Market</th><th colspan="2">2. Knowledge Infrastructure</th></tr>
<tr><td colspan="2">▪ Direct, indirect, and induced employment opportunities (Bowes-Lyon et al., 2009; Rodon & Lévesque, 2015; Cordes et al., 2016)</td><td colspan="2" rowspan="2">▪ Increased knowledge and skills development among labour force (MMSD, 2002; Bowes-Lyon et al., 2009; Scott et al., 2012)
▪ Outsourcing of jobs with high-level mine positions due to inadequate local expertise (Azapagic, 2003)</td></tr>
<tr><td colspan="2">▪ High wage structure and attraction of more labour force (Evans & Sawyer, 2009; Lockie et al., 2009)</td></tr>
<tr><th colspan="2">3. Economic Structure</th><th colspan="2">4. Physical Infrastructure</th></tr>
<tr><td colspan="2">▪ Revenue generation and job creation (Bowes-Lyon et al.,2009; Garnett, 2012; Rodon & Lévesque, 2015; Al Rawashdeh et al., 2016)</td><td colspan="2" rowspan="3">▪ Investment in the development of local physical infrastructure e.g.: road, school, hospital, etc. (Rolfe et al., 2010, Hajkowicz et al., 2011, Petkova et al., 2009)</td></tr>
<tr><td colspan="2">▪ Spin-offs for local businesses (Evans & Sawyer, 2009; Petkova et al., 2009; Kotey & Rolfe, 2014)</td></tr>
<tr><td colspan="2">▪ Vulnerability due to lack of economic diversification into other industries (Kuyek & Coumans, 2003; Andrews-Speed et al., 2005; Stacey et al., 2010; Rixen & Blangy, 2016)</td></tr>
</table>

Source: Author's construct based on literature review

2.4.2 Socio-Cultural Impacts

This section discusses the literature on the socio-cultural impacts of mining on communities. These include impacts on population and demography, health and well-being, housing and living conditions, education, sense of place, and participation and governance.

a. Population and Demography: The impacts of mining on the population and demographic patterns of mining-dependent communities around the world are well documented (Hollywood, 2002; Bainton et al., 2017; Castillo & Brereton, 2018). Population migration has been noted as the main population and demographic dynamic in mining regions. The strong connection between the mining industry and migration has been highlighted by Taylor (1969) and Emery (1992) in their reference to mining as a 'migratory trade' and miners as 'industrial gypsies'. Some social impact researchers have linked different forms of migratory behaviours to mining developments (Castillo & Brereton, 2018). These include: the movement of people to and from resource areas due to mining induced displacement and resettlements (Szablowski, 2002; Bury, 2007; Owen and Kemp, 2015), the in-migration of 'foreigners' attracted by new economic opportunities and improved services in mining areas (Gilberthorpe et al., 2016; Bainton et al., 2017), the out-migration of low-income 'locals' due to high cost of living (Sachs & Warner, 2001), and the out-migration of both foreigners and locals due to lack of economic opportunities after the closedown of mines (Hollywood, 2002; Nyame et al., 2009). Some studies have also established a relationship between the population and demography of mining communities and the boom and bust periods of mining. The boom period studies have linked population growth in mining communities to the development of new economic opportunities, resulting in in-migration; while the bust period studies have linked out-migration and population decline in

mining communities to the decline in economic opportunities (Sachs & Warner, 2001; Nyame et al., 2009). These studies have characterized the bust periods as involving the desertion of communities (Nyame et al., 2009), ageing of the population (Rolfe & Kotey, 2014), and the consequent withdrawal of some government services, like healthcare, education, etc. from communities (Hanlon & Halseth, 2005, Nyame et al., 2009).

b. Health and Well-Being: The impact of mining on the health and well-being of communities has attracted the attention of governments, NGOs, researchers, and the mining industry itself (Shandro et al., 2011). A comprehensive literature review by Stephens and Aherns (2001) highlighted that most studies on mining and its impact on community health have, over the years, focused on the negative health implications of community exposure to toxins. In recent times, however, the literature is replete with examples of the impact of mining developments on the different facets of community health and well-being. Attention is being paid to issues like: public health (Saha et al., 2011; Ahern et al., 2011; Gibb et al., 2014; Hendryx, 2015), family health (Gibson & Klinck, 2009; McPhedran & De Leo, 2014), women's health (Hinton et al., 2003; Lovell & Critchley; 2010, D'Souza et al., 2013), mental and emotional health (Hendryx & Innes-Wimsatt, 2013; Hossain et al., 2013), workers' health and safety (Storey & Lewchuk, 2000; Graber et al, 2014), and community health care provision (Hanlon & Halseth, 2005). A case study by Shandro et al. (2011) of the coal mining community of Tumbler Ridge in British Columbia, for example, observed that the boom-bust nature of mining development had negative impacts on the community's health and well-being. These impacts included: the prevalence of sexually transmitted diseases, drug abuse, violence and abuse against women, family stress, mine work injuries, mental health issues (depression and anxiety), and burdens to health and social services.

c. Housing and Living Conditions: Housing and living conditions in mining communities are mostly impacted by the temporary nature of mining developments. Most case studies in the literature, particularly in Australia and North America, have linked shortages in housing and high cost of housing acquisition and general costs of living to the boom period of resource developments (Lawrie et al., 2011; Jacquet, 2009; Haslam McKenzie & Rowley, 2013). Haslam McKenzie and Rowley (2013) noted that the high demand for labour and consequent rise in population in-migration in mining communities results in these conditions. Other scholars further highlight that the high costs of living, including housing in resource communities, including mining communities, during boom periods sometimes results in the exclusion of the low-income earners not involved in the resource industry (Sachs & Warner, 2001; Lockie et al., 2009; Scott et al. 2012). This usually results in a 'dysfunctional community' that lacks support services and population diversity (Haslam McKenzie et al., 2009; Wetzstein, 2011). The bust period of resource development, on the other hand, has been associated with rapid decline in local population due to out-migration, which results in less demand for housing and low cost of housing and in some cases to deserted settlements (Ennis et al., 2013). For example, the closure of the Quintette mine in the year 2000 resulted in a drop in the cost of housing in Tumbler Ridge in British Columbia (Mining Watch Canada, 2001). Some authors also highlight how the bust period of mining also resulted in a reduction in the value of housing, mostly owned by mine workers in mining communities (Mining Watch Canada, 2001; Petkova et al., 2014).

d. Education: The impact of mining on the state and level of education in local communities is well documented in the literature, mostly in form of case studies (Bowes-Lyon et al., 2009; Hajkowicz et al., 2011; Petrova & Marinova, 2013; Al Rawashdeh et al., 2016). The case studies

suggest that mining usually has mixed impacts on the state and level of education in communities. For example, Hajkowicz et al. (2011), in their study of 71 local government areas in Australia, discovered that mining had a positive impact on a number of life quality indicators, including education. Most of the people living in remote mining regions of the study were seen as having high levels of educational attainment. Another study by Bowes-Lyon et al. (2009) in Nunavut also discovered that mining had positive impacts on the education of local residents. This was because mining companies were supporting local communities through donations in the form of scholarships, as well as infrastructural development funds. Contrary to the observations made in the above studies, a case study by Al Rawashdeh et al. (2016), in a Jordanian mining region, noted that the non-investment of mining revenues in local educational expenditures, and the lack of support from mining companies contributed to low rate of literacy in the region. Similarly, a study by Petrova and Marinova (2013) in Western Australia also identified inadequate educational facilities and a low literacy rate in the mining town of Boddington. They indicated that this resulted from the rise in the town's population due to mining and, again, the non-investment in new educational facilities. Therefore, according to previous research, the investment in education by mining companies vary by location and company.

e. Sense of Place and Cultural Identity: According to Hummon (1992), "…sense of place involves a personal orientation towards place, in which one's understanding of place, and one's feeling about place become infused in the context of environmental meaning" (p. 262). Following this definition, mining developments are noted as usually impacting the sense of place of communities, as mining involves the removal of residents and land usage to make way for minerals' extraction and, thus, the removal from place attachments (Askland, 2018). The impact

of mining on the sense of place of communities is well documented in the Mining-Induced Displacement and Resettlement (MIDR) literature, primarily in the context of the developing world (Downing, 2002; Goessling, 2010; Terminski, 2012; Askland, 2018). According to Downing (2002), MIDR usually results in landlessness, joblessness, homelessness, marginalization risks, health risks, etc.

Even though studies of MIDR and its impact on sense of place have mostly focused on mining communities in the developing world, mining communities in the developed world also face related challenges. A study by Askland (2018) highlights how coal mining in a small village in New South Wales in Australia, for example, has led to the displacement of several residents, resulting in what he referred to as a 'hollowed senses of place' in the affected areas. Some case studies in the literature have focused on the inability of mine workers to connect and integrate well in their communities due to the high demands of mining work (Gibson & Klinck, 2005, Lockie et al. 2009, McDonald et al., 2012; Rodon & Lévesque, 2015).

With regard to the impact of mining on cultural identity, examples are replete in the literature on the impact of mining on the cultural values and heritage of local communities. The impacts as noted in the literature include the destruction of heritage sites to make way for mining developments (Dixon & Dillon, 1990; O'Faircheallaigh, 2008; Leonard, 2018) and the prominence of social vices like drug abuse, alcoholism, sexual promiscuity, crime, etc. (Carrington et al., 2011; Bryceson et al., 2013); child labour (Mclntosh, 2000; Hilson, 2008). The development of the tourism industry was also noted in the literature as a positive impact of mining on cultural identity. This was especially true in communities where cultural heritage and local identity evolved around mining and are subsequently celebrated through tourism (Robertson, 2006; Conlin & Jolliffe, 2010; Perelli et al., 2011).

f. Participation and Governance: There are examples in the literature of how the negative impacts of mining projects have often led to community-industry conflicts and project shutdowns (Prno & Sclombe, 2012). A collaborative governance approach that brings together mining companies, local communities and government sectors has been widely recognized as a strategy for avoiding such conflicts (Cheshire et al., 2014; Yakovleva & Alabaster, 2003). Local governments, by virtue of their dual function as representatives of the people and as service delivery providers, are deemed essential in operationalizing any collaborative governance approach (Douglas, 2005; Barnett, 2011). The literature, however, suggests that most local governments in remote rural mining areas have limited resources to enable them to act in full capacity (Cheshire et al., 2011; Cheshire et al., 2014). As a result, mining companies are noted as more often than not assuming local governance roles in mining areas (Cheshire et al., 2014). Mining companies with good governance mindsets are seen as taking advantage of this new role by supporting the well-being of communities through frequent engagements, thereby obtaining the social license to operate (Cheshire et al., 2011; Cheshire et al., 2014; Lin et al., 2015). Mining companies with poor governance mindsets are rather seen as operating in a manner that shows no regard to the immediate environment and communities where they operate (Lin et al., 2015). Such companies are often under the media spotlight as their operations are vehemently protested (Prno & Sclombe, 2012).

Table 2. 3: Summary of Literature on Socio-Cultural Impacts of Mining

1. Population and Demography	**2. Health and Well-Being**
▪ Increased population due to in-migration during boom period (Gilberthorpe et al., 2016; Bainton et al., 2017)	▪ Adverse impacts on public health, worker health, mental health, etc. (Shandro et al., 2011; Hendryx, 2015; McPhedran & De Leo, 2014)
▪ Decreased population due to out-migration during bust period (Hollywood, 2002; Nyame et al., 2009)	▪ Pressured social and health services (Hanlon & Halseth, 2005; Shandro et al., 2011)
3. Housing and Living Conditions	**4. Education**
▪ More demand for housing and high cost of housing during boom period (Wilson, 2004; Lawrie et al., 2011; Jacquet, 2009; Heslam McKenzie & Rowley, 2013)	▪ High literacy rate where revenue investment and industry support in educational facilities (Bowes-Lyon et al., 2009; Hajkowicz et al., 2011)
▪ Less demand for housing and low cost of housing during bust period (Mining Watch Canada, 2001; Ennis et al., 2013)	▪ Low literacy rate where there is no revenue investment and industry support in educational facilities (Petrova & Marinova, 2013; Al Rawashdeh et al., 2016)
▪ High cost of living and segregation of low-income earners (Lockie et al., 2009; Sachs & Warner, 2011; Scott et al., 2012)	
5. Sense of Place and Local Identity	**6. Participation and Governance**
▪ Displacement and resettlement of local people (Downing, 2002; Askland, 2018)	▪ Increased community-industry conflicts where there is bad governance (Lin et al., 2015)
▪ Prevalence of social vices, e.g: drug abuse, alcoholism, sexual promiscuity, crime, etc. (Goldman, 1981; Bryceson et al., 2014; Carrington et al., 2011)	▪ Increased community participation and acceptance where there is good governance (Cheshire et al., 2011; Cheshire et al., 2014; Lin et al., 2015)
▪ Destruction of places of value and heritage sites (Dixon & Dillon, 1990; O'Faircheallaigh, 2008; Leonard, 2018)	

Source: Author's construct based on literature review

2.4.3 Environmental Impacts

This section discusses the literature on the environmental impacts of mining on communities. These include impacts on land use, air quality, waste materials, water resources, and ecosystems and biodiversity.

a. Land Use: The impact of mining on land use, even though considered in this thesis as an environmental impact, also has economic and socio-cultural dimensions. Mining involves the clearing or removal of vast land areas to allow for resource extraction. Multiple studies in the

literature discuss the drastic changes in the landscape of mining regions over time (Schueler et al., 2011; Sonter et al., 2014). Mining usually results in the repurposing of lands originally serving other purposes like agriculture, forestry, conservation, and recreation (Söderholm, 2000; Aitken, et al., 2016). Indeed, the literature on MIDR is replete with examples of how mining operations, mainly in the industrializing world, have resulted in the disruption of land use patterns, consequently displacing or dislocating communities (Terminski, 2012; Owen & Kemp, 2015). A study by Human Rights Watch (2013), for example, shows how a coal mining boom in the Tete province of Mozambique led to the loss of farmlands and resettlement of several villagers. There are also examples in the context of the industrialized world. For instance, Gibson and Klinck (2005), in their study on the impacts of mining on communities in northern Canada, reported how the traditional food systems of Indigenous communities are disrupted as a result of the restrictions placed by mining developments on their ability to hunt and gather food. The prevalence of literature on 'land use rights' (particularly Indigenous rights) conflicts between mining communities and mining companies is indicative of the adverse relationship that often exists between mining and other land uses (Hilson, 2002, Kemp et al., 2011; O'Faircheallaigh, 2015).

b. Air Quality: Mining contributes both directly and indirectly to local air pollution (Kumar et al., 1994). There are two main sources of air pollutants from mining operations (UNESCAP, 1992). The first is particulate matter or airborne dust from excavation, drilling, blasting, materials transportation, haul roads, tailings or stockpiles. And the second is gas emissions (sulphur dioxide, nitrogen dioxide, carbon dioxide, mercury, etc.) from fuel combustion during explosion and mineral processing. These air pollutants, which either suspend in the air, or settle on soil

and water bodies, have adverse effects on people and other living organisms (e.g. plants and animals) in and around mining areas (Chaulya, 2004). The acidification effect of sulphur emissions on soil, water, buildings and other structures in mining areas (UNCTAD, 1997, Söderholm, 2000), as well as the adverse health effects of exposure to mine polluted air on communities, are also well documented in the literature (Hendryx & Ahem, 2009, Hendryx, 2015).

c. Waste Materials: The extraction and processing of ore involves the generation of large volumes of waste (Tujan & Guzmann, 2002; Bridge, 2004). The average Canadian metal mine, for example, rejects about 42% of mined materials as waste rock, and a further 52% from the mill as tailings (Ripley, 1995). As there is often no ready market for mineral waste, mine waste disposal is one of the biggest challenges confronting the global minerals industry (Bridge, 2004, Franks et al., 2011). Standard mine waste disposal practices, like tailings pond disposal and sub-marine disposal, have received stiff public criticisms for their tendencies to cause catastrophic disasters (Bridge, 2004). The literature is replete with examples of the adverse environmental and social effects of tailings pond spills or failures, and direct mine waste discharge on mining communities (Hart, 2007; Franks, 2007; Fourie, 2009). A very recent example occurred in the Brazilian state of Minas Gerais, where the collapse of the tailings pond of an iron-ore mine destroyed properties and claimed the lives of hundreds of people in the mining town of Brumadinho (Al-Jazeera, 2019).

Acid Mine Drainage (AMD) is arguably the most serious environmental problem confronting the minerals industry due to its uncontrollable nature when it occurs (Bravante & Holden, 2009). AMD occurs when water and oxygen come into contact with sulphide ore deposits in mine waste

rock or tailings (Akcil & Koldas, 2006). AMD adversely affects both plant life and aquatic life in surrounding areas (Simate & Ndlovu, 2006). The adverse effects of AMD on public health in mining communities, including those in Canada (Environmental Mining Council, BC, & BC Wild 2006; Canadian Mining Innovation Council, 2013) are well documented in the literature.

d. Water Resources: Mining developments have significant impacts on the quality and availability of water resources in surrounding areas (UNESCAP, 1992). In fact, contamination of surface and ground water from mining operations was identified 20 years ago as one of the top ecological security threats facing the world (EPA, 1999 cited in Bridge, 2004). Current literature suggests this major concern still exists. Several recent examples in the literature demonstrate how chemicals from mineral processing, tailings dumps, and mine wastewater contaminate surface water in mining areas (Bernhardt et al., 2012; Northey et al., 2016). The adverse effects of mine chemicals like cyanide, mercury, and arsenic on water resources have been highlighted (Bundschuh, 2012). For instance, in Canada, the issue of arsenic and its effect on water resources is an area of concern, particularly in the remediation of mines in the Northwest Territories and other gold mining areas (Sandlos & Keeling, 2017; Canada North Environmental Services, 2018; Sprague, et al., 2018).

The impact of mining on underground water, including the lowering of water tables and the consequent drying up of natural sources of water (wells, springs, etc.) is also well documented (UNCTAD, 1997; Akabzaa et al., 2007). As mining involves the use of large volumes of water, social tensions between the mining industry and other water user groups in local communities (Bebbington & Williams, 2008), including those in fishery (Holley & Mitcham, 2016), in

agriculture (Ghobani & Kuan, 2016), and in tourism (Wessman et al., 2014), are also well documented.

e. Ecosystems and Biodiversity: According to Miranda et al. (2003), about one third of all active mines and explorations are located in ecosystem regions with high conservation value. Land degradation, loss of ecosystems and biodiversity have been noted as some major impacts of mining (Schueler et al., 2011). Mining, which by its nature involves the removal of biota, is seen as a major threat to the functioning of ecosystems (Lloyd et al., 2002). The literature is filled with examples of the adverse effects of mining developments on aquatic life (Meech et al. 1998; Tarras-Wahlberg et al., 2001), vegetation (Lloyd et al. 2002; Miranda et al., 2003), and wildlife (Buehler & Percy, 2012; Beyer et al., 2018) in mining areas. Hilson (2001), for example, reports of the wiping-out of entire ecosystems in some mining areas in Sub-Saharan Africa. There are also examples in Canada of how mining has resulted in the destruction of wildlife habitats (Mining Watch Canada, 2001; Canadian Mining and Innovation Council, 2013). As a response to the negative impacts of mining on ecosystems and biodiversity, there is a growing body of literature on ecosystem restoration, land reclamation and rehabilitation measures post-mining (Bradshaw, 1997; Cooke & Johnson, 2002; Majer et al., 2007). The mining industry and governments in several developed jurisdictions (e.g. Canada and Australia) are working together to champion this course (Lloyd et al. 2002; NRCan, 2016).

Table 2. 4: Summary of Literature on Environmental Impacts of Mining

1.Land Use	**2. Air Quality**
▪ Destruction of vegetation and land degradation (Kusimi, 2008; Schueler et al., 2011; Sonter et al., 2014)	▪ Local air pollution from particulate matter, airborne dust, and gas emissions (UNESCAP, 1992; Kumar, 1994; UNCTAD, 1997; Söderholm, 2000)
▪ Repurposing land use from other uses like agriculture, recreation, conservation, etc.	

(Söderholm, 2000; Hilson, 2002; Kemp et al., 2011; O'Faircheallaigh, 2015)	
3.Waste Materials	**4.Water Resources**
▪ Generation of high volumes of waste (Tujan & Guzmann, 2002; Bridge, 2004; Franks et al., 2011)	▪ Water Scarcity (Bebbington & Williams, 2008; Ghobani & Kuan, 2016)
▪ Mine waste (tailings) threatens public health and safety and biodiversity, e.g: tailings pond failure, acid mine drainage, etc. (Mining Watch Canada, 2001; Fourie, 2009; Canadian Mining Innovation Council, 2013; Al-Jazeera, 2019)	▪ Pollution of surface and underground water (UNCTAD, 1997; Akabzaa et al., 2007; Sprague, et al., 2018)
5.Ecosystems and Biodiversity	
▪ Destruction of aquatic life (Meech et al. 1998; Tarras-Wahlberg et al., 2001)	
▪ Displacement of wildlife through habitat destruction (Mining Watch Canada, 2001; Canadian Mining and Innovation Council, 2013)	
▪ Destruction of ecosystem function (Hilson, 2001; Lloyd et al., 2002)	

Source: Author's construct based on literature review

2.5 General Conclusions from Chapter 2

The discussions in this chapter were presented in four parts. The first part explored the conceptual underpinning of the study - Sustainable Development (SD). It was observed in this part of the chapter that SD as a concept has been defined differently both within the academic literature and by advocacy groups and organizations. The second part explored the various viewpoints from which SD has been conceptualized in the mining industry. It was observed that 'mine sustainability' and 'resource sustainability' were the two major viewpoints for SD in the context of mining, forming the basis for other perspectives. It was also observed in this section that government and non-governmental organizations and the mining industry itself have developed frameworks and initiatives for championing the course of SD in the global mining sector. The third part of the chapter reviewed the literature on resource dependent communities, including mining communities. It was observed in this section that most of the social impacts of

the boom period of resource dependency (such as: drug abuse, mental health problems, crime and violence, etc.) were also present in the bust period.

The final part of the chapter examined the impacts of mining on communities using the three pillars of SD. The key observation in this part was that mining's impacts on communities cut across all the three pillars of SD. It was further observed that even though the impacts varied across the three pillars, the economic impacts of mining were more positive in nature overall than the socio-cultural and environmental impacts. The environmental impacts have been the most adverse, combined with related implications for human health and well-being. This perhaps indicates why, until recently, more attention has been placed on the need to ensure environmental sustainability in the mining industry than of the other SD pillars. Section 3.1 of the next chapter (chapter 3) draws from this section's discussions to review the historical development of the mining industry on the island of Newfoundland and how it has impacted communities. Chapter 6 also draws from this section, as it specifically discusses the impact of mining in the case study area of Baie Verte in comparison with the observations made in the reviewed literature.

Chapter 3: Mining in NL and Policy Responses in Pursuit of Sustainable Mining

This chapter gives a background of the historical development of mining in Newfoundland (the island portion of the NL province, which is the focus of the study) and its impacts on communities. This is followed by discussions on policy responses on sustainable mining from the Canadian federal government, the NL provincial government, and the mining industry itself, and how they apply to community sustainability in NL specifically.

3.1 Mining in Newfoundland and Labrador

3.1.1 The Historical Development of Mining in Newfoundland

The island of Newfoundland has a long mining history that can be traced back to the pre-historic times and to the later discovery and extraction of copper in the 1860s (Wardle, 2004). Mining over all these periods has made significant contributions to the development of the island. The history and development of mining in Newfoundland has been divided into two eras: the pre-confederation era (period before 1949) and the post-confederation era (period after 1949) (Wardle, 2004). Accounts of pre-confederation mining in Newfoundland can be found in the works of Martin (1983), Snelgrove (1938), and Rennie (1998). Accounts of post-confederation mining can also be found in the works of several scholars (Snelgrove & Baird, 1953; Rennie, 1998; Wardle, 2004; Martin, 2012; Skeard, 2014; Thistle, 2016). This section of the thesis draws from the accounts of the aforementioned sources to give an overview of the development of the mining industry in Newfoundland and its impacts on communities.

Small-scale mining activities were present in Newfoundland as early as the 1770s, and perhaps even done earlier by the Indigenous peoples (Rennie, 1998). Commercial mining development, however, started in 1864 with the discovery of large copper deposits in Tilt Cove,

a town located on the Baie Verte Peninsula on the northcentral coast of Newfoundland. The period between 1864 and 1917 was characterized by increased copper production in Tilt Cove, which became one of the world's largest copper producers at that time, until international market and military conditions, coupled with problems of low ore grade and accessibility led to the mine's closure in 1917. The mine was re-opened from 1957 to 1967 after more high-grade copper deposits in the area were discovered by Maritime Mining Company. Apart from Tilt Cove, small-scale mining of copper, gold, and pyrite were also done between 1860 and 1968 in other parts of the northcentral coast in places like Bett's Cove, Little Bay, and Pilley's Island (Rennie, 1998).

The discovery of iron-ore in Bell Island in 1892 also played a significant role in the development of the mining industry in Newfoundland, because it happened at a time when copper production in the northcentral coast was in decline (Weir, 1986). The discovery of iron-ore on Bell Island led to the development of the Wabana mining operations by the Nova Scotia Steel and Coal Company (Scotia) in 1895. By 1900, the Bell Island mine became one of the leading suppliers of iron-ore in the world, supplying mainly to the Cape Breton steel plants and some parts of Europe. By the 1960s, however, factors such as legal and financial disputes among distant owners, international wars, fluctuating ore prices, and competition from other producers (including from Labrador) led to the mine's collapse in 1966.

In 1905, Newfoundland experienced yet another mineral discovery along the Buchans River. This discovery was a result of an ore sample test conducted by Anglo-Newfoundland Development (AND), which confirmed the presence of commercial quantities of zinc, lead, copper, gold, and silver in the area. Efforts were made by AND and American Smelting and Refining Company (ASARCO) to separate the minerals. Mining then commenced in 1928 and led to the formation of Buchans as a company town. The Buchans mine, though having to deal

with labor and civil unrest, survived for nearly half a century. The mine shutdown in 1984 after the complete exhaustion of the mineral deposits (Skeard, 2014).

Around 1900, fluorspar mining in St. Lawrence became the major mining development in Newfoundland (Rennie, 2005; Collins, 2014). St. Lawrence Corporation of Newfoundland, an American-based company, started fluorspar mining in the area in 1933. The company was joined by the Newfoundland Fluorspar Company, a subsidiary of the Aluminum Company of Canada (ALCAN), in 1939. In its peak years of production, St. Lawrence mine was one of the major suppliers of ore to the US manufacturing and military industries. However, infiltration of the market by cheaper fluorspar from Central and South America, coupled with labour unrest within the company led to the mine's collapse in 1939 (Rennie, 1998).

Post-confederation mining developments on the island of Newfoundland started in the 1960s, with asbestos mining in Baie Verte being the most prominent one. Advocate Mines began asbestos mining in Baie Verte in 1963, more than a decade after the discovery of ore in the area in the 1950s (Rennie, 1998). Trans-Pacific Asbestos Limited, also known as Baie Verte Mines Limited, took over asbestos mining in Baie Verte shortly after the collapse of Advocate Mines in 1981 (Rennie, 1998). After operating for less than a decade, market and accessibility problems along with health and legal clashes forced the mine to shut down in 1990. The mine was reopened by Terra Nova in 1991 to 1995. Consolidated Rambler Mines Limited also operated a copper mine in the Baie Verte region from 1964 to 1982 (Town of Baie Verte, 2004). Between the 1960s and 1970s, several other 'short-lived' mining operations were present on the northcentral coast and west coast of the island. Notable among these were operations of the Consolidated Rambler Group (which included Rambler, Ming, East, and Big Rambler Pond mines), the Whalesback mine, the Gullbridge mine, the York Harbour mine, and the Little Pond mine

(Wardle, 2004; Martin, 2012). See figure 3.1 below for a map of Newfoundland showing the mining communities in both the pre-confederation and post-confederation eras. See also table 3.1 for an overview of the historical development of mining in Newfoundland from the pre-confederation period to the post-confederation period.

Table 3. 1: Historical Development of Mining in Newfoundland from 1860 to 2017

Pre-Confederation Era (Period Before 1949)			**Post-Confederation Era (Period After 1949)**		
Mine Location	Mineral	Year of Production	Mine Location	Mineral	Year of Production
Tilt Cove	Copper	1864 - 1917	Tilt Cove	Copper/Gold	1957 - 1967
Betts Cove	Copper	1875 - 1886	Little Bay	Copper/ Gold	1961 - 1969
Pilley's Island	Pyrite	1887 - 1908	Baie Verte	Asbestos	1963 - 1995
Bell Island	Iron Ore	1895 - 1966	Baie Verte	Copper	1964 - 1982
Buchans	Base Metals	1928 - 1984	Whales Back Pond	Copper	1965 - 1972
St. Lawrence	Fluorspar	1933 - 1978	Baie Verte	Gold	2010 - to date
			Baie Verte	Copper/Gold	2011 - to date
			Conception-Bay South	Pyrophyllite	2014 - to date
			St. Lawrence	Fluorspar	2017 - to date
			St. George's Bay	Gypsum	2017 - to date

Source: Author's construct, based on literature

At the moment, there are eleven active minerals mines in NL (NL Department of Natural Resources, 2018a). Several of these mining operations are on-going on the island in areas such as Baie Verte, St. Lawrence, Conception Bay, and George's Bay (NL Department of Natural Resources, 2018b). In addition to the eleven producing mines, there are also numerous minerals exploration and development activities on-going, particularly in areas such as Baie Verte, Springdale, the Great Northern Peninsula on the island portion of the province, and other places in the central and southern parts of the island (NL Department of Natural Resources, 2019).

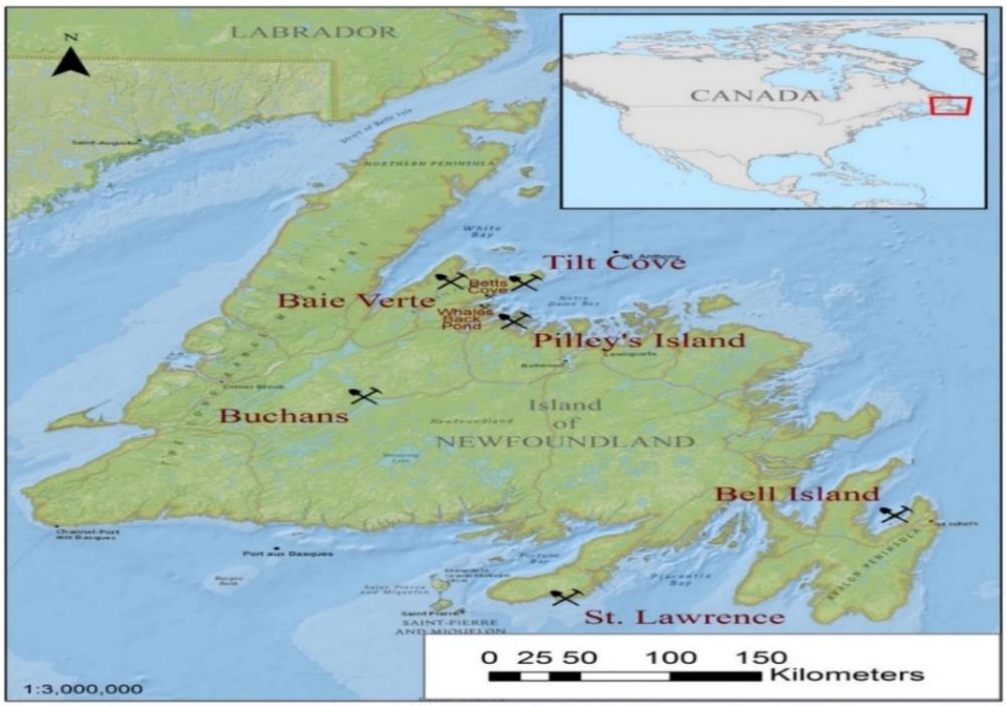

Figure 3. 1: Map of Newfoundland Mining Communities

(Map by ©Myron King, 2019, EPI, Grenfell Campus, Memorial University)

3.1.2 The Impacts of Mining on Communities in Newfoundland

Mining on the island of Newfoundland in both the pre-confederation and post-confederation periods has had mixed impacts on the sustainability of communities. The sections that follow will discuss the socio-economic and environmental impacts of mining on communities in Newfoundland in relation to the observations made in the global literature, as discussed in chapter 2.

a. Socio-Economic Impacts

The socio-economic impacts of mining on communities in Newfoundland have included job creation, revenue generation, infrastructural development, development of tourism,

population decline, and child labour (Martin, 1983; Rennie, 1998). These impacts are discussed in the below paragraphs.

Similar to the observation in the global literature (Bowes-Lyon et al., 2009), mining has provided both direct and indirect employment opportunities in several communities in Newfoundland. The benefits from these employment opportunities are relative to the average wage levels and the number of available jobs, with the common income multipliers ranging from 1.32 to 1.36 (Wardle, 2004). Mining's impact on employment and benefits in Newfoundland can be traced back to the 1800s. During this period, the fishing industry was unstable due to poor prices and over exploitation of fish stock (Rennie, 1998). With few job opportunities present outside of fisheries, the mining industry provided people in several communities with alternative, stable and well-paid employment opportunities. For example, in the 1930s, the Buchans mine, which was at its peak season of production, created many job opportunities and became a major employer in central Newfoundland, providing stable and well-paid employment to an average of 650 people (Weir, 1986; Thurlow, 2010; Skeard, 2014). In the 1900s, child labour became a social impact of mining on communities in Newfoundland, similar to observations made in the global literature (Jennings, 1999; Mclntosh, 2000; Hilson, 2008). In Bell Island, for example, boys as young as 10 years old, dropped out of school and took up menial jobs in the mines as mine laborers (Rennie, 1998); working conditions in mines have, however, changed in recent times.

Mining in Newfoundland has resulted in provincial revenue generation, mostly from royalties and taxes obtained from the mines. These provincial revenues were in turn invested in communities, usually in the form of infrastructural development (Locke, 2012). For example, mining operations in Buchans led to the development of a power line that linked central

Newfoundland to Corner Brook and a road network that linked central Newfoundland to Red Indian Lake and Burgeo (Thurlow, 2010). In St. Lawrence, also, most of the town's present sporting and recreational facilities were set-up during the peak periods of mining. So were the schools and other social amenities in Bell Island (Rennie, 1998). A study by Porter and Vodden (2012), however, indicated that not all the revenue obtained from industrial developments (such as mining) were invested back in the immediate or neighbouring communities where the developments had been done, with concerns raised that investment in infrastructure and services in an area do not always compensate for the additional pressures associated with these developments.

Similar to the observations made in the global literature (Robertson, 2006; Conlin & Jolliffe, 2010), mining helped in the development of local tourism in some communities in Newfoundland (Rennie, 1998). For example, in Bell Island, an old mine shaft called 'the No. 2 mine' and a miners' museum serve as tourist attractions to the town (Rennie, 1998; CBC, 2014). Also, in St. Lawrence and Baie Verte, miners' museums, which have been stocked with many artifacts, photos, and documents displaying illustrious mining histories, contribute to the local tourism in these areas (Rennie, 1998).

The 'boom-bust' nature of mining in Newfoundland has affected the population of communities, similar to the observations made in the global literature (Hollywood, 2002; Bainton et al., 2017; Castillo & Brereton, 2018). For example, during the peak period of mining in the 1970s, Buchans had a population size of about 2,543 people with almost a quarter of the population employed by the mine (Skeard, 2014). After the mine's closure in 1984, the town's population declined drastically, recording a low of 640 people by the 2016 census (Community Accounts, 2018). This situation is similar to that of other mining communities in Newfoundland,

such as Baie Verte (the impacts of mining in Baie Verte will be discussed further in chapter 6), Tilt Cove, Bell Island, etc. (Rennie, 1998; Wardle, 2004; CBC, 2014).

b. Environmental Impacts

Mining in Newfoundland has also had some environmental impacts on communities, mainly in the form of air pollution (Rennie, 1998; Wardle 2004) and land degradation (NOAMI, 2013; Skeard, 2014). Air pollution from mining has had adverse effects on workers' health (Del, 2009; Martin, 2012, Burki, 2013; Villeneuve et al., 2007). In St. Lawrence, for example, air pollution from 'silica dust' from the fluorspar mines resulted in the death of several mine workers (Rennie, 2008; Burt, 2008; Martin, 2012). Over three hundred deaths from 'silicosis', lung cancer, and other respiratory related diseases were recorded during the mine's operations in the 1930s (Rennie, 2008). Also, in Baie Verte, air pollution from asbestos mine dust negatively impacted mine workers' health (Center for Occupational Health and Safety Research, 2013) (discussed further in chapter 6).

Orphaned and Abandoned Mines (OAMs), which have been defined as "mines for which the owner cannot be found or is financially unable or unwilling to remediate the site" (Tremblay & Hogan, 2016, p.1), are land degradation related legacies left behind by old mining operations across Canada. OAMs have been noted as having a high tendency to cause Acid Mine Drainage (Tremblay & Hogan, 2016). In NL, OAMs mostly date back to mining operations in the pre-confederation era. OAMs in NL have been a major threat to the environment, public health and safety in communities such as Buchans, Baie Verte, St. Lawrence, Hope Brook, York Harbour, etc. (NOAMI, 2013).

3.2 Policy Responses on Mining and Sustainability in Canada

3.2.1 Defining Policy

Mining has impacted the sustainability of communities on the island of Newfoundland in different ways, as illustrated above. These varied impacts also occur in the general Canadian context, and (perhaps) even more in the global context, as observed in section 2.4. In dealing with the issues of mining and sustainability, both government and industry are developing policies all over the world, including in Canada (Hilson, 2000). Birkland (2015) defined a policy as "…a statement by government of what it intends to do, such as a law, regulation, ruling, decision, order, or a combination of these" (p. 10).

Scholars have identified several mechanisms or tools/instruments used to implement an overall public policy framework. Howlett and Ramesh (2009), for example, identified three types of policy instruments, namely:

- 'Voluntary' instruments, which involve little role by government beyond advocacy and persuasion;
- 'Mixed' instruments, which employ a greater role for the state and include information and exhortation, subsidies, taxes, and user charges; and
- 'Compulsory' instruments, which include regulation, public enterprises and direct provision of services.

Althaus et al. (2013) suggested four different ways of conceptualizing policy instruments. These include:

- Policy through advocacy, such as case argument, education, and persuasion;
- Policy through money, such as usage of spending and taxing power to shape activity;
- Policy through direct government action, such as service delivery; and

- Policy through law, such as legislation, regulation, and authority.

In Canada, a mix of policy instruments such as laws (environmental legislation and regulations), standards and voluntary actions, performance-based regulation, information and education, and economic instruments (taxes, charges, fees, loan guarantees) have been used by both governments and the mining industry to address the issue of mining and sustainability (Treasury Board of Canada Secretariat, 2007). The sections that follow highlight some of the milestones that have been reached with regard to public policies on mining and sustainability in Canada, and in NL specifically, at both the government and industry levels. Compulsory instruments, in particular policy through law, are critical elements of the policy mix in Canada. Environmental legislation and regulations, the focus of the next section, have been key policy tools or instruments used to address the issue of sustainability in the mining industry.

3.2.2 Environmental Legislation and Regulations and Sustainable Mining

Any move towards sustainability in mining requires the establishment of sound environmental management structures and procedures (Hilson, 2000). As stated by Hilson (2000), most of the environmental legislation and regulations in Canada have a bearing on mining developments. These pieces of legislation and regulations were put in place before the current mining-specific policies, and thus, have guided the formulation of those policies. Environmental legislation in Canada exists at both the federal and provincial levels (Hilson, 2000). Federal environmental legislation like the Fisheries Act (1972), the Navigation Protection Act (1985), the Canadian Environmental Protection Act (1999), and the Canadian Environmental Assessment Act (2012) (now Impact Assessment Act under Bill C-69), even though developed decades ago, are still effectively used for the regulation of industrial activities, including mining (MAC, 2018).

Provinces and territories in Canada have also developed supplementary environmental legislation for the regulation of industrial activities in their respective jurisdictions (Hilson, 2000). In the province of Newfoundland and Labrador, some examples of such legislation include the Environmental Protection Act (2002), the Environmental Assessment Act (2003), and the Water Resources Act (2002), (NL Municipal Affairs & Environment, 2019). Table 3.2 below gives a summary of the federal and NL environmental legislation and regulations and the sections that relate to sustainable mining.

Table 3. 2: Federal and NL Environmental Legislation and Sections Relevant to Sustainable Mining.

Level	Environmental Legislation and Regulations	Sections Relevant to Mining
Federal	1. Fisheries Act (1972)	▪ Metals and Diamond Effluent Regulations
	2. Navigation Protection Act (1985)	▪ Navigable Water Works Regulations
	3. Canadian Environmental Protection Act (1999)	▪ Chemicals Management Plan
	4. Canadian Environmental Assessment Act (2003)	▪ Interprovincial Movement of Hazardous Waste Regulations
		▪ Asbestos Mines and Mills Release Regulations
		▪ Species at Risk Act
		▪ Migratory Birds Convention Act
		▪ Wildlife Area Regulations
NL Provincial	1. NL Environmental Protection Act (2002)	▪ Air Pollution Control Regulations
		▪ Waste Management Regulations
		▪ Waste Materials Disposal Areas Regulations
		▪ Environmental Assessment Regulations
	2. Water Resources Act (2002)	▪ Environmental Control Water and Sewage Regulations
	3. Environmental Impact Assessment Regulation (2003)	▪ Environmental Assessment Regulations

Source: Author's construct

3.2.3 Government Policies on Mining and Sustainability

In addition to the environmental legislation discussed above, both the federal government and NL provincial government have developed a number of policies specifically directed towards ensuring sustainable mining activities. These policies, which will be further discussed in the next section, attempt to address both the environmental and socio-economic aspects of sustainable mining.

3.2.3.1 Federal Government Policies

The policies developed by the government of Canada are generally geared towards ensuring sustainability of the mining industry itself and of the communities hosting the industry across all provinces and territories (Hilson, 2000). These policies include the following: The Minerals and Metals Policy of the Government of Canada, the National Orphaned and Abandoned Mines Initiative (NOAMI), Impacts and Benefits Agreements, and the Canadian Minerals and Metals Plan.

The Minerals and Metals Policy was launched in 1996 as the first attempt by the Canadian government to incorporate the concept of sustainable development in the mining industry (Hilson, 2000). Other earlier government commitments to sustainable mineral development, like the Liberal Plan for Canada, the Liberal Mining Agenda, etc., laid the foundation for the development of this policy (Government of Canada, 1995). The Minerals and Metals Policy, thus, responded to those earlier commitments, as well as to the sustainable mining principles and goals that were developed by the Whitehorse Mining Initiative (WMI) Leadership Council earlier in 1992 (NRCan, 2017). The WMI was a national roundtable funded by industry and government (Fitzpatrick et al., 2011). Its aim was to achieve a consensus among a diverse group of industry

stakeholders such as government officials, industry officials, labour unions, Aboriginal groups, and the environmental community (Government of Canada, 1995). The Whitehorse Mining Initiative (WMI) Leadership Council Accord was signed in 1995 as a result of the coming together of the industry stakeholders to assess issues affecting the competitiveness of the mining industry in Canada (Government of Canada, 1995).The WMI Accord envisioned the Canadian mining industry as one that will be "socially, economically, and environmentally sustainable and prosperous…., underpinned by political and community consensus" (Government of Canada, 1996, p.1). Even though the Canadian government did not spell out any implementation strategy for the Minerals and Metals Policy, the principles and objectives of the policy (see table 3.3 for details) have helped in clarifying the role of governments in ensuring sustainability in the mining industry, as well as providing guidelines to mining companies on how to operate sustainably (Shinya, 1998; Hilson, 2000).

Table 3. 3: *Principles and Objectives of the Minerals and Metals Policy*

Principles	**Objectives**
▪ Implement a sustainable development approach to decision making to help ensure that decisions concerning minerals and metals integrate environmental and socio-economic considerations at the earliest opportunities in decision-making processes	▪ Find, extract, produce, use, recycle, and dispose of minerals and metals in the most efficient and environmentally responsible manner
▪ Ensure a positive business climate is maintained for mineral investment	▪ Maintain or enhance quality of life and the environment for both the generations of the present and future
▪ Promote the sustainable development of mining operations at the international level through partnerships with other countries, stakeholders, and multilateral institutions and organizations	▪ Respect the needs of all resource users, and account for these needs in governmental decision-making processes
▪ Establish Canada as a global leader in promoting the safe use of minerals, metals and related products	▪ Secure the involvement and participation of stakeholder groups in decision-making
▪ Promote Aboriginal involvement in mineral extraction and processing activities	

▪ Foster innovation through science and technology for the purposes of enhancing the mining industry's competitiveness and environmental stewardship	

Source: Hilson (2000)

The National Orphaned and Abandoned Mines Initiative (NOAMI) was established in 2002, as a collaborative initiative between the government and industry dedicated to the clean-up of Orphaned and Abandoned Mines (OAMs) (see section 3.1.2) across all of Canada's provinces and territories. OAMs are present in several mining jurisdictions in Canada. The serious threats that such mines pose to the environment, public health and safety, and the general sustainability of communities in Canada are well documented (Keeling & Sandlos, 2009; Sandlos & Keeling, 2013). The work of Cunningham (2017) and NOAMI's annual performance report highlight the contributions of NOAMI in enhancing the environmental sustainability of mining communities across Canada by cleaning up such mines. The contributions have mainly been centred on land reclamation, remediation, and revegetation practices (NOAMI, 2015).

Impact and Benefit Agreements (IBAs) are policy mechanisms being used by the federal government in collaboration with Indigenous governments to ensure sustainable mining by establishing formal relationships between mining companies and Indigenous communities (Sosa & Keenan, 2001). The main purpose of IBAs, as stated by Sosa and Keenan (2001), are "…to address the adverse effects of commercial mining activities on local communities and their environments, and to ensure that First Nations receive benefits from the development of mineral resources" (p. 2). IBAs rely on Environmental Assessment (EA) as a point of reference to understand the potential impacts of mining projects and to devise the possible means by which they could be addressed (Jones & Bradshaw, 2015). IBAs are institutionalized as either part of existing land claim agreements, or as a form of corporate social responsibility approach from

mining companies (Jones & Bradshaw, 2015). IBAs were in the past focused on ensuring the provision of local employment in mining areas (Sosa & Keenan, 2001). Recent IBAs, however, are also focused on ensuring environmental, economic and socio-cultural sustainability in communities through "… environmental restrictions, socio-cultural programs, dispute resolution mechanisms, revenue sharing provisions, etc." (Sosa & Keenan, 2001, p. 9). In the context of NL, a number of studies have been done on IBAs and their application in Voisey's Bay in Labrador. These studies have highlighted topics ranging from Indigenous women's participation in mining, to land claims agreements, to community development, etc. (Archibald & Crncovich, 1999; O'Faircheallaigh, 2010; Cox & Mills, 2015; Belayneh, 2018).

The Canadian Minerals and Metals Plan (CMMP) is a new Pan-Canadian plan developed by the federal, provincial, and territorial governments in collaboration with industry partners and stakeholders, including government officials, industry officials, and Indigenous groups. This five-year plan, launched in March 2019, has several components, such as: a vision, a set of principles, and strategic directions and actions to be followed by government, industry, and stakeholders to ensure the mining industry's competitiveness and the sustainable development of mineral resources in Canada (Government of Canada, 2019a). An implementation plan, which has been set for release in the year 2020, will require provincial and territorial governments to devise implementation strategies suitable for their respective jurisdictions (Government of Canada, 2019). The strategies could either be in the form of jurisdictional strategies; collaborations with other jurisdictions, partners, or stakeholders; or a Pan-Canadian initiative (Government of Canada, 2019). The CMMP consists of five strategic areas based on which the Canadian minerals and metals industry will be developed: economic development and competitiveness; advancement of Indigenous participation; preservation of the natural

environment; science, technology and innovation; local communities support; and global leadership (Government of Canada, 2019). Table 3.4 gives a summary of strategic areas of the CMMP relevant to sustainable mining and communities and to this thesis.

Table 3. 4: Strategic Areas of the CMMP Relevant to Sustainable Mining and Communities

Strategy 1 **Economic Development and Competitiveness**	***Strategy 2*** **Advancing Indigenous Participation**	**Strategy 3 Preserving the Natural Environment**	***Strategy 5*** **Supporting Local Communities**
- Increase certainty on land access and land use. Mainly through settling more land claim agreements with Indigenous peoples	- Support the development of more Impact and Benefit Agreements between communities and project proponents	- Encourage mine developments that demonstrate environmental leadership through increased adoption of best available technologies	- Diversify the local workforce of the mining industry to include 30% of women
- Invest in tangible local infrastructure to support mineral development in promising remote and isolated communities	- Explore opportunities for increased Indigenous procurements and business activity	- Expand the mandate of NOAMI as a means of reclaiming abandoned mine sites in communities	- Increase the local procurement of goods and services in the minerals and metals industry
	- Enhance resources for capacity building to support Indigenous people's participation in the mining industry	- Support research and development to reduce footprint of mine waste and improve environmental performance of mining	- Develop education-based initiatives to attract and retain highly qualified local personnel and develop a pipeline of local future talents through the same means

Source: Author's construct, as deduced from CMMP

3.2.3.2 NL Provincial Government Policies

Mineral exploration and mining activities in NL are regulated by the provincial government, mainly through the Department of Natural Resources (NL Department of Natural Resources, 2010) with support from other key departments, including the Department of Environment and Municipal Affairs. The Mines Branch of the Department of Natural Resources is the main division responsible for the mining industry in NL. The Mines Branch operates with three sub-divisions, namely:

- The Geological Survey Division- responsible for collecting, storing, and publishing Geoscience data by utilizing field surveys and industry assessment reports; as well as promoting NL's minerals potential to exploration and mining companies.
- The Minerals Lands Division- responsible for administering mineral land tenure, including: issuance of mineral licenses, exploration approvals, mining leases, and quarry permits and leases.
- The Minerals Development Division- responsible for approving the development and operation of mines, monitoring mining industry, developing mineral and mining policies, managing incentive programs for exploration and development, and rehabilitating abandoned mines (NL Department of Natural Resources, 2019).

The responsibilities for developing legislation, regulations, and other forms of policy frameworks for ensuring sustainability in the Canadian mining sector lie solely with provincial and territorial (except Nunavut, which has a federally developed mining regulations) governments (Hart & Hoogeveen, 2012). The involvement of the federal government is usually limited to specific instances where mineral activities are either related to federal crown corporations or carried out on federal crown lands or offshore areas (NRCan, 2017). The federal environmental laws discussed in 3.2.2, however, apply to the regulation of the mining industry in all jurisdictions (Hart & Hoogeveen, 2012). Along with those federal environmental laws, provinces and territories (except Nunavut) are responsible for enacting their own mining acts, laws, and other forms of policies for regulating the industry in their respective jurisdictions (Hart & Hoogeveen, 2012).

In Newfoundland and Labrador (NL), the provincial government, through the Minerals Development Division of its Department of Natural Resources and in conjunction with other

government departments and agencies (as noted above), has developed a number of policies and initiatives geared towards ensuring sustainability in the mining industry, in addition to the provincial environmental legislation and regulations discussed earlier (see section 3.2.2). These include the Mining Act (1999) and Mining the Future 2030: a Plan for Growth in the NL Mining Industry. These policies are discussed in the next paragraphs.

The Mining Act is administered by the Mines Branch of NL Department of Natural Resources and it addresses the operations of mines and mills in the province. The Act has a number of regulations that impose obligations on mining project proponents to engage in sustainable mining practices in the province. Before the commencement of any mining project entitlement holders are required by the Act to present a mine development and operation plan, and a mine closure and rehabilitation plan (NL Department of Natural Resources, 2010) in a bid to ensure environmental sustainability of the project. Table 3.5 below provides details of sections of the above plans that are relevant to this thesis. Those sections align with the study's analytical framework for ensuring community sustainability in areas such as mine waste management, biodiversity and ecosystem conservation, and job creation.

Table 3. 5: *Sections of the Mining Act Relevant to Sustainable Mining and Communities*

Mine Development and Operation Plan	**Mine Closure and Rehabilitation Plan**
- Description of tailings disposal method and description of tailings impoundment area including - total volume available for disposal and anticipated active life of the area	- Financial Assurance for mine closure and rehabilitation
- Description of operational effluent treatment methods	- Progressive Rehabilitation Methods, including re-vegetation and reclamation strategies
- Five Year Plan showing annual production including tonnages, grades, and areas to be mined	- Final Rehabilitation Strategies, including tailings impoundment areas management; waste rocks and stockpile areas management; open pits and quarries rehabilitation; machinery, equipment, and storage

- Planned number of employees required for each department and for the entire project operation	tanks removal; building structure, electrical works, civil engineering works, and other project related infrastructure removal
- Annual operational review reports on the mining and milling activities of the project	

Source: Author's construct as deduced from the Mining Act

Mining the Future 2030: A Plan for Growth in the NL Mining Industry is a strategic plan aimed at ensuring the growth of the NL mining industry. It was launched in 2018 and developed through a collaboration between the NL provincial government and the NL Mining Association (including mining companies, contractors, and other stakeholders). The plan's vision is to make NL "… a globally competitive top tier jurisdiction for mineral exploration and development, one that is safe, environmentally responsible, maximizes benefits and opportunities, and competitively produces quality products for global markets" (NL Department of Natural Resources, 2018a, p.10). Like the CMMP, this policy initiative also contains a set of principles and strategic directions to be followed by the government and other industry stakeholders. The implementation or action plan for this policy, which is yet to be developed, will require future actions to be based on four strategic areas of focus, as follows:

- Competitiveness and Efficient Regulatory Processes
- Public Geoscience, Marketing and Education
- Indigenous and Community Engagement
- Innovation and Emerging Technology (NL Department of Natural Resources, 2018a)

Table 3.6 gives an overview of the plan's focus areas relevant to this thesis. Those areas align with the study's analytical framework for ensuring community sustainability in areas such as enhancement of participation and governance, provision of local employment opportunities, support of local businesses, and enhancement of the local knowledge base.

Table 3. 6: *Strategic Areas of Mining the Future 2030: Plan Relevant to Sustainable mining and Community*

Strategy 2: Indigenous and Community Engagement	**Strategy 3: Public Geoscience, Marketing, and Education**
- Encourage capacity building and readiness initiatives in Indigenous communities	- Identify and develop emerging technical and leadership skills through education and training opportunities
- Identify Indigenous and community opportunities for procurement and supplier development	- Develop outreach programs for schools and communities to improve public awareness on mining
- Develop benchmarks and reporting structures for community and employment benefit impact	
- Strengthen Indigenous and women participation rates in the workforce, including leadership roles	
- Promote transparency and information sharing among stakeholders using industry led community sustainability metrics	
-Achieve a workforce that is more diverse and includes a minimum of 30% women	

Source: Author's construct, as deduced from Mining the Future 2030: Plan

3.2.4 Industry Policies on Mining and Sustainability

The mining industry mainly at the national level has also developed a number of policies and initiatives geared towards sustainable mining. These policies are discussed in the next sections.

3.2.4.1 National Industry Policies

Canada's two main mining industry associations, the Mining Association of Canada (MAC), and the Prospectors and Developers Association of Canada (PDAC) have also been at the forefront of ensuring sustainable mining in the country. These two associations have individually developed performance-based policy initiatives, namely the Towards Sustainable Mining (TSM) Initiative and e3 Plus to guide mining companies towards sustainable mining operations. These two industry policy initiatives are discussed below.

The Towards Sustainable Mining (TSM) Initiative is a sustainable mining industry policy initiative established in 2004 by the Mining Association of Canada (MAC). Its main objective is "... to enable mining companies to meet society's needs for minerals, metals and energy products in the most socially, economically and environmentally responsible way" (MAC, 2014, p. 4). With a mandatory participation of all MAC member companies (which are primarily large mining companies), the TSM initiative consists of a set of tools and indicators for driving performance and ensuring that key mining risks are managed responsibly at MAC member companies (MAC, 2014). So far, only a few mining companies in NL are members of MAC, but none of the mining companies in the case study area of Baie Verte are members (due to their small size, to be discussed further in chapter 7). As a policy initiative that focuses on the efforts of mining companies in addressing the underlying sustainability problems facing the mining industry (Fitzpatrick et al., 2011), TSM has gained world-wide recognition. It has been adopted by other countries like Finland, Argentina, Botswana, Spain and the Philippines, and it is still being explored by other countries (MAC, 2018).

TSM measures the performance of member companies based on a set of environmental and socio-cultural performance protocols and indicators, which have been summarized in table 3.7 below. TSM is relevant to this thesis as the performance protocols and indicators that it uses align with the study's analytical framework for ensuring community sustainability in areas such as community engagement, health and well-being, waste material management, biodiversity and ecosystems conservation, GHG emissions control, etc.

Table 3. 7: Summary of TSM Sustainability Assessment Framework

Core Areas of TSM	Performance Protocols	Description of Performance Protocols
1. Communities and People	Aboriginal and Community Outreach	Consist of a set of indicators that seek to confirm whether mining companies have developed and implemented formal processes for engaging with communities of interest (COI)
	Crisis Management Planning	Consist of a set of indicators that seek to confirm whether companies have systems in place for mitigating the cause of crisis, as well as for communicating, managing, and resolving crisis situations
	Safety and Health	Consists of a set of indicators that seek to confirm the efficiency and effectiveness of occupational health and safety standards at the mining facility level
2. Environmental Stewardship	Tailings Management	Consist of a set of indicators that seek to confirm whether companies have developed and implemented systems for responsible tailings management in their facilities
	Biodiversity Conservation Management	Consist of a set of indicators that seek to confirm whether mining companies have made formal commitments for the management and conservation of biodiversity in their sites
3. Energy Efficiency	Energy Use and GHG Emissions Management	Consists of a set of indicators that seek to confirm whether mining companies have established comprehensive systems for energy use and GHG emissions in their facilities

Source: Author's construct as deduced from TSM

The e3 Plus initiative is a framework for responsible exploration developed by the Prospectors and Developers Association of Canada (PDAC) in 2009. Its main aim is to assist PDAC member companies to improve their social, environmental, and health and safety performance (PDAC, n.d). Some mining companies in NL, including those in the case study area of Baie Verte, are PDAC members. e3 Plus consists of a set of principles, guidance notes, and

tool kits that encourage sustainable practices in mineral development and exploration in the country. The need to enhance community engagement in mineral exploration and development in Canada resulted in the development of a guidance document called 'First Engagement: A Field Guide to Explorers' issued by PDAC in 2015 (PDAC, n.d). This guidance document complements the e3 Plus by providing prospectors and developers with practical guidance on how to operate sustainably and build good community-company relationships. Table 3.8 below gives a summary of how the e3 Plus contributes to sustainable mining operations through its performance tool kits.

Like the case of TSM, components of the e3 Plus toolkits are also relevant to this thesis, as they align with the study's analytical framework for ensuring community sustainability in areas such as water use, land use, air quality management, biodiversity and ecosystems conservation, participation and governance, waste material management, etc.

Table 3. 8: Summary of e3 Plus Sustainability Toolkit

Environmental Stewardship Toolkit	**Social Responsibility Toolkit**	**Health and Safety Toolkit**
▪ Land Disturbance	▪ Ethical Governance	▪ General Safety
▪ Site Management	▪ Human Rights	▪ Emergency Response
▪ Air Management	▪ Community Development	
▪ Fish and Wildlife Management	▪ Community Engagement	
▪ Water Use and Conservation		
▪ Waste and Spill Management		
▪ Reclamation and Closure		

Source: Author's construct, as deduced from e3Plus

3.2.4.2 NL Provincial Industry Policies

The NL provincial Mining Industry Association (Mining Industry NL) identifies itself as a subsidiary of the Mining Association of Canada (MAC) and, thus, concentrates on contributing to the implementation of MAC's sustainable mining policy initiatives (such as TSM) in mining

companies operating within the province. The association also collaborates with the provincial government in championing the course of sustainable mining in the province. One example is their heavy involvement in the development of the recent provincial minerals industry development plan – Mining the Future 2030, which has been discussed in section 3.2.3.2 above. The industry also encourages its member companies to operate sustainably by focusing on its three areas of commitment, namely: Environmental Sustainability, Community Engagement, and Occupational Health & Safety (Mining Industry NL, 2010).

3.3 General Conclusions from Chapter 3

Discussions from this chapter indicate that the development of the mining industry on the island of Newfoundland has had different levels and types of socio-economic and environmental impacts on the sustainability of communities on the island, across two eras: the pre-confederation era (before 1949) and the post-confederation era (after 1949). It was also observed from the chapter that both the federal and NL provincial levels of government and the mining industry itself have developed a number of policies and initiatives to tackle the issue of mining and sustainability. The chapter's discussions further indicate that the policy instruments used by government have mainly been in the form of laws (legislation and regulations), standards and voluntary actions (agreements, and strategic plans) (Treasury Board of Canada Secretariat, 2007). Two of the most recent government policies, namely the CMMP (initiated by the federal government) and Mining the Future 2030: Plan (developed by the NL provincial government) are still in their developmental phases, and thus, lack an implementation or action plan.

The policy instruments used by the mining industry, on the other hand, have been performance-based. The industry policy initiatives are mainly compulsory only to member

companies of the industry associations, which are predominantly large companies. This means that junior or small mining companies (mostly non-members) are typically not obligated to conform to them. Chapter 7 of this thesis will further explore whether and how the government and industry policies discussed in this chapter are being used to enhance community sustainability in the case study area of Baie Verte.

Chapter 4: Methodology

This chapter discusses the methodological approach applied in the empirical part of the study. This includes: the research design; the selection and description of the case study area; the use of the Telos Framework, a local and regional sustainability assessment model, as the analytical framework; the methods for data collection and analysis; the ethical considerations; and, last but not least, the limitations of the study.

4.1 Research Design and Justification

As stated by Yin (2009) "every empirical research has a research design, whether implicit or explicit" (p. 26). The research design serves as a plan that provides a logical model of proof, allowing a researcher to draw inferences on causal relations among variables being investigated (Yin, 2009). The research design is in essence a roadmap that directs the researcher through the research process (Skeard, 2014). The research design employed in this study is based on a mixed methods case study approach. A case study approach, as noted by Yin (2009), provides an illustration of a phenomenon in a particular context and at the same time knowledge that may be transferred to other study areas in different ways. Creswell (2014) added that a case study also allows for an in-depth analysis of a specific subject area. Most studies in the literature on the impacts of mining on local communities around the world in areas such as Australia, Asia, Sub-Saharan Africa, Latin America, and North America, including Canada, have been based on case studies. Hence, this study also employed a mixed methods case study approach, using both quantitative (resident survey, and statistical profile data) and qualitative (semi-structured interview) data, to explore in detail the impacts of mining on community sustainability in Newfoundland and the role of policy in that. Tashakkori and Creswell (2007) defined a mixed

methods study as one in which "the investigator collects and analyzes data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or a program of inquiry". Creswell (2014) identified three basic designs as being either implicit or explicit in all mixed methods research. These are: the convergent design, the explanatory sequential design, and the exploratory sequential design. This study has made use of the explanatory design. According to Creswell (2014), the explanatory design involves two phases: the quantitative (numeric) phase and the qualitative (text) phase. The qualitative phase usually builds-up and elaborates on the quantitative phase. Later, both phases are connected at an intermediate part of the study (Ivankova et al., 2006). This was the approach adopted in the study.

4.2 Description of the Case Study Area

4.2.1 A Brief Background of the Town of Baie Verte

The Town of Baie Verte is located on the Baie Verte Peninsula on the Northcentral coast of Newfoundland (see figure 4.1 below). Baie Verte is a French word for 'Green Bay', a name given to the area by its first French settlers in the late 1600's. Even though French fishermen controlled the area until 1904, English families also fished and farmed there in the 1870s. Thus, between the 1800s and early 1900s Baie Verte existed as a small fishing community, which later incorporated as a town in the mid-1950s (Town of Baie Verte, 2004). During the first half of the twentieth century, the population of Baie Verte began to grow around a developing forestry industry. Forestry became the mainstay of the town's economy by the 1960s ("Baie Verte", 1981). The discovery of asbestos and other ore deposits including copper, and the consequent establishment of two mines (Advocate Mines Limited and Consolidated Rambler Mines Limited)

by 1964, however, led to a rapid change in the town's economy ("Baie Verte", 1981). Located on a peninsula with a complex geology rich in minerals deposits, the development of the mining industry in the region led to an increase in the town's population from 1,000 in 1960 to 2,500 in the late seventies (Town of Baie Verte, 2005). The decline of mining operations in the area in the mid 1990s resulted in the out-migration of residents and a consequent decline in the town's population from 1,708 in 1996 to 1,492 in 2001 (Town of Baie Verte, 2005).

The Town of Baie Verte still plays a key role in the NL mining industry. It is located in a region that currently hosts two active mining operations: gold mining by Anaconda Mining Inc. and gold-copper mining by Rambler Metals and Mining PLC, which have been on-going since 2010. In addition to the active mining operations, several minerals prospecting and exploration activities are also underway to make way for future minerals production in the region (NL Department of Natural Resources, 2018b).

4.2.2 Selection of the Town of Baie Verte as the Case Study Area

Three reasons have accounted for the selection of the Town of Baie Verte as the case study area for the study. The first reason is that the town is located on a peninsula that is key to the NL mining industry. It hosts several mining activities, as noted above. Past mining operations have impacted the town in various ways, including its population. Current mining operations are also expected to have further impacts on the town. Considering the key role of the town as the commercial and service center to about twenty-five surrounding communities on the Baie Verte peninsula, its sustainability is crucial to the development of the region, which is in turn key to the NL mining industry, as noted above.

The second reason is that a call was made to Memorial University by the Town's former Chief Administrative Officer - Brian Peach, in October 2017 for a study on the economic contributions of mining to the town. This call for research highlighted not just the need for an economic study, but also the need for a more holistic study that would assess the impacts of mining on the town's overall sustainability (economic, socio-cultural, and environmental).

Finally, my first exposure to the Town of Baie Verte in March 2018 through its Annual Mining Conference and a Harris Centre Thriving Regions Workshop held in the town enabled me to reaffirm the two points mentioned above. It also gave me the opportunity to interact with both community and industry stakeholders about my research intentions and, ultimately, to obtain their support. This exposure was an important step in making this research a possibility, as it later helped me secure an internship placement with the municipality. The internship enabled me to obtain more support and insights from both community and industry stakeholders to better understand the sustainability issues in the town, laying a solid foundation for the study.

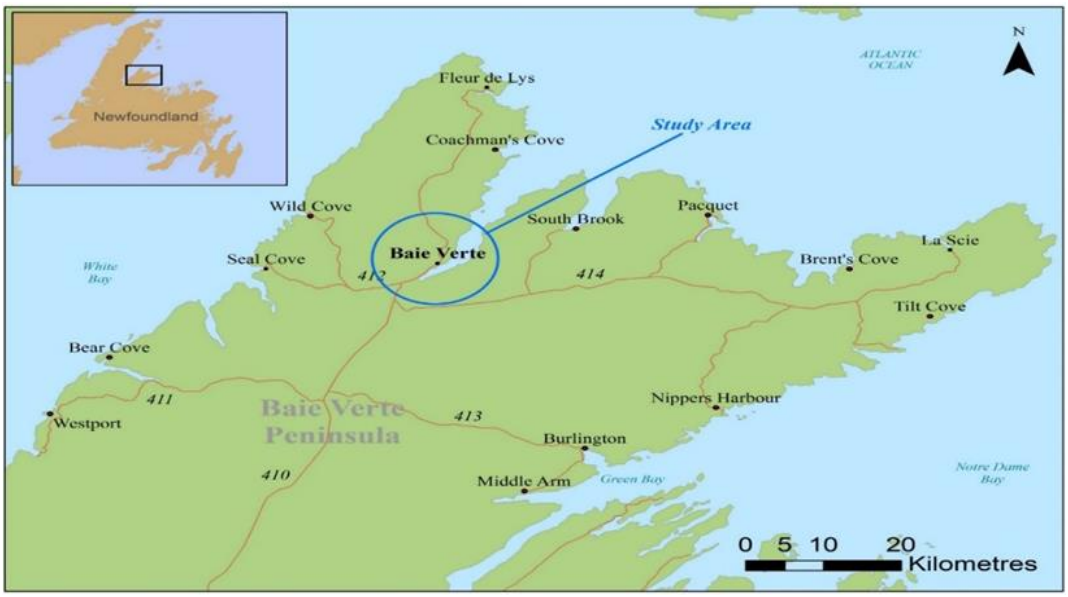

Figure 4. 1: Map of the Baie Verte Peninsula and the Town of Baie Verte
(Map by © Myron King, 2019, EPI,Grenfell Campus Memorial University)

4.3 Analytical Framework

The research focused on assessing the impacts of mining on community sustainability in Newfoundland by using the Town of Baie Verte as a case study. In doing so, there was a need to adopt a model that operationalizes the sustainability concept at the local level in such a way that the impacts of mining could be assessed. The Telos framework, a sustainability assessment model, which uses a set of indicators to measure local and regional sustainability was thus adopted as the analytical framework for the study. The Telos framework (discussed further in section 4.3.2 below) assisted in the choice and organization of the measurement indicators used in the study to assess community sustainability in Baie Verte and the impacts of mining on these sustainability outcomes.

4.3.1 Sustainability Measurement and Assessment Indicators

Sustainability Indicators (SIs) have been used as tools for assessing and facilitating progress towards the attainment of local and regional socio-economic and environmental sustainability goals (Reed et al., 2006). SIs thus form an integral part of both national and international sustainability policy discussions (Reed et al., 2006). The onset of SIs can be traced to the earlier development of highly technical 'top-down', 'expert-driven' tools like the Drivers-Pressures-State-Impacts-Response Framework (OECD, 1993), the Multi-Criteria Decision Analysis (Voogd 1983; Ferrarini et al., 2001), the Orientation Theory (Bossel, 2002), etc. This was followed by the development of more 'bottom-up' oriented SIs following the global call for the implementation of sustainable development goals at local level, after the UN's Agenda 21 (UNCED, 1992). Unlike the earlier top-down oriented SIs, the bottom-up oriented SIs are more participatory and interactive in nature (Holman, 2009), meaning that communities and other

relevant stakeholders are involved in their development and application (Hermans et al., 2011). The Telos framework used in the study is an example of a bottom-up oriented approach. The development of its indicator framework and application in local contexts is participatory in nature, as it involves consultations with community stakeholders (Telos, 2018).

4.3.2 The Telos Framework

The Telos framework is a three-capital model that fits within the Community Capital Framework (CCF). The CCF (as mentioned in chapter 2) has been adopted and widely used in sustainability measurement and community development. It focuses on the assets or capitals of a community and the need to harness them for the overall attainment of community well-being. CCF highlights the importance of the interdependent and synergistic relationships that exist between community capitals (Emery & Flora, 2006). According to the CCF approach, the depletion in the value of one capital leads to adverse effects on other capitals, and vice-versa, and consequently has an impact on the overall well-being or sustainability of a community (Gutierrez-Montes et al., 2009).

The Telos framework was developed in the early 2000s by Telos, the Brabant Center for Sustainability Issues- an institution established in 1999 to develop and share knowledge about sustainable development in the province of Brabant in the Netherlands (Knippenberg et al., 2007). The Telos framework was developed as a local and regional sustainability monitoring and assessment model or tool (Telos, 2017). The framework is symbolized by the 'Telos Triangle', an equilateral triangle (see figure 4.2 below). Building on the three pillars or the TBL model of sustainable development, discussed in section 2.1, and using a capitals approach, the Telos Triangle is comprised of three forms of community capitals, namely: Ecological Capital, Socio-

cultural Capital, and Economic Capital (Knippenberg et al., 2007). As can be seen in figure 4.2 below, the Telos Triangle consists of two sets of triangles - the main or larger triangles and the smaller inside triangles. The inside triangles depict the actual conditions of the capitals, whereas the larger ones symbolize the ideal situation for each capital, based on science and expert or stakeholder judgements (Knippenberg et al., 2007). According to the Telos Framework, sustainable development is defined in terms of a balanced increase in quantity and quality of the three forms of capitals (Knippenberg et al, 2007). The framework identifies three criteria that will lead to the occurrence of sustainable development, namely:

- The use of an approach that balances improvements in all three forms of capitals;
- The pursuit of development that is sustainable over time and throughout generations; and
- The pursuit of development that is sustainable at both the local and global levels (Knippenberg et al., 2007).

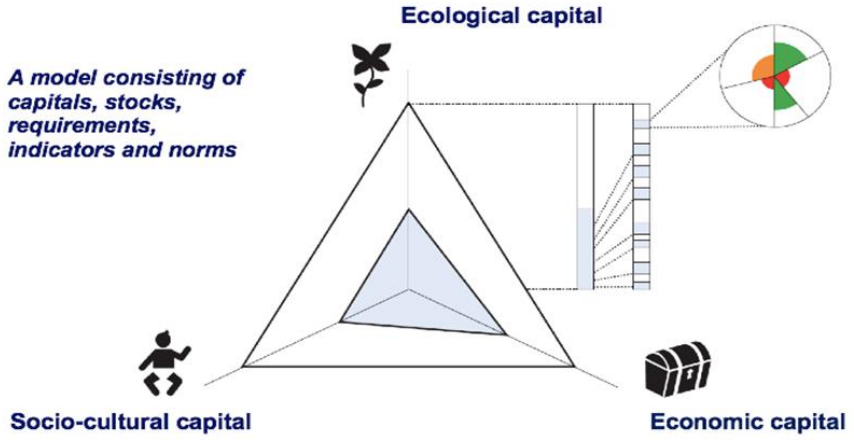

Figure 4. 2: The Telos Triangle

Source: Dagevos (2018)

In order to choose the appropriate components for the capitals to attain a balance in development, Telos adopted three guiding principles, based on definitions by the Swiss Federal Statistical Office (SFSO 2001), namely: social solidarity, economic efficiency, and ecological resilience (Knippenberg et al., 2007). Social solidarity consists of social equity and quality of life. It implies the notion of fairness in the division of social costs and benefits, which can be attained under prerequisite conditions like the existence of equal opportunities, the fulfilment of basic needs, and legal equity (Telos, 2003). Economic efficiency refers to ways in which individual or social needs are met (Telos, 2003). It connotes carrying out economic activities in an effective and efficient manner with less adverse impacts on future generations (SFSO 2001). Ecological resilience refers to the attainment of a balance between the human use of nature and its ecological regenerative capacity (Knippenberg et al., 2007).

The Telos framework utilizes a multilayered method for monitoring SD which is related to the indicators' method by Bossel (1999) and the International Centre for Integrated assessment and Sustainable development (ICIS) method. This multilayered method, as stated by Knippenberg et al. (2007), has the following characteristics: it is

- Integrated: economic, social, and ecological interests are all considered at the same time
- Interdisciplinary: expertise from different scientific disciplines are integrated into one approach
- Interactive*:* all stakeholders are involved
- Strategic: focus is both on short-term problems and on long-term sustainability requirements
- Normative: unwanted long-term effects are made explicit with help from stakeholders and experts.

- Indicative: unwanted long-term consequences or outcomes are made explicit

In applying the Telos framework (see figure 4.3 for details), the three forms of community capitals mentioned above are measured by means of sub-systems called ‘stocks’. The stocks together form essential elements that determine the quality and quantity of the capitals. Examples of stocks include air, water, education, and infrastructure (Knippenberg et al., 2007). Long-term ‘goals’ or ‘requirements’ are assigned to each of the stocks, reflecting the sustainability vision and aspirations of the area being studied. ‘Indicators’ are then assigned to each goal, measuring the degree to which the goals are attained. The indicators are developed based on locally available data, as well as inputs from stakeholders (Knippenberg et al, 2007; Hermans et al, 2011).

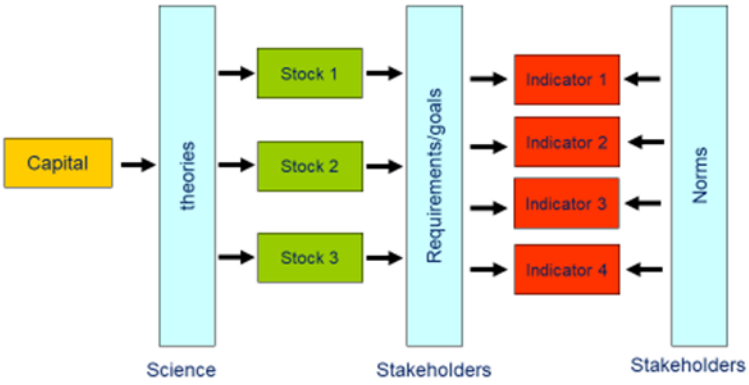

Figure 4. 3: Conceptual Underpinning of the Telos Framework

Source: Dagevos (2018)

The Telos framework was adopted in this study for several reasons. Firstly, even though originally developed and used in the Brabant Region in The Netherlands, the framework has also been used for local and regional sustainability assessments in Newfoundland, first in the Clarenville-Bonavista-Isthmus Region (Lowery & Vodden, 2017) and then in the City of Corner Brook (Belanzaran et al., 2018). I was involved in the latter project and was therefore familiar

with the framework. The second reason for the adoption of the framework is that it takes the same position in the definition of sustainable development as a balanced development or increase in all the three pillars of SD (economic, social, and environment), thus a strong sustainability approach. In addition to this, the framework conceptualizes SD by breaking it down into several recognizable components (capitals and stocks) with goals and measurement indicators assigned to them. This makes it a good fit in attaining the objectives of this study, which seeks to assess the overall sustainability (economic, socio-cultural, and environmental) of a community and the impacts of mining on it. Finally, the supervisory committee members[2] for the study have been engaged in the development and/or application of the framework and were therefore in a good position to advise on its use.

In applying the Telos framework in this study, a Sustainability Balance Sheet (SBS)[3] (see Appendix F) was developed and used to conduct a sustainability assessment of the case study Town of Baie Verte. The main objective of the SBS, according to Dagevos (2011), is to "… measure sustainable development through incorporating community priorities and expert knowledge, reflecting the political and normative nature of sustainable development, increasing citizen participation, and mobilizing citizens in defining and measuring sustainability" (cited in Lowery, 2011, p. 91). In developing the SBS for Baie Verte, data collection methods, such as document review, stakeholder consultations, statistical data collection, and a resident survey (to be discussed further in the section that follows) were used.

[2] Dr. John Dagevos is one of the pioneer developers of the Telos framework. He has been involved in its extensive usage for local and regional sustainability assessments in the Netherlands. Dr. Kelly Vodden has also been involved in the usage of the framework for regional sustainability assessment in rural Newfoundland.

[3] The SBS is in the form of a pie chart with its underlying data mainly in the form of an excel sheet and facts sheet. The excel sheet has a number of columns, showing the capitals, stocks, the goals or requirements, the measurement indicators, the indicators data set, the unit of measurement, the geographical level of data availability (e.g.; municipal, provincial, regional, federal, etc.), and the data source.

The design of the SBS for Baie Verte began with a review of municipal sustainability documents (see section 4.4.1). The purpose of this review was to identify the components of sustainability (or capitals) that the municipality defined as relevant to the town. Consequently, four stocks were identified as relevant to the economic capital of Baie Verte, seven stocks for the socio-cultural capital, and five stocks for the ecological capital (see table 4.1). Goals were then assigned to the identified stocks. The goals were also deduced from the reviewed municipal documents and authenticated by the municipality (to be discussed further in section 4.4.4). In consultation with community stakeholders, a set of measurement indicators were then developed for the identified stocks and goals (see Appendix E for details).

Table 4. 1 List of Relevant Sustainability Stocks for Baie Verte

Ecological Capital	**Economic Capital**	**Socio-Cultural Capital**
Water Quality, Use, and Infrastructure	Labour Market	Population and Demography
Air Quality	Economic Structure	Health and Well-Being
Ecosystem Health and Protection	Knowledge Infrastructure	Housing and Living Conditions
Land Use	Physical Infrastructure	Education
Waste Materials Management		Sense of Place and Cultural Identity
		Participation and Governance

Source: Author's construct based in reviewed community documents

To complete the SBS for Baie Verte, sustainability profile data relevant to the indicators were obtained from several sources, described further below. This process helped to provide a better understanding of the sustainability issues at stake in Baie Verte. It also enabled reflections to be made on the role mining and mining policies have played in the Town of Baie Verte in relation to the identified sustainability issues.

4.4 Data Collection

During two different phases, both quantitative and qualitative data were collected for the study. The first phase involved the collection of both quantitative and qualitative data from sources such as community sustainability documents, Community Accounts, Statistics Canada, municipal and provincial government reports and websites, residents survey, etc. The purpose of the first phase was to address the first and second objectives of the study, which are to: (1) identify the sustainability vision and goals of Baie Verte as defined by the municipality and residents, and (2) identify the strengths and weaknesses of Baie Verte from a sustainability perspective.

The second phase involved the collection of qualitative data through participant observation and semi-structured interviews of community opinion leaders, municipal and provincial government officials, and mining industry officials. The second phase had two purposes. The first was to discuss the preliminary results obtained from the first phase. The second was to address the third and fourth objectives of the study, which are to: (3) examine the impacts of mining on community sustainability in Baie Verte in relation to how it has been defined by the municipality and residents, and (4) identify mining related policies (both government and corporate) being used or that could be used in the future to enhance community sustainability in NL in general, and in Baie Verte specifically. See table 4.2 below for details on how the two phases of data collection were used to address the research objectives. The sections that follow will also further discuss how the data was collected and analyzed in the study.

Table 4. 2: Relationship between Data Collection Phases and Research Objectives

Research Objectives	Type of Data	Sources of Data
1. Identify the sustainability vision and goals of Baie Verte as defined by the municipality and residents	Qualitative and Quantitative	Community sustainability policy documents, such as: Baie Verte ICSP, Baie Verte Economic Action Plan, Baie Verte Peninsula Thriving Regions Report
2. Identify the strengths and weaknesses of Baie Verte from a sustainability perspective		Residents survey, statistical profile data from sources such as: Community Accounts, Statistics Canada, government and academic reports, etc.
3. Examine the impacts and contributions of mining on community sustainability in Baie Verte in relation to how it has been defined by the municipality and residents	Qualitative	Semi-structured interviews of community and industry stakeholders
4. Identify mining related policies (both government and corporate) being used to ensure community sustainability in NL in general, and in Baie Verte specifically	Qualitative	Government and industry policy documents, and semi-structured interviews of stakeholders

Source: Author's construct

4.4.1 Document Review

In order to obtain a better understanding of the sustainability vision and goals of Baie Verte, three main community documents were reviewed: the Baie Verte Economic Action Plan (2004), the Baie Verte Integrated Community Sustainability Plan (ICSP) (2010), and the Baie Verte Peninsula Thriving Regions Report (2018). These documents were obtained from the Baie Verte municipal database and confirmed by the municipality as containing relevant information that provide key insights on the town's sustainability vision and goals. The main contents of these documents are discussed in the following paragraphs.

The Baie Verte Economic Action Plan was developed in 2004 by the Baie Verte municipal government as a road map to direct the town towards the attainment of its economic vision of becoming "the growth center for the Baie Verte Peninsula" (Town of Baie Verte, 2004, p.1). In order to attain this vision, goals and objectives were set for municipal infrastructure, business, tourism, education, and recreation (Town of Baie Verte, 2004). This document helped in defining the sustainability stocks for Baie Verte in table 4.1, and also assisted in identifying the sustainability goals relevant to the stocks.

The Integrated Community Sustainability Plan (ICSP) was developed by the Baie Verte municipal government in 2010. In an agreement signed between the federal government and provincial governments, on the transfer of federal gas tax revenue, municipalities were mandated to develop an Integrated Community Sustainability Plan (ICSP). In Newfoundland and Labrador, an ICSP guide was made available by the Department of Municipal Affairs. The guide gave municipalities the option to either develop a Stand-Alone ICSP, or partner with other municipalities to develop a collaborative ICSP. The Town of Baie Verte opted to develop a Stand-Alone ICSP. Baie Verte's ICSP depicts its overall sustainability vision as centered around developing a true community that caters to the needs of industrial workers in the fishing, lumbering, and mining industries (Town of Baie Verte, 2010). The town's ICSP highlights key issues like health and well-being, sense of place, economic development, and environmental protection, as relevant to its sustainability. These issues were all taken into account in defining the relevant stocks in table 4.1 above.

The Baie Verte Peninsula Thriving Regions Report is a by-product of a workshop organized by Memorial University's Leslie Harris Centre for Regional Policy and Development, which was held in Baie Verte in March 2018. The workshop brought together several

stakeholders of the Baie Verte Peninsula to deliberate on priority research areas for the sustainable development of the region. In doing so, the workshop made use of techniques like individual reflections, group brainstorming and group discussion sessions. The Thriving Regions report resonates well with the other community documents mentioned above as it highlights and reflects on most of the key sustainability issues discussed in them, such as: health and well-being, infrastructural development, education and training, economic diversification, sense of place and cultural identity, etc. (Harris Centre, 2018a). The report, thus, also highlighted some of the key sustainability issues that were considered in defining the stocks in table 4.1.

In addition to the above documents, other documents pertaining to the government and industry policies and initiatives on sustainable mining in Canada and NL discussed in chapter 3 were also reviewed. This provided a better understanding of the role of mining policies on community sustainability in Baie Verte, which was key to achieving the fourth research objective.

4.4.2 Statistical Data Collection

In applying the Telos framework, sustainability profile data relevant to the defined assessment indicators were collected for the various stocks of the three capitals (economic, socio-cultural, and ecological) for Baie Verte (see Appendix F). The data were collected from several sources, including but not limited to Community Accounts, Statistics Canada, Vital Signs, municipal and provincial government reports, government websites, municipal documents, academic reports, news articles, etc.

To allow for comparison and a better understanding of Baie Verte's situation, the same kind of data was also collected for three other peer communities, and provincial averages.

Buchans and St. Lawrence were selected as two peer communities from the island of Newfoundland, because they are also mining towns like Baie Verte. Even though the study is focused on the island portion of the province, Wabush in Labrador was selected as the third peer community because it is a mining town of the same population size as Baie Verte. The additional data sets of the peer communities and the provincial averages, together with relevant data on national averages, where applicable, were used to define the norms, standards, or benchmarks by which the performance of Baie Verte has been assessed in this thesis. A colour coding system (see able 4.3 below) was used in making this assessment. This is presented in a sustainability assessment summary in chapter 5, which gives an overview of the status/performance of all the defined stocks of Baie Verte (see table 4.1) per the research findings.

Table 4. 3: Sustainability Assessment Colour Coding System

Coding	Status
	Moderate to Poor - Immediate actions are needed to enable the sustainability of the stock
	Moderate - Certain elements of the stock require action or improvement
	Good - No immediate action required
	No Data - Further research required

Adopted from the Telos framework

Ideally, more indicators should have been included in the assessment, but some desired data sets (e.g. waste generation per capita, greenhouse gas emissions per capita, etc.) were not readily available. Even with the indicators that were used, there were instances where data was not readily available for the peer communities and/or the provincial and national averages to allow for reasonable comparisons to be made. There is, therefore, a data gap in the study, which

has been addressed by taking a range of indicators into account within each category of community capitals.

4.4.3 Resident Survey

Considering the fact that the study was based on community sustainability in Baie Verte, a resident survey was selected as the most appropriate survey instrument. A resident survey was conducted from November 2018 to January 2019 to complement the findings obtained from the document review process discussed above, and to fill the data gaps identified in the statistical data collection process, also discussed above. Groves et al. (2009) defined a survey as "a systematic method of gathering information from (a sample of) entities for the purposes of constructing quantitative descriptors of the attributes of the larger population of which the entities are members of" (p. 2). Pinsonneault and Kraemer (1993) further stated that the gathered information in a survey is usually on the "characteristics, actions, or opinions of a large group of people" (p. 77). In this study, the survey questionnaire used covered topics relevant to the identified sustainability stocks in table 4.1.

Various forms of survey instruments are used in research. The choice of a survey instrument depends on the purpose of the research and desired results (Glasow, 2005). For the purpose of this study, a questionnaire was used as the survey instrument. The questionnaire was administered using a mixed survey approach of both online and paper-based surveys. The ultimate goal of this approach was to obtain the highest possible survey response rate in the shortest possible time (Sallant & Dillman, 1994). The online survey entailed developing the survey questionnaire on survey monkey and sharing the link with residents through social media advertisements on the town's Facebook page and website. Poster ads were also posted at strategic

town locations, including the post office, grocery store, hospital, college, stadium, convenience stores, gas stations, and restaurants, encouraging residents to participate. The paper-based survey, on the other hand, was distributed along with a copy of the survey ad to various community groups, including churches, fire department, seniors' club and other volunteer groups, asking them to encourage their members to participate. To avoid the completion of duplicate surveys, two approaches were used. The first approach was that participants were asked through the survey ads to participate in the study only once, either online or through the paper survey. The second approach was that an IP-based duplicate protection was set on the online survey to prevent multiple completions.

The survey targeted Baie Verte residents mainly 15 years and older. A total of 145 surveys were completed. Considering that Baie Verte has a population of 1,105 people who are 15 years and older (Statistics Canada, 2016), the survey had a participation rate of 13.1%. Of the total 145 surveys, 62.8% were completed online and 37.3% on paper. The majority of the survey respondents were between the ages of 30-59 years, with 29.6% in the 30-44 years age bracket, and 32.6% in the 45-59 years age bracket. Respondents between the age brackets of 15-29 years and 60 years and older represented 12.6% and 18.5% of participants, respectively. In comparison with the 2016 census data (see table 4.4 below), where 15.4% of Baie Verte's population were 15-29 years, 21.7% between 30-44 years, 26.7% between 45-59 years, and 36.7% 60 years and older, the survey respondents in the 30-44 years and 45-59 years age brackets of Baie Verte's population were overrepresented. In terms of gender, 49.6% of respondents were female, 42.4% male and 8% did not declare their gender. In comparison with the 2016 census data, where 47.1% of Baie Verte residents aged 15 years and older were male and 52.9 % of the same age bracket

female, the gender split of the survey respondents was similar to the wider population in Baie Verte.

Table 4. 4 Survey Participants Age Group vs 2016 Census Data

Age Group	Representation in Survey (%)	Representation in 2016 Census (%)
15 - 29	12.6	15.4
30 - 44	29.6	21.7
45 - 59	32.6	26.7
60 +	18.5	36.7

Author's construct based on research survey and census data

4.4.4 Stakeholder Consultations

Findings from the community documents review, statistical data collection and resident survey were shared with community stakeholders, including municipal government officials, community group leaders, and mining company officials for their review and feedback. This was done through a presentation to the Baie Verte town council, follow-up meetings at the town office and via emails from January to February 2019, and again in fall 2019 to further clarify and fill in remaining data gaps. This process helped in authenticating the preliminary findings of the research and obtaining feedback. It also provided more insights into the key sustainability strengths and weakness of Baie Verte, thereby highlighting areas to probe for more details in the interviews conducted later on in the study.

4.4.5 Participant Observation

Participant observation was used in this study to observe the Town of Baie Verte from a general sustainability perspective, and to understand how the mining industry has impacted it. My role as a participant observer started during my internship placement with the town office,

from November 2018 to January 2019 and continued with subsequent visits after the internship ended. The six-week internship placement in Baie Verte focused on addressing the first and second objectives of the study, which are: (1) to identify the sustainability vision and goals of Baie Verte, as defined by the municipality and residents, and (2) to identify the strengths, and weaknesses of Baie Verte from a sustainability perspective.

According to Kawulich (2005), participant observation is the process of learning about a research problem through exposure to or involvement in the routine activities of participants in the research setting. The role of a researcher in participant observation "consists of gathering impressions of the surrounding world through all relevant faculties" (Adler & Adler, 1994, p.378). Recording the gathered impressions or perceptions into field notes relevant to the theme of the research is an important component of participant observation (Werner & Schoepfle, 1987). During my stay in Baie Verte, I kept a record of both formal and informal interactions with residents and how that related to the subject of mining and community sustainability in the town. In addition to the field notes, I also took photographs of objects and places that I deemed relevant to the theme of the study. All of these provided more context to this thesis and have been incorporated into the analysis and results.

4.4.6 Semi-Structured Interviews

The study also used interviews, one of the main qualitative research data collection methods that allow a researcher to collect facts or gain insights into the opinions, attitudes, experiences, behaviors, and predictions of respondents (Rowley, 2012). The purpose of the interviews was to: 1) discuss participants' opinions and obtain feedback on the preliminary findings from phase one of the study; 2) obtain insights in participants' (expert) opinions on the

impacts of mining on community sustainability in Baie Verte; and 3) identify the mining related policy options being used to enhance community sustainability in NL and Baie Verte, specifically.

A total of 17 interviews were conducted, as follows:

- Seven with community stakeholders, mainly residents and opinion leaders from a cross-section of social, economic, and environmental community groups and organizations;
- Three with municipal government officials, including the mayor of Baie Verte;
- Three with provincial government officials from the Department of Natural Resources - Mines Branch, the Department of Municipal Affairs and Environment, and the Department of Tourism, Culture, Industry, and Innovation;
- Three with Baie Verte mining company officials; and
- One with a provincial mining industry association (Mining Industry NL) official.

A total of 20 participants were targeted to be interviewed. Three of them were not available to participate; however, the responses provided by the 17 participants interviewed were sufficient to serve the intended purposes of interviews in the study.

Two main techniques were used in recruiting the interview participants. The first was purposive sampling. Onwuebguzie and Collins (2007) describe this as a targeted selection of participants with prior knowledge of a subject matter and the ability to provide in-depth information on it. The second was ‘snowball’ sampling. Christensen (2012) describes this as a method in which participants refer researchers to other individuals with in-depth knowledge in a particular area, as potential participants. All targeted participants had some prior knowledge about community sustainability issues and mining, as can be seen from the cross section of

participants listed above. The interview process commenced with a list of 16 targeted participants. Each participant was asked at the end of the interview to recommend other people with in-depth knowledge about mining and community sustainability issues in Baie Verte, who could contribute to the study. This process resulted in the recruitment of four other participants (mainly community stakeholders) who were not part of the targeted list. And as stated earlier, this amounted to a total of 20 targeted participants, of which 17 participated.

The interviews were conducted in two phases: a 'local' one and a 'provincial' one. In the local phase of the interviews, community stakeholders, municipal government officials, and mining company officials in Baie Verte were interviewed. The interviews in this phase were conducted in person in February 2019 at different venues in Baie Verte, based on participants' preferences. The venues included the College of the North Atlantic campus, the town office, the fire department office, and other offices. In the 'provincial' phase of the interviews, provincial government officials and a mining industry association official were interviewed. Due to long distances and at the convenience of participants, the interviews in this phase were conducted over the phone and on skype in March 2019.

Both the local and provincial interviews lasted approximately 45 minutes on average and were semi-structured in nature. Participants were allowed to elaborate on themes relevant to a set of pre-determined questions set out in an interview guide (Butters, 2018) (see Appendices C, D, & E for interview guides). All interviews were recorded by notetaking and audio recording, with the permission of participants. The interviews were later transcribed using Microsoft Word and Express Scribe Transcription version 7.0. in preparation for analysis. All interview participants were guaranteed data confidentiality to the best of the researcher's ability (see section 4.6 for further details).

4.5 Data Analysis

The credibility of a research process and research results are largely dependent on the research methodology, including the process of data collection and analysis (Thorne, 2000; Nowell et al., 2017). According to Creswell et al. (2003), data analysis in mixed methods research is dependent on the type of design employed in a study. Statistical analysis is usually used for the quantitative data, and a content and/or thematic analysis for the qualitative data (Creswell et al., 2003). Considering that the study was based on a mixed methods approach, thematic analysis and descriptive statistical analysis were used to analyze the collected data (see sections 4.5.1 and 4.5.2 below for details). The analyzed data have been integrated into the results, discussions, and conclusion chapters of this thesis (chapters 5, 6, and 7).

4.5.1 Thematic Analysis

Thematic analysis was the main technique used to analyze the qualitative data obtained from the documents and articles reviewed, interview transcripts, and participant observation notes. Fereday and Muir-Cochrane (2006) and Braun and Clark (2006) defined thematic analysis as involving organizing and describing data set in rich detail by searching for themes that emerge as being important to the description of a phenomenon. The nature of the qualitative data collected in the study (as illustrated above) made this technique the most appropriate analysis method to use. Version 12 of the NVivo coding software was used for conducting this data analysis. In doing so, both deductive and inductive techniques were used in coding the data sets. The deductive technique, on the one hand, allowed for themes to emerge from the academic literature reviewed, and the inductive technique, on the other hand, allowed for themes to emerge during the data analysis process. The themes that emerged were categorized under broader

themes, namely "economic sustainability", "socio-cultural sustainability", "environmental sustainability", "mining policies and sustainability" to allow for easy interpretation in the coding process. As can be seen in table 4.5 below, the themes that emerged from the data analysis reflect some of the sustainability stocks defined for Baie Verte in table 4.1, and are, thus, relevant to the study.

Table 4. 5: Classification of Emerged Themes from Data Analysis

Economic Sustainability Themes	**Socio-Cultural Sustainability Themes**	**Environmental Sustainability Themes**	**Mining Policies & Sustainability Themes**
Labour	Population Fluctuation	Water Resources	Legislation
Employment	Migration	Water Quality	Laws
Economy	Health & Safety	Air Quality	Acts
Knowledge-base	Cost of Living	Mine Waste	Regulations
Infrastructure	Literacy	Land Degradation	Policies
Social Amenities	Accommodation		Standards
	Community Engagement		Initiatives
	Governance		
	Togetherness		
	Governance		

4.5.2 Statistical Analysis

Statistical analysis was used to analyze and interpret the data obtained from the residents survey. The analysis was descriptive in nature. Results from the survey laid the foundation for a better understanding of community sustainability in Baie Verte, as perceived by residents and the impacts of mining on it. The analysis of the survey data was done based on age, gender, income, and occupation of respondents. The gender, income, and occupation analysis did not show apparent differences; hence the analysis based on age, which showed notable differences, will be presented in the results section in chapter 5. Calculations for percentages were used to present these survey findings in a graphical form (see chapter 5). The graphical representation of

the survey results provided an overview of the sustainability priorities of Baie Verte residents and helped identify areas for probing for more details in the interviews. Other statistical data relevant to the town's sustainability profile collected from sources like Community Accounts, Statistics Canada, Vital Signs, government and academic reports, etc. were also analyzed using percentages and means. This analysis has also been integrated into the results section in chapter 5.

4.6 Ethical Considerations

The study involved human dimensions. As such, it was guided by the principles of the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans. Accordingly, ethics clearance was obtained from the Grenfell Campus Research Ethics Board (GC-REB) before commencement of the research. The study did not pose any serious threat to participants, as no physical, emotional, psychological, and financial risks were encountered. Efforts were made to ensure the anonymity of all participants. Survey participation was strictly voluntary and anonymous. Survey respondents were given the free will to opt out of the survey at any point during the completion of the survey. Interview participation was also voluntary. All participants were provided with background information on the research and given enough time to decide on their participation. Prior to the interviews, participants' consent was obtained through the signing of an informed consent form (see Appendix A). During the interviews, participants were given the option to skip questions they were uncomfortable with. After the interview, participants were given up to May 2019 to withdraw their participation from the study without any repercussions. To maintain confidentiality, all interview transcripts and surveys were anonymized. All hardcopy documents like the interview notes and paper surveys were stored in a locked filing cabinet kept

in a locked space, then digitized and hardcopies were destroyed. The digitized documents, together with the interview transcripts and online surveys, have been securely stored in password-protected files on a password-protected personal computer and kept in a locked space. All data gathered for the study, including interview data and survey data will be retained for up to five years, after which they will be destroyed in accordance to Memorial University's policy guideline on integrity in scholarly research.

4.7 Limitations of the Study

The study had some limitations with data collection for both the survey and interviews. One limitation with the survey data collection was that the study area did not have a usable sampling frame - as a source material or device that can be used to identify the individuals in a population who can be sampled (Särndal et al., 2003). Also, the fact that the survey took place in the winter season made it even more difficult to achieve a proper sample from the general population of Baie Verte. As noted earlier, a mixed approach of using both online and paper survey was therefore used to obtain as many survey responses as possible. This resulted in some bias in the survey results, as a certain group of the population were easier to approach than others (as illustrated in table 4.4). Other forms of data from the SBS (statistical data) and the interviews, however, helped to address this limitation. Another limitation with the survey data was the possibility of survey duplication, due to the mixed survey approach used. The survey was an anonymous one where participants were not asked to provide identification data (such as names). Some participants were therefore likely to have completed more than one survey. As previously noted, steps like adding a clause on the recruitment poster ad, asking potential participants to complete the survey only once, as well as making use of IP duplicate detection protocols on the

online surveys, were taken to help address this identified duplication problem. Despite these steps, the study was unlikely to have detected all duplicate surveys that may have occurred.

With regard to the interview data collection, one limitation was with the close connection between the research and my internship assignment within the study area, which was focused on addressing two of the research questions indicated in section 4.4.5. Due to this close link between the internship and the study, most of the mining company interview participants were unclear of the differences between the two. They, therefore, tried to avoid questions which they assumed were addressed by the internship. Because those questions were vital to the study, conscious efforts were made to explain the similarities and differences between the two, including the fact that results from the internship assignment were also drawn into the study. This guided the interview discussions and ensured answers were obtained for all relevant questions.

Another limitation of the study has to do with the representation of some aspects of the research findings. The research data gathered on the impacts of mining on community sustainability in Baie Verte were mainly from the interviews with stakeholders such as community opinion leaders, municipal government officials, and mining company officials. As such, that aspect of the study's findings represents the views and opinions of those individuals only and cannot be considered representative of the Baie Verte population in its entirety. This is a common issue with interviewing selected groups in any study, even if the selection is deliberately done to represent a range of varying perspectives. In the case of this study, the use of triangulation, the findings from the internship assignment, and the designed sustainability balance sheet complemented the perspectives from the interviews.

4.8 General Conclusions from Chapter 4

Discussions in this chapter justified the methodological approach used in the study. This included the choice of the Telos framework as an analytical framework for assessing the state of sustainability in the case study area of Baie Verte and the impacts of mining on it, as well as a mixed methods case study approach, including a range of data collection and analysis methods. The chapter also highlighted the limitations of the study and the various techniques that were used to address them in order to answer the research questions. Answers to the research questions are presented in the results, discussions, and conclusions chapters that follow.

Chapter 5: Community Sustainability in Baie Verte - Results and Discussions

This chapter presents the results and discusses the findings that relate to the first and second objectives of the study, which are: 1) to identify the sustainability vision and goals of Baie Verte, as defined by the municipality and residents; and 2) to identify the strengths and weaknesses of Baie Verte from a sustainability perspective. The results and findings have for the most part been deduced from the Sustainability Balance Sheet (SBS) (see section 4.3.2) developed for Baie Verte. Section 5.1 of the chapter addresses the first research objective, as it discusses the sustainability vision and goals of Baie Verte, as defined by both the municipality and residents. Sections 5.2, 5.3, and 5.4 address the second research objective, as they discuss the status (including strengths and weaknesses) of the defined sustainability (economic, socio-cultural, and ecological) vision and goals of Baie Verte.

5.1 Sustainability Vision and Goals of Baie Verte

5.1.1 Sustainability Vision and Goals as Defined by the Municipality

The overarching sustainability vision of the Town of Baie Verte, as stated in the town's Integrated Community Sustainability Plan (ICSP) is to "…provide a clean, safe, economically viable environment for all its citizens, from youth to seniors, while promoting health and wellness, and protecting the environment" (p.11). The ICSP, as mentioned in section 4.4.1, is a municipal document that was developed in 2010 using a number of community engagement procedures like public meetings and a residents survey. The ICSP highlights the sustainability vision and goals of the Town of Baie Verte.

In order to obtain a better understanding of the ways that Baie Verte's sustainability vision is being achieved, a Sustainability Balance Sheet (SBS) was developed for the town. Relying on

community documents and following the Telos framework, four stocks were identified as relevant to the economic capital of Baie Verte, six stocks to the socio-cultural capital, and five stocks to the ecological capital. Each of the identified stocks were assigned goals (see table 5.1 below for details). The goals were also deduced from the reviewed community documents and authenticated by municipal government officials. In consultation with community stakeholders, a set of measurement indicators were developed for the identified stocks and goals (see Appendix E for details). Profile data to complete the SBS were then obtained from several sources, as discussed in sections 4.4.2 and 4.4.3 above.

Table 5. 1: Relevant Sustainability Stocks and Goals for Baie Verte

Economic Capital	Socio-Cultural Capital	Environmental Capital
1. Labour Market	**1.Population and Demography**	**1. Water Quality, Use, and Infrastructure**
Ensure the availability of adequate employment opportunities for all residents	Ensure population stabilization	Ensure that all residents have uninterrupted access to quality drinking water
2. Economic Structure	Enhance youth retention	Ensure that wastewater is treated prior to disposal
Continue to support the growth of the mining industry	**2.Health and Well-Being**	**2. Air Quality**
Diversify economy by supporting the development of other industries (forestry, fishery, tourism, etc.)	Ensure good physical, emotional, and mental health among residents	Ensure good local air quality for all residents
3. Knowledge Infrastructure	Ensure residents have adequate access to healthcare	Reduce GHGs emissions
Promote training and skills development programs relevant to industry	**3. Housing and Living Conditions**	**3. Ecosystem Health and Protection**
4.Physical Infrastructure	Ensure the availability and affordability of housing for all residents	Ensure terrestrial ecosystem (forests and wildlife) is preserved
Preserve town's pristine nature and culture through beautification	Enhance the development of housing	Ensure aquatic ecosystem (water bodies, fish stocks, etc.) is preserved
Enhance Transportation Infrastructure	**4. Education**	**4. Land Use**
Enhance Communication Infrastructure	Ensure residents have access to high-quality primary & secondary education	Enhance land availability for the development of the agricultural sector

	Encourage residents to pursue post-secondary education	Enhance land availability for the development of local businesses
	5. Sense of Place and Cultural Identity	Enhance land availability for residential developments
	Ensure good residents community connectedness	**5. Waste Materials Management**
	Protect cultural heritage and local identity	Reduce waste generation
	6. Participation and Governance	Enhance waste diversion
	Increase residents' involvement in local governance	
	Enhance residents' participation in community through volunteerism	

Source: Author's construct as deduced from Municipal documents

5.1.2 Sustainability Vision and Goals as Defined by Residents

As part of an internship placement in Baie Verte in fall 2018, a residents survey was conducted. The purpose of the survey was to understand how Baie Verte residents perceive the sustainability of the town in terms of the topics/themes they consider as most important to the town's sustainability. This was done in relation to the relevant sustainability stocks and goals defined by the municipality, as shown in table 5.1 above. The survey also assisted with filling in data gaps identified in attempting to complete the SBS with the available statistical data.

As can be seen in figure 5.1 below, survey respondents agreed that all the stocks and goals defined by the municipality are very important to the sustainability of Baie Verte. For economic capital, the availability of employment and business opportunities stand out as the most important sustainability concerns for those who responded (deemed important by 90%). Health and well-being, housing and living conditions, and educational facilities and services stand out as the most important concerns (90%) for socio-cultural capital. And for ecological capital, water quality and waste reduction stand out as the most important concerns (90%). Overall, all types of capitals are

deemed as very important by respondents, with ecological capital being the highest, based on the average of responses across all goals within this category.

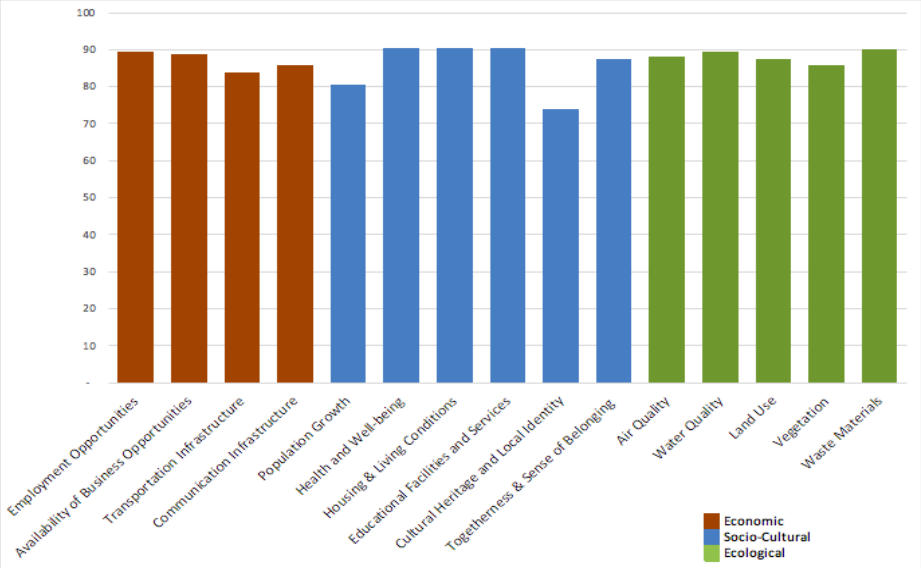

Figure 5. 1: *General Sustainability Concerns by all Survey Respondents*

Source: Baie Verte Community Survey (2018 - 2019)

An interesting finding from the survey, as can be seen in figures 5.2, 5.3, and 5.4 below, is that the sustainability concerns perceived by survey respondents vary by age group. For example, for economic capital (see figure 5.2) respondents between the ages of 15-59 years identify the availability of employment opportunities as a main area of concern (86 - 100%); whereas respondents from 60 years and above, who are probably retired or nearing retirement, identify the availability of business opportunities as a main area of economic concern (84%). Surprisingly, respondents between 30-44 years who completed 29.6% of the survey identify availability of good communication network as a less important area of concern (55%). This is perhaps, because Baie Verte is the only town in the region with access to a relatively good communication network (Municipal Government Official, participant BVI03).

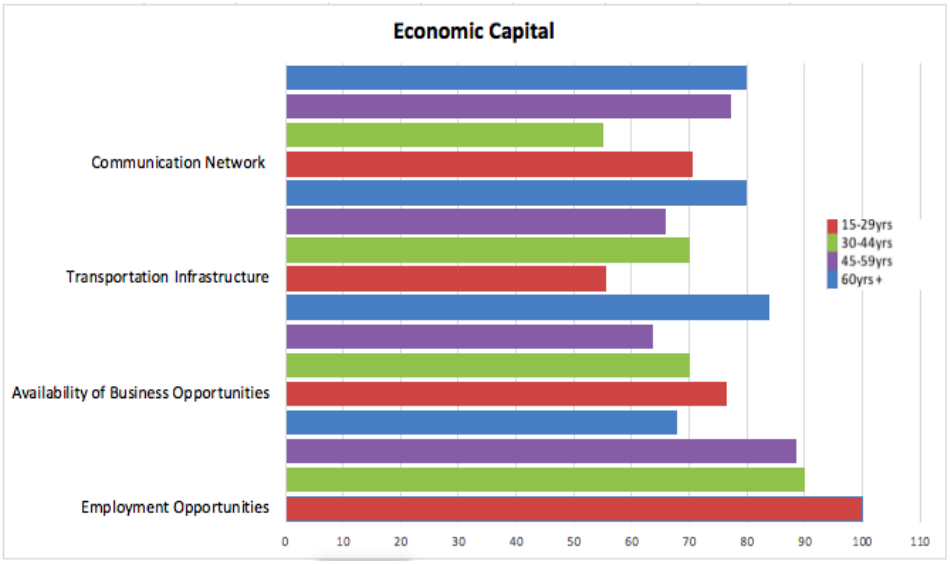

Figure 5. 2: Economic Capital Sustainability Concerns by Age Group

Source: Baie Verte Community Survey (2018 - 2019)

For the socio-cultural capital (see figure 5.3), all respondents identify health and well-being as a main area of concern, with the lowest score being 84% and the highest being 92%. Again, within this capital, differences can be seen between age groups. For instance, respondents between the ages of 15-29 years and 30-44 years are more concerned about education (94% & 85% respectively), while those between 45-59 years are concerned about housing and living conditions (90%), and those 60 years and above are more concerned about togetherness and sense of belonging than other age groups (80%). Population growth (40% - lowest score among those 15-29 years, and 80% - highest score among those 60 years and above) and cultural heritage and identity (18% lowest score and 77% highest score) are important concerns to those 45 years and above, but less important to those 15-44 years old. In the socio-cultural capital, the differences in priorities by age group seem to have a strong connection with the different preferences humans attach to things in their developmental life cycle (Armstrong, 2007).

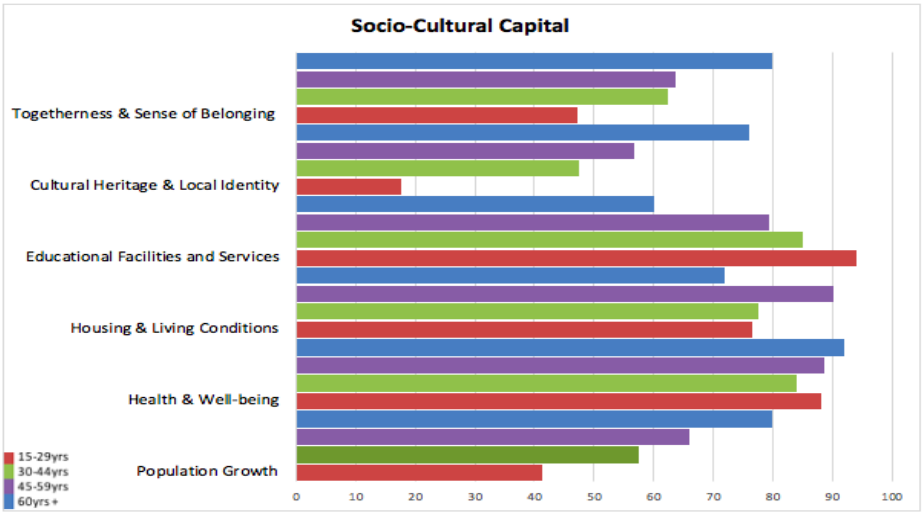

Figure 5. 3: *Socio-Cultural Capital Sustainability Concerns by Age Group*

Source: Baie Verte Community Survey (2018 - 2019)

For ecological capital (see figure 5.4), water quality (lowest score of 82% within the 15-29 age group, and highest score of 92% within the 60 years and older group) and air quality (lowest score being 81% among the 45-59 years age group, and highest score of 88% within the 60 years and older group) are identified as the top areas of concern by all age groups. On the other hand, land use (lowest score of 37% among those aged 30-44 years, and highest score of 73% among the 60 years plus group) and vegetation and green space (lowest score of 43% again among the 30-44 group, and highest score of 68% within those 60 years of age and older) are identified as less important to respondents between the ages of 15-44 years than to those 45 years and above.

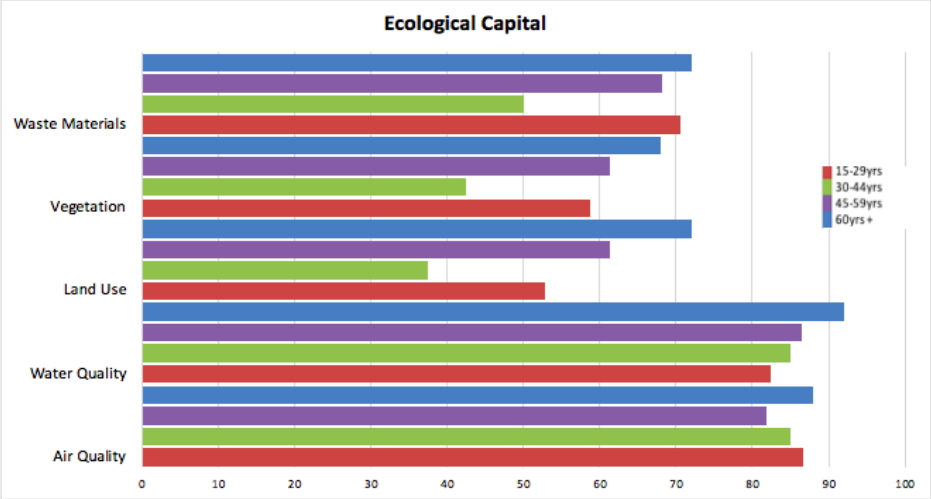

Figure 5. 4: *Ecological Capital Sustainability Concerns by Age Group*

Source: Baie Verte Community Survey (2018 - 2019)

The section that follows will discuss the status, including the strengths and weaknesses of the identified sustainability stocks, for all three capitals (economic, socio-cultural, and ecological) for the Town of Baie Verte.

5.2 Economic Capital of Baie Verte

This section discusses the strengths and weaknesses of the economic capital of the Town of Baie Verte in relation to the Telos framework. These include discussions on the status of the labour market, economic structure, physical infrastructure, and knowledge infrastructure.

5.2.1 Labour Market

For analysing the functioning of the town's labour market, the goal of ensuring adequate employment opportunities for residents guided the selection of relevant indicators for this stock (see table 5.1). These included indicators such as employment and unemployment rate, labour force participation and self-reliance (see Appendix E1 for the list of indicators).

According to Community Accounts, in 2016 the employment rate[4] in Baie Verte for the population of 15 years and older was 44.6%. This was below the provincial average of 49.5% (10.7% below the national average) and of Wabush's 64.2%, but above Buchans' and St. Lawrence's 23.6% and 43.4% respectively (Community Accounts, 2016; Statistics Canada, 2016). The unemployment rate for Baie Verte was 18.3% for the same year. This was above the high NL provincial average of 15.6% (8.7% above the national average) and Wabush's 11.3%; even though below Buchans and St. Lawrence's 27.5% and 19.6% respectively (Community Accounts, 2016; Statistics Canada, 2016). Again, in 2016, for the population of 15 years and older, Baie Verte had a moderate labour force participation rate[5] of 55.7% compared to the 58.7% provincial average (7.1% below the national average) and Wabush's high of 72.2% (Community Accounts, 2016; Statistics Canada, 2016). Baie Verte had a good self-reliance ratio[6] of 79.6% compared to the 72.1% for St. Lawrence and 64.3% for Buchans and was similar to the 80.6% provincial average (Community Accounts, 2016).

The composition of the labour force in Baie Verte in terms of employment was suggested by most study participants as being diverse, as it includes mine workers, hospital workers, FIFO workers, etc. *"... Most of the labour force here its either they work at the mines, or commute to Alberta, or work in the service centres like the college or the hospital kind of thing"* (Economic Organization Staff, Participant BVI04). The hospital and the mines were noted as the main

[4] Employment Rate is a statistical ratio that measures the proportion of a community's working age population that is employed (Community Accounts, 2016).

[5] Labour Force Participation Rate measures an economy's active labor force and is the sum of all employed workers divided by the working age population. Retrieved from https://www.investopedia.com/terms/p/participationrate.asp.

[6] Self-Reliance Ratio is a measure of the community's dependency on government transfers such as: Canada Pension, Old Age Security, Employment Insurance, Income Support Assistance, etc. (Community Accounts, 2016).

employers of the town's labour force. A college staff member, participant BVI07, highlighted this: *"I would say the mining companies and the hospital are the biggest employers in this town".* In support of the above statement, it was discovered that out of the total 550 jobs within the town's labour force 15 years and above in 2016, 90 were provided by the mining sector and 115 by the healthcare sector, including social services (Community Accounts, 2016; Statistics Canada 2016).

Further findings on employment rates in Baie Verte by sector will be discussed in the next section. It is, however, worth noting that the situation in Baie Verte, like the high unemployment rates mentioned above, actually reflects the NL provincial situation (Moore, 2018). In the case of Baie Verte, the contributions from the mining and healthcare industries make the labour market situation in the community more favourable than for many other rural communities in the province, though still with lower rates of employment and labour force participation than the provincial average. See table 5.2 below for a status summary of the labour market in Baie Verte.

Table 5. 2: Status Summary for Labour Market

Stock	Status	Summary	Data Sources
Labour Market	**Moderate**	Employment rate for population 15 years and above in 2016 was 44.6%. This was above St. Lawrence and Buchans, but below the provincial average of 49.5%, and 64.2% for Wabush	Community Accounts (2016), Baie Verte Community Survey (2018 - 2019)
		Unemployment rate for population 15 years and above in 2016 was 18.3%, above the 15.6% provincial average and Wabush's 11.3% but below the 27.5%, and 19.6% of Buchans and St. Lawrence respectively	
		Labour force participation rate was a moderate 55.7% compared to the 58.7 % provincial average and 72.2% of Wabush in 2016	
		Fairly good resident self-reliance ratio of 79.6% in 2016, compared to St. Lawrence's 72.1%, Buchan's 64.3% and the 80.6% provincial average	

5.2.2 Economic Structure

For analysing the functioning of the town's economic structure, the goals of supporting the mining industry and diversifying the economy guided the selection of relevant indicators for this stock (see table 5.1). These included indicators such as population employed in the mining industry and the population employed in other key industries (see Appendix E1 for the list of indicators).

According to the Baie Verte Economic Action Plan, the economic structure of Baie Verte is a mix of mining, forestry, fishing, sales and service (Town of Baie Verte, 2004). This is reflected in the town's ICSP (2010) in which Baie Verte is noted as envisioning itself as *"... a true community that caters for the needs of industrial workers in the fishing, lumbering, and mining industries"* (p. 4). Data from the 2016 census on employment rates by sector in Baie Verte, however, reveal fewer contributions from fishery and forestry and more contributions from mining and healthcare, including social services (see table 5.3 below). For example, according to the census data, 16.5% of the Baie Verte's labour force of 15 years and above were employed in the mining and related industry as against the provincial average of 3.8%, 19.7% in healthcare and social services against the provincial average of 13.8%, 15.4% in the sales and service industry as against the provincial average of 12.4%, and 7.8% in the agriculture, fishing, and forestry industries as against the provincial average of 3.4% (Statistics Canada, 2016). Regarding the mining employments, data obtained from the mining companies operating in the area reveal higher employment contributions in recent times. The above statistics data on mining employment in the town and the one obtained from the companies, together with the employment growth rate from 2016 to 2019 will be discussed further in chapter 6.

Table 5. 3: *Labour Force Population by Relevant Sectors*

	Baie Verte	NL	Wabush	Buchans	St. Lawrence
Mining & Related Industries	16.5%	3.8%	24.2%	7.7%	4.9%
Healthcare & Social Services Industry	19.7%	13.8%	4.7%	15.4%	23.3%
Sales & Service Industry	15.4%	12.4%	17.7%	15.4%	7.8%
Agriculture, Fishing, & Forestry Industries	7.8%	3.4%	0%	0%	7.8%

Source: Statistics Canada (2016)

In addition to the indications of the statistics data above, survey and interview data from the study also suggest that the economy of Baie Verte is not as diversified as noted in the municipal documents. Most participants identified mining and healthcare as the main drivers of the town's economy. For instance, 92.6% of survey respondents rated the mining industry as playing a very important role in the economic development of Baie Verte, and 89.6% of those respondents considered supporting its development a necessity. Given that the municipal documents referenced above are 9 -15 years old, this may indicate that the economic structure or dependency of Baie Verte has changed in recent times and is now more reliant on mining than in the recent past.

In relation to the slightly diversified nature of Baie Verte's economy mentioned above, the sub-region in which the town is located has been noted as endowed with natural resources and attractions that give it good potentials for the development of other industries like fishery, forestry, and tourism (Hurley, 2017a; Harris Center, 2018). However, more than half (52.2%) of survey respondents indicated that development opportunities have not been created for these industries in the town. For example, the federal government quota restrictions on harvesting for cod was reported as affecting the development of the fishery industry in the town (Hurley,

2018a). The lack of development opportunities for the tourism, forestry, and fishery industries is also evident in the 2016 census, which showed only a small segment of the town's labour force engaged in those industries. For example, only 2.2% of Baie Verte's labour force 15 years and older are employed in the recreation and tourism industry, and only 7.8% in the agriculture, fishing, and forestry industries combined (Statistics Canada, 2016). In summary, while the town is not highly dependent on the mining sector according to criteria for resource dependence, such as those described by Clemenson (1992) and Randall and Ironside (1996) in chapter 2, limited opportunities in other industries raise concerns about the diversity of the Baie Verte economy and, thus, its economic structure. See table 5.4 below for a status summary of the economic structure in Baie Verte.

Table 5. 4: Status Summary for Economic Structure

Stock	Status	Summary	Data Sources
Economic Structure	**Moderate to Poor**	Economy largely dependent on mining and healthcare and social services; 92.8% of survey respondents note mining plays a significant role in the economic development of Baie Verte	Baie Verte Economic Action Plan (2004), Statistics Canada (2018), Baie Verte Community Survey (2018-2019)
		Town's region endowed with natural resources with good development potentials for the fishery, forestry, and tourism industries	
		More than half of survey respondents (52.2%) think few efforts have been made to develop other industries (e.g., fishery, forestry, tourism)	

5.2.3 Knowledge Infrastructure

For analysing the functioning of the town's knowledge infrastructure, the goal of training and skills development relevant to industry guided the selection of relevant indicators for this stock (see table 5.1). These included indicators such as availability of a college, number of

industry relevant course offerings, and population that pursued programs relevant to key industries (see Appendix E1 for the list of indicators). Relevant statistics regarding education levels were also examined.

Results of the 2016 census show that the percentages of Baie Verte's population who have certificates or diplomas relevant to the key industries (mining, healthcare, forestry, fishing, sales and service) were for the most part above that of Buchans, St. Lawrence and the provincial averages, but on par with or below that of Wabush. This was also the same for the percentages of the population that had enrolled in programs relevant to the key industries (see table 5.5 below). With regard to certificates or diplomas relevant to the key industries, 28% of Baie Verte residents aged 15 years and above had a certificate or diploma in apprenticeship, or trades program. This was above the provincial average of 22% and the national average of 17.7%; but 10-19% lower than for all three peer communities (Statistics Canada, 2016). With regard to pursuing programs relevant to the key industries, 13.7% of Baie Verte residents 15 years and above had enrolled in mining related programs (Statistics Canada, 2016). This was above Buchans, St. Lawrence, and the provincial average, although below the 23.4% of Wabush. In addition, 1% had enrolled in fishery and forestry related programs, similar to the provincial average and all three peer communities (Statistics Canada, 2016). Furthermore, 11.4% had enrolled in healthcare programs, which was above the provincial average and all three peer communities. Also, 10% had enrolled in business related programs, almost at par with the provincial average and St. Lawrence, but 1.4% below Wabush (Statistics Canada, 2016).

Table 5. 5: Programs Taken by the Population Relevant to Key Industries in Percentages

	Baie Verte	NL	Wabush	Buchans	St. Lawrence
Mining Programs	13.7	9.4	23.4	10.6	8.3
Fishery/Forestry Programs	1.0	1.0	1.0	1.6	1.0
Healthcare Programs	11.4	5.9	5.0	6.5	7.8
Business Programs	10.0	10.9	11.4	9.8	10.4

Source: Statistics Canada (2016) Census Profile

Baie Verte has a training college (College of the North Atlantic) which was established in 1973. During this time, several training and skills development programs relevant to industry, particularly mining, were offered there (College Staff, participant BVI07). Interview data, however, reveal that the college currently offers only one program in personal care assistantship, with only a handful of students enrolled in it. This is considered as a challenge to the town, as residents who have interest in programs other than healthcare are moving elsewhere for training. In relation to this, 11% of the survey respondents between the ages of 15-29 years intend to leave Baie Verte in the next 5 years to pursue further education. The out-migration of young people for further education is cited as a normal occurrence in rural communities across Canada (Corbett, 2005), and Baie Verte is no exception. With regard to the fact that the town's college offers fewer courses than in the past, a college staff, participant BVI07, indicated that the courses and programs offered were mainly demand-driven, with such demands currently low in the town:

> The educational infrastructure (college) here is more than capable of handling anything that they (residents) would need, I think we went through a period that was a little bit saturated that we put up a lot of millwright, welders, electricians, etc., and it kind of caught up with the economy. But the infrastructure is still in place, if they want us to offer millwright or anything else, it's just about going up to unlock the door and we are ready to go.

The above statement indicates that most Baie Verte residents are not interested in pursuing courses relevant to the key industries (such as mining) at present, at least not in the town's college. This may be because the current skills set in the town matches the industry's demands. See table 5.6 below for a status summary of the knowledge infrastructure in Baie Verte.

Table 5. 6: Status Summary for Knowledge Infrastructure

Stock	Status	Summary	Data Sources
Knowledge Infrastructure	**Moderate**	Population 15 years and above with certificates or diplomas relevant to the key industries higher than the provincial and national averages, but below all three peer communities	Statistics Canada (2018), Baie Verte Community Survey (2018), CNA- Baie Verte Campus (2018)
		Population 15 years and above pursuing industry relevant programs higher than Buchans, St. Lawrence, and the provincial average for the most part, but below or at par with Wabush	
		Decreased demand for trades courses relevant to key industry at the town's college, leading to college being under-utilised	

5.2.4 Physical Infrastructure

For analysing the functioning of the town's physical infrastructure, the goals of preserving the town's pristine nature through beautification and enhancing the transportation and communication infrastructure guided the selection of relevant indicators for this stock (see table 5.1). These included indicators such as the availability of recreational facilities, frequency of road maintenance, residents' satisfaction with transportation and communication infrastructure, and network speed (see Appendix E2 for the list of indicators).

Baie Verte has a good number of recreational facilities such as a ski hill, snowmobile trails, walking trails, a sporting arena, an outdoor swimming pool, etc., that add to its beautification and recreational amenities (Baie Verte ICSP, 2010). These facilities make Baie Verte confident in its

recreational tourism development potential (Municipal Government Official, BVI03). It was, however, discovered that most of the town's recreational facilities that are key to its tourism industry are in dire need of maintenance (CBC, 2019). It was also discovered that only 2.2% of the town's labour force are employed in the recreation, tourism and related industry (Statistics Canada, 2016). This indicates that the town's 'recreational tourism potential' noted by municipal government officials above, is either not as significant as expected or has not been fully realized. The mines and the miners' museum in Baie Verte also give it further industrial tourism development potential, which is again not fully utilized. All these points are highlighted in the statement of a municipal government official, participant BVI03:

> …You know, this town is blessed to have recreational facilities, and even the mines, these are all great tourist attractions, but the thing is that, we are not maximizing our tourism potentials to the fullest. For example, most of these (recreational) facilities are only managed by volunteers and need maintenance.

For transportation infrastructure, the Town of Baie Verte has approximately 16km of paved street and 1km of sidewalk constructed during the era of the old mines in the 1970s (The Town of Baie Verte, 2004). It was noted that the street has not had any replacements or major maintenance other than the few patches done on rotational basis at 5 to 10 year intervals (Municipal Government Official, BVI03). The infrequent maintenance of the roads explains why 80.4% of survey respondents were dissatisfied with the town's transportation infrastructure. Given that the tourism industry relies on a good transportation network, including good roads (Sorupia, 2005), the poor transportation infrastructure in Baie Verte is not likely to support the development of tourism in the town.

In terms of access to transportation, 90.4% of survey respondents stated that they have access to vehicles when needed. Most residents either own vehicles or rely on family and friends

to move around. A few people rely on a cab service to move within the town and its environs, or on a privately-owned shuttle service to commute to bigger centers like Deer Lake and Corner Brook (Municipal Government Official, BVI03). Hence, 79.6% of respondent indicated that public transport was not important to the town.

With regard to communication infrastructure, the Town of Baie Verte seems to have a good communication infrastructure (telephone, cellphone, internet, and cable services). 78.5% of survey respondents expressed a good level of satisfaction with the town's communication infrastructure. The town's communication network is mostly comprised of telephone and internet services, which are mainly provided by Bell Alliant and Eastlink at a speed ranging from 56kbps to 1.5mbps as of 2004 (Town of Baie Verte, 2004). A municipal government official, participant BV003, noted that the network speed in the town has not changed much from the above. The network speed in Baie Verte seems to be at least at par with rural NL standards (Bartlett, 2017), given that only 60% of NL residents have access to high-speed internet (Harris Centre, 2017). The internet speed in Baie Verte is, however, set to improve as the town has been awarded funding of about $430,000 under the federal Connect to Innovate program (The Southern Gazette, 2018), a program aimed at ensuring rural communities across Canada have access to high speed internet by 2021 (Government of Canada, 2019b). Even though the current communication network in Baie Verte is not as good as urban standards, it was noted as being better than that of other surrounding communities in the region. This was reflected in the statement of a municipal government official, participant BVI03:

> In Baie Verte itself, I think the infrastructure is not bad. I have been here a couple of years. I may have seen Bell go down once for a couple of hours and that's about it…. This isn't bad for an isolated community in the middle of a peninsula where there is no connectivity all over the west of the peninsula…Once you get outside of Baie Verte there isn't or very little.

See table 5.7 below for a status summary of physical infrastructure in Baie Verte.

Table 5. 7: Status Summary for Physical Infrastructure

Stock	Status	Summary	Data Sources
Physical Infrastructure	**Moderate to Poor**	Most recreational facilities in disrepair and in dire need of maintenance	Baie Verte Economic Action Plan (2013), Baie Verte ICSP (2010), Baie Verte Community Survey (2018)
		Both recreational and industrial tourism potentials under-utilized.	
		Roads date back to the 1970s, have not received any major maintenance works and are considered to be in a state of disrepair. 80.4% of survey respondents expressed dissatisfaction with the transportation infrastructure.	
		Fairly good communication network compared to surrounding communities in the region and rural Newfoundland standards	
		78.5% of survey respondents expressed their satisfaction with the communication infrastructure	

5.3 Socio-Cultural Capital of Baie Verte

This section discusses the strengths and weaknesses of the socio-cultural capital of the Town of Baie Verte in relation to the Telos framework. These include discussions on the status of the population and demography, health and well-being, housing and living conditions, education, sense of place and cultural identity, and participation and governance.

5.3.1 Population and Demography

For analysing the functioning of the town's population and demography, goals of enhancing youth retention and ensuring population stabilization guided the selection of relevant indicators for this stock (see table 5.1). These included indicators such as population size,

population growth rate (a result of natural growth and migration), median age, and age structure (see Appendix E2 for the list of indicators).

According to Community Accounts (2017), the population of Baie Verte declined by 7.8% from 1,405 in 2011 to 1,295 in 2016. The population of NL and Wabush, however, increased by 1% and 2.4% respectively during the same period, whereas that of St. Lawrence and Buchans also declined by 4.4% and 7.9% respectively. As per Community Accounts 2017 data, the median age of Baie Verte's population in 2016 was 48 years, with 60% of the population being 54 years and younger and 40% being 55 years and older. This was above the provincial median age of 46 years, with 58% of the population younger than 55 years and 42% older than 55 years. The figures of Baie Verte are, however, below that of St. Lawrence and Buchans whose median ages were 51 years and 60 years respectively, and whose population 54 years and younger were 57% and 40% respectively. Wabush appears to have a different age structure than the others comparison communities, with a median age of 36 years and 81% of its population being younger than 55 years. This could be due to less employment in the mining industry in the other towns than in Wabush because the mining companies operating in them are smaller (in terms of scale of production and employment) (CBC, 2018a; NL Department of Natural Resources, 2018). For example, as per the 2016 census data (see table 5.3), 24.5% of Wabush's labour force 15 years and above were employed in the mining sector, whereas in Baie Verte, only 16.5% of the labour force were employed in mining (Statistics Canada, 2016).

The development of a population is calculated in terms of natural factors (birth and death) and migration (immigration and emigration). According to Community Accounts, in 2017, Baie

Verte had a birth rate[7] of 8.4, below Wabush's 10.5, but above the 7.6 provincial average and much higher than St. Lawrence's 0.8. Data is not readily available for death rates; however, according to Community Accounts (2017), Baie Verte had a median death age of 80 years and a 66.7% decrease in the number of deaths from 2016. The median death age in Baie Verte was the same as that of St. Lawrence and Buchans, but slightly above the 78 years of the province and well above Wabush's 67 years (Community Accounts, 2017). With regard to migration, as of 2015, Baie Verte had a residual net migration[8] of -0.22% against the provincial average + 0.63%, Buchans' +1.59%, St. Lawrence's -3.25% and Wabush's -4.00% (Community Accounts, 2017). These figures indicate that the median level of migration in Baie Verte is a low negative, and its birth rate and life expectancy are positive and above the provincial average. Even though the population of Baie Verte declined by 7.8% between the 2011 and 2016 census periods, municipal government participants suggested that the town's population has become quite stable in recent times since mining operations increased in the area. This was highlighted in the following statement of a municipal government official, BVI10:

> Since the operations of the new mines peaked in this area, we now see fewer people going out of this town, and a little more coming in compared to back in the days when the old mines shutdown… so yes! our population is becoming quite stable now…we are gradually stopping to lose people.

See table 5.8 below for a status summary of Baie Verte's population and demography.

[7] Birth rate is the ratio of live births in an area to the population of that area expressed per 1,000 population or pro mille (Community Accounts, 2017).

[8] Net migration using the residual method is calculated by subtracting the current population from the population in the previous year and then removing the effect that births and deaths has on the population. By doing so, the remainder/residual is the number of people who migrated into or out of the area (Community Accounts, 2018).

Table 5. 8: Status Summary for Population and Demography

Stock	Status	Summary	Data Sources
Population and Demography	**Moderate**	Population declined by about 7.8% between 2011 and 2016. This decline was greater than in St. Lawrence (- 4.4%) and almost at par with Buchans (-7.9%). Whereas Wabush and the province recorded a rise of 2.4% and 1% respectively.	Community Accounts (2016), Statistics Canada (2016), Interview of Baie Verte Community Stakeholders (2019)
		Ageing population with median age of 48 years, 59.5% of population younger than 55 years, and 40.5 % older than 55 years. Older than the provincial average of 46 years, and 63.8% younger than 55 years; and Wabush's 36 years, 81.3% younger than 55 years, but younger than both St. Lawrence and Buchans (median ages 51 and 60 respectively).	
		Birth rate of 8.4 pro mille and median death age 80 years, against the provincial average of 7.6 and 78 years, Wabush's 10.5 and 67 years, and St. Lawrence's 0.8 and 80 years	
		Residual Net Migration of -0.22%, against the provincial average of 0.63%, 1.59% for Buchans, -4.00% for Wabush, and -3.25% for St. Lawrence.	
		Population becoming more stable in recent times due to the mines	

5.3.2 Health and Well-Being

For analysing the functioning of the town's health and well-being, goals of ensuring good access to health care and ensuring good resident physical, mental, and emotional health guided the selection of relevant indicators for this stock (see table 5.1). These included indicators such as residents' physical and mental self-health assessments, percentage of hospital morbidity, and median death age (see Appendix E2 for the list of indicators).

According to Community Accounts, in 2016, 64.9% of residents 12 years and older living in the economic zone where Baie Verte belongs rated their health status as excellent or very good.

This was higher than in St. Lawrence, Buchans and the provincial average, which all recorded 62%. With a median death age of 80 years, the rate of hospital morbidity attributed to chronic diseases in the Rural Secretariat Region where Baie Verte belongs, remained at 6% over a 3-year period (2012-2015), whereas that of the three peer communities which was even higher than Baie Verte (ranging from 1-17%) increased by 2-4% over the same period (Community Accounts, 2016).

For mental health, however, the percentage of Baie Verte residents who rated their mental health as excellent or very good in 2014 was 54.2%. This was above Buchans 39.9%, slightly below Wabush's 55%, and extremely below the provincial average of 73.5% and the national average of 71.1% for the same year (Community Accounts, 2015). Recent statistics data show a decrease in even the high NL provincial average by 4.3% to 69.2% as of 2018 (Statistics Canada, 2018). This low record on mental health for the province in recent times is consistent with reports of mental illness being identified as an emerging problem in NL (Cooke, 2018; Power 2019). For instance, as of 2017, NL recorded the highest rate of hospitalization due to self-harm (105 per 100,000 population) in the Atlantic region, far exceeding the high national average of 68 (Harris Centre, 2018). Most interview participants also suggested a rise in mental health cases in Baie Verte in recent times. A mining industry official, participant BVI09, highlighted this in a statement:

> I am seeing it more as a supervisor and operations manager… that, people are dealing with lots more mental issues right now, be it financial stress that they are putting on themselves, or because of they taking marijuana, etc.… I have seen the people with mental health issues in this town double or probably triple.

With a regional health facility (Baie Verte Peninsula Health Centre), located in the Town of Baie Verte, 92% of residents have access to primary healthcare when needed, which is higher

than the provincial average of 78.9% (Community Accounts, 2016). This is likely to explain why 75.9% of survey respondents expressed a high level of satisfaction with the health care provision in Baie Verte. The remaining 24.1% of respondents who expressed dissatisfaction with the healthcare provision in Baie Verte did so because the healthcare facility in the town does not provide advanced healthcare services. This is not uncommon for healthcare facilities in rural Newfoundland. Hence, 20.7% of respondents who have lived in Baie Verte for more than 20 years indicated they will move out to retire in larger centers with advanced healthcare services. See table 5.9 below for a status summary of health and well-being in Baie Verte.

Table 5. 9: Status Summary for Health and Well-Being

Stock	Status	Summary	Data Sources
Health and Well-Being	**Moderate**	With a median death age of 80 years, about 64.9% of residents aged 12 years and older rated their health status as excellent or very good between 2015-2016, a little above the 62% recorded by St. Lawrence, Buchans, and the provincial average.	Community Accounts (2016), Baie Verte Community Survey (2018)
		54.2% of residents rated their mental health as excellent or very good as at 2014. Above Buchans' 39.9%, slightly below Wabush's 55% and extremely below the provincial average of 73.5% and the national average of 71.1%. Both the provincial and national averages also decreased by 4.3% and 2.5% respectively as of 2018.	
		The rate of hospital morbidity attributed to chronic diseases in the Rural Secretariat Region remained constant (at 6%) over a 3-year period between 2012-2015, while that of all three peer communities increased between 2-4% over the same period.	
		75.9% of survey respondents expressed a high level of satisfaction with the health care provision in Baie Verte. 24.1% of the respondents expressed dissatisfaction due to lack of advanced healthcare provision in the town's health facility.	

5.3.3 Housing and Living Conditions

For analysing the functioning of the town's housing and living conditions, goals of ensuring the availability and affordability of housing and enhancing housing development guided the selection of relevant indicators for this stock (see table 5.1). These included indicators such as rate of private dwellings construction, monthly cost of housing for homeowners and renters, and percentage of income spent on housing (see Appendix E2 for the list of indicators).

According to the Baie Verte Economic Action Plan (2004), the development of housing in Baie Verte resulted in a two-sectional division of the town (new town site and old town site). In 2016, there were about 115 apartments and 545 houses in Baie Verte; 7.3% of the houses were constructed between 2011-2016 (Statistics Canada, 2016). This increase in housing development is the same as the provincial average, but 4.2% above St. Lawrence, and 2.2% below the peer community of Wabush (Statistics Canada, 2016). Municipal government participants indicated that housing development in Baie Verte was mostly affected by a lack of readily available land due to municipal - crown land uncertainties in the town. This was echoed in a statement made by a municipal government official, participant BVI03: *"... we have not traditionally had a good handle on who owns what land inside our borders ... and that's extremely important for people to be able to buy it and develop on it".* However, with about 2.25km^2 of land allocated by the municipality for residential development, it is anticipated that more new homes will spring up in Baie Verte in the near future to meet any increase in housing demand that may occur if the ongoing mineral exploration and development activities noted in section 3.1 lead to increased economic activities in the town.

With regard to the cost of housing for both homeowners and renters in Baie Verte, 3.6% of owner households spent more than 30% of their household income on shelter, as opposed to the

provincial average of 10.6%, Buchans' 10.2%, Wabush's 9.4%, and St. Lawrence's 8.4% (Statistics Canada, 2016). Thus, housing is affordable by this measure. Also, 26.9% of tenant households spent more than 30% of their household income on shelter as opposed to the provincial average of 39.4% and St. Lawrence's 25%. No data was recorded for Buchans and Wabush. This indicates that the cost of housing in Baie Verte is low relative to provincial standards overall, while ownership but not renting is affordable when compared to peer communities. Interview data, however, suggest that the cost of housing in the town is rising in recent times, mainly due to the development of the mining industry:

> I doubt if you would get a house for sale here at around $40,000 or $50,000, because that's what a piece of land is almost costing now. As opposed to about 10 years ago it maybe an older home, but you could find a house around here for around $40,000 and $50,000, and that has changed big time. (Municipal Government Official, Participant BVI10).

The above statement probably explains why 90.1% of survey respondents between the ages 45-59 years considered housing and living conditions as a very important sustainability concern in Baie Verte. See table 5.10 below for a status summary of housing and living conditions in Baie Verte.

Table 5. 10: Status Summary for Housing and Living Conditions

Stock	Status	Summary	Data Sources
Housing and Living Conditions	**Moderate**	Increase in housing development between 2011- 2016. But further development currently affected by unavailability of land due to municipal-crown land uncertainties	Statistics Canada (2016), National Household Survey (2011), Baie Verte Community Survey (2018 - 2019), Interview of Community Stakeholders (2019)
		Cost of housing as of 2011 for both homeowners and renters quite low. Increasing cost of housing in recent times relative to surrounding communities due to the presence of the mining industry	
		90.1% of survey respondents between the ages 45-59 years consider housing and living conditions as an important sustainability concern	

5.3.4 Education

For analysing the functioning of the town's education, goals of ensuring access to quality primary and secondary education and encouraging the pursuit of post-secondary education guided the selection of relevant indicators for this stock (see table 5.1). These included indicators such as availability of elementary and high school, availability of post-secondary institution, and relevant statistics regarding residents' levels of education (see Appendix E2 for the list of indicators).

Baie Verte has a daycare (The Young Shall Grow Daycare), a high school offering K-12 Curriculum (Copper Ridge Academy), and a training college (College of the North Atlantic) that provide early childhood, primary, secondary, and post-secondary education services respectively to the town and surrounding communities. This is very good compared to many other rural communities in NL, where educational institutions have been closed down or consolidated with others (Samson, 1997). It was, however, noted that the college in Baie Verte is underutilised due to fewer course offerings and enrolments than in the past, as already discussed under knowledge infrastructure in section 5.2.3. This probably explains why education facilities and services was rated by survey respondents as a major socio-cultural sustainability concern (94%) in Baie Verte. A college staff, participant BVI07, however, noted that the college had the capacity to offer more courses once there are demands for them.

Considering access to education in Baie Verte, according to Community Accounts, in 2016, 75.7% of Baie Verte residents 15 years and above had at least a high school diploma. This was 4.2% and 12.9% respectively below the peer communities of St. Lawrence and Wabush, and 1% below the provincial average (Community Accounts, 2016). In addition, 10.4% of the residents with a high school diploma have a bachelor's degree or higher. This was between 0.5

% to 3.8% above that of the peer communities, and 4.4% below the provincial average (Community Accounts, 2016). As can be seen from the above, high school completion rate in Baie Verte, even though almost at par with the provincial average, was lower than for two of the peer communities. Post-secondary completion rate in Baie Verte, on the other hand, was higher than for all three peer communities, but lower than the provincial average. See table 5.11 below for a status summary of education in Baie Verte.

Table 5. 11: Status Summary for Education

Stock	Status	Summary	Data Sources
Education	**Moderate**	Town endowed with educational facilities for primary, secondary, and post-secondary education, but college is under-utilised	Community Accounts (2016), College of North Atlantic, Baie Verte Campus (2018)
		As of 2016, 75.7% of residents 15 years and above had at least a high school diploma, 4.2 % below St. Lawrence, 12.9% below Wabush, and 1% below the provincial average.	
		In 2016, 10.4% of the residents with high school diploma had a bachelor's degree or higher, 0.5% to 3.8% above the peer communities, and 4.4% below the provincial average	

5.3.5 Sense of Place and Cultural Identity

For analysing the functioning of the town's sense of place and cultural identity, goals of ensuring good community connectedness, and protecting cultural heritage and local identity guided the selection of relevant indicators for this purpose (see table 5.1). These included indicators such as feelings of community attachment, satisfaction with life in general, and municipality's efforts on cultural heritage protection (see appendix E2 for the list of indicators).

According to Community Accounts, in 2016, 92.3% of people living in Baie Verte had a strong feeling of attachment to their community. This was far above the percentages recorded for

all three peer communities (83-85%) and the provincial average (79.6%) (Community Accounts, 2016). As of 2010, 92.5% of Baie Verte residents felt safe in their community and surrounding areas, 3.1% above the provincial average (Community Accounts, 2011). The feeling of community connectedness and safety in Baie Vere has been confirmed by the survey, as 61.1% out of the total 70.8% of respondents who have lived in Baie Verte for over 20 years do not intend to leave the town in the next five years. The survey also shows that the notion of community connectedness and local identity in Baie Verte resonates more with the older population than the younger population. This is because 32.7% out of the total 45.9% of the respondents who plan to leave Baie Verte in the next five years were between the ages of 15-44 years. The survey finding is consistent with literature illustrating that humans place different levels of priority on things throughout their developmental life cycle (Armstrong, 2007).

Cultural heritage and local identity were also highlighted as very important (85.9%) to socio-cultural sustainability in Baie Verte in the survey results. Despite this apparent current strong sense of place and cultural identity, 87.4% of survey respondents indicated that the municipality was not doing enough to protect the town's cultural heritage and local identity. See table 5.12 below for a status summary of sense of place and cultural identity in Baie Verte.

Table 5. 12: Status Summary for Sense of Place and Cultural Identity

Stock	Status	Summary	Data Sources
Sense of Place and Cultural Identity	**Good**	Baie Verte residents have a stronger feeling of attachment to their community compared to the provincial average and three peer communities	Community Accounts (2016), Baie Verte Community Survey (2018-2019)
		Baie Verte residents feel safe in their community and surrounding area	
		Cultural heritage and local identity were highlighted by survey respondents (85.9%) as very important for the socio-cultural capital of Baie Verte	

		In the eyes of the survey respondents, the municipality is not doing enough to protect the town's cultural heritage and local identity.	

5.3.6 Participation and Governance

For analysing the functioning of participation and governance in the town, goals of enhancing residents' involvement in local governance, and enhancing residents' participation through volunteerism guided the selection of relevant indicators for this purpose (see table 5.1). These included indicators such as number of municipal election voter turnout, number of volunteer groups, and rate of volunteerism (see appendix E2 for the list of indicators).

The Town of Baie Verte is governed by a town council of six members. Adequate statistical data is not available on resident's participation in local governance in Baie Verte, however, municipal government officials indicated that residents' participation in local governance in the town is very poor. This is echoed in a statement made by a town council member, participant BVI08:

> When I was asked to be on council, they said we are going to have an election, would you like to be part? ….so I put my name forward, and I anticipated that there would be an election and I would lose because I am not from here. And a couple of days later they said oh, we don't have enough people, so you are acclaimed to your position as councillor, … so you are a councillor now. So, I mean… it's been difficult to get people to become engaged, and this is what we've been struggling with.

The situation in Baie Verte is a reflection of the NL provincial situation in general. As stated by Vodden et al. (2016), due to difficulties in obtaining candidates to contest for elections, many municipalities in NL do not have enough people to run for council. For example, in 2009, only 52% of the municipalities in NL held a contested election (Government of NL, 2009). A 2018 Vital Signs report also revealed that the percentage of acclamation in municipal elections in NL

has increased by about 3% since 2009 and that voter turnout for municipal elections in NL has been low over the years. For example, as of 2011, voter turnout for municipal elections dropped by 8.3% and fell 4.1% below that of provincial and federal elections, respectively (Harris Centre, 2018b). In the 2011 provincial election, however, a higher percentage of eligible residents voted in the Baie Verte-Springdale region than in the province as a whole (59.8% vs. 57.9%) (Government of NL, 2012). Voter turnout rates in NL for provincial and federal elections are among the lowest in the country (The Conference Board of Canada, 2017).

In terms of community participation, the spirit of volunteerism in Baie Verte seems to be high. This is perhaps a reflection of the provincial situation, as the rate of volunteerism in NL, even though reported as a low 46.4% in 2013, was still 2.8% above the national average (Harris Centre, 2015). Baie Verte has close to 40 volunteer groups with representation for almost every community event and program (Municipal Government Official, BVI03). Key departments and administrative units of the town, such as the Fire Department, the Green Depot, the Recreation Commission (Hennebury, 2018) and several other town committees, are managed by volunteers (Municipal Government Official, participant BVI03). In a comment on community participation and volunteerism in Baie Verte, a community leader, participant BVI02, stated:

> … The involvement is quite big. And there is a cross-section of people, some people are involved in 2 or 3 different organizations because they have time, and others are only involved in 1 because of their work commitment and their family commitments and things like that.

Even though the volunteerism rate in Baie Verte has been noted above as being high, municipal government officials indicated that volunteers were sometimes difficult to come by. In relation to this, the municipal government acknowledged the efforts of volunteers in order to encourage

others to also get involved (Dooley, 2017; Hurley, 2018). This was again highlighted by participant BVI02:

> … We do have a volunteer appreciation night in April..., we use it as a night where the town gives out about 30 - 35 certificates to organizations for being volunteers and supporting their community… and also encourage others to come on board.

As can be seen from the above discussions, community participation and governance in Baie Verte are divided, with low residents' involvement in local governance, and high residents' volunteerism and participation in the community. The high spirit of volunteerism observed among residents is also a reflection of the strong community connectedness and sense of place present in Baie Verte, as discussed earlier. See table 5.13 below for a status summary of participation and governance in Baie Verte.

Table 5. 13: Status Summary for Participation and Governance

Stock	Status	Summary	Data Sources
Participation and Governance	**Moderate**	Residents' participation in local governance is poor based on municipal elections and voter turnout, reflective of the provincial situation in NL.	NL Vital Signs, (2018), Baie Verte Town Office (2018), Baie Verte Community Survey (2018-2019)
		The spirit of community participation and volunteerism is reported to be high, reflecting the strong community connectedness and sense of place present in the town.	
		Most key departments and administrative units of the town, such as the Fire Department; the Green (Recycling) Depot; the Recreation Commission and several other town committees are managed by community volunteer groups.	

5.4 Ecological Capital of Baie Verte

This section discusses the strengths and weaknesses of the ecological capital of the Town of Baie Verte in relation to the Telos framework. These include discussions on the status of water quality, use, and infrastructure; air quality; ecosystem health and protection; land use; and waste materials management.

5.4.1 Water Quality, Use, and Infrastructure

For analysing the functioning of the town's water quality, use, and infrastructure, goals of uninterrupted access to quality drinking water, and ensuring the treatment of wastewater guided the selection of relevant indicators for this stock (see Table 5.1). These included indicators such as availability of water treatment facility, boil water advisories, harmful chemical concentrations in both drinking water and wastewater, and availability of sewage treatment facility (see appendix E3 for the list of indicators).

The source of drinking water for the Town of Baie Verte is the Southern Arm pond, located 4 miles from the town (Town of Baie Verte, 2004). No rating data on source water quality was available on the NL water resources portal for Baie Verte. It was, however, discovered that a water treatment facility made up of a chlorination and filtration system is used for the treatment of source water prior to distribution to the town (Town of Baie Verte, 2004). This is commendable, as several communities in rural NL do not have such water treatment facilities (Chireh, 2018). Nonetheless, Trihalomethanes (THM)[9] concentration in the town's drinking water was 121.3 microgram/litre (µg/l) in 2017, and 105.6 µg/l in 2018 (NL Department of

[9] Trihalomethanes (THMs) are a group of compounds that can form when the chlorine used to disinfect drinking water reacts with naturally occurring organic matter (e.g., decaying leaves and vegetation). THMs are noted as 'toxic by-products' from water treatment, considered to be a possible carcinogen in humans (Health Canada, 2006).

Municipal Affairs and Environment, 2019). These are all slightly above the maximum acceptable concentration (MAC)[10] of 100 µg/l (Health Canada, 2006). Further, due to the effect of the water treatment process on the smell and color of tap water in Baie Verte, almost half of the survey respondents indicated their dissatisfaction with drinking water quality in the town. This observation is similar to other communities in NL, where some residents dislike treated drinking water due to its aesthetic properties (Holisko et al., 2014; Daniels and Vodden, 2015). With regard to the distribution of drinking water, it was noted that large volumes of treated drinking water are frequently lost to the town's old and worn out water infrastructure. This is typical of many small rural communities in NL (Vodden et al., 2014). No data was readily available at the municipal level in Baie Verte on the exact volumes of drinking water lost to the town's ageing and failing water infrastructure. The municipality, however, indicated that it was accepting proposals for the detection and repair of leakages in the town's infrastructure.

With regard to wastewater treatment, Baie Verte lacks a wastewater treatment facility. This is a reflection of the provincial situation, as the lack of funding for setting up waste treatment plants has been identified as a major challenge facing several communities in NL (MNL, 2019; Robinson, 2019). In Baie Verte, wastewater is dumped into the White Bay untreated through the town's four sewage outfalls. Deleterious substances[11] such as suspended solids and Carbonaceous Biochemical Oxygen Demand (CBOD) substances are present in the wastewater

[10] The maximum acceptable concentration (MAC) for trihalomethanes (THMs) in drinking water is based on a locational running annual average of a minimum of quarterly samples taken at the point in the distribution system with the highest potential THM levels (Health Canada, 2006)

[11] Deleterious substance are substances that degrade or alter the quality of water in such a way that it alters the quality of water, making it harmful for fish and or its habitats. Examples include CBOD substances, suspended solids, un-ionized ammonia, etc. Retrieved from: https://laws-lois.justice.gc.ca/eng/regulations/sor-2012-139/fulltext.html

disposed through the outfalls. In 2018, the combined average volume of suspended solids disposed into the bay from two of the outfalls alone (Butlers Brook and South Shore Drive) was 39.25 metres per litre (m/l), far above the acceptable standard of 25m/l. The value of Carbonaceous Biochemical Oxygen Demand (CBOD)[12] substances in the sewage outfall for the same year was 47.25 m/l, also far above the acceptable standard of 25 m/l (Town of Baie Verte, 2018).

See table 5.14 below for a status summary of water quality, use, and infrastructure in Baie Verte.

Table 5. 14: Status Summary for Water Quality, Use, and Infrastructure

Stock	Status	Summary	Data Sources
Water Quality, Use and Infrastructure	**Moderate to Poor**	Drinking water treated prior to distribution to the town.	Baie Verte ICSP (2010), Baie Verte Economic Action Plan (2004) NL Water Resources Portal (2018), Baie Verte Community Survey (2018)
		No rating data available on source water and tap water quality.	
		Average THM concentration in drinking water in 2017 and 2018 slightly above the maximum acceptable concentration (MAC) of 100 microgram/litre.	
		Half of the survey respondents indicated their dissatisfaction with drinking water quality due to color and smell from treatment process.	
		Large volumes of treated drinking water lost to the town's old and failing water infrastructure.	
		Average volume of suspended solids and CBOD substances in sewage outfalls far above the acceptable 25m/l in 2017 and 2018, due to lack of sewage treatment facility.	

[12] CBOD determines the pollutants in a waste stream and the extent to which it will contaminate/ pollute a receiving stream by depriving living organisms in the stream of oxygen. http://www.ohiowea.org/docs/How_are_your_CBODs.pdf

5.4.2 Air Quality

For analysing the functioning of the town's air quality, goals of ensuring good local air quality and reducing greenhouse gas (GHG) emissions guided the selection of indicators for this purpose (see table 5.1). These included indicators such as air quality health index, and municipal carbon footprint (see appendix E3 for the list of indicators).

Following the NL provincial campaign to increase awareness on climate change and energy efficiency, municipalities in NL have become more conscious about their GHGs emissions (NL Department of Municipal Affairs and Environment, 2016). Some municipalities have turned to the NL municipal carbon calculator to estimate the GHG emissions from municipal operations, such as energy used in municipal buildings and services (transportation, waste, etc.) (Government of NL, 2013a). For instance, one of the study's peer communities, Wabush, won the municipal carbon footprint contest in 2013, due to its energy savings efforts such as the installation of timed lighting controls on streetlights (Government of NL, 2013b). In Baie Verte, the year 2017 was the baseline year for such a calculation (Personal Communication, Municipal Government Official, March 2019). According to the municipal government official, the total carbon footprint for the town's municipal operations for 2017 was 1,766 tonnes, 97.3% of which was from solid waste, 1.2% from vehicles, and 1.5% from buildings. The study was unable to verify this information, but it was discovered that the municipality has a target to reduce its overall footprint by 12% (Personal Communication, Baie Verte Town Clerk, March 2019).

In relation to this, the survey results indicate that some households in Baie Verte are also making efforts to reduce their carbon footprints, as 44.4% of survey respondents indicated they always try to conserve energy (electricity, gas, and oil) in their household, and 51.1% indicated they did so sometimes. At the provincial level, GHG emissions in NL decreased by about 3%

between 2016 and 2017 (Government of NL, 2019b), whereas national emissions increased by about 1% for the same period (Environment Canada, 2019). NL is ranked as the Canadian jurisdiction with the fourth lowest GHGs emissions, with the heavy industries (mainly oil and gas, and mining) noted as accounting for nearly half of the province's emissions (Government of NL, 2019b).

With regard to local air quality, no data was readily available for Baie Verte specifically, but an ambient air monitoring report by the NL Department of Municipal Affairs and Environment (2017) indicated that local air quality across communities in NL was generally good.

> "The air quality in communities across the province is generally considered to be good as the ambient air quality standards are rarely exceeded for the pollutants (NO_x, PM, CO, SO_2, O_3) being measured. On occasion, communities in close proximity to an industrial operation may experience episodic decreases in the quality of the air; however, these episodes tend to be brief in nature and are rarely at levels that exceed the air quality standards" (p.1).

It can be inferred from the above statement that the presence of the mining industry in Baie Verte is likely to occasionally impact on the town's local air quality. It was, however, discovered that the region where Baie Verte belongs has constantly had an Air Health Quality Index (AHQI) ranking of 2-3, just as the three peer communities (Environment Canada, 2019). This suggests Baie Verte as being a low health risk area with good local air quality. See table 5.15 below for a status summary of air quality in Baie Verte.

Table 5.15: Status Summary for Air Quality

Stock	Status	Summary	Data Sources
Air Quality	**Good**	In 2017 the total carbon footprint for Baie Verte was 1,766 tonnes, 97.3% of which was from solid waste, 1.2% from vehicles, and 1.5% from buildings	Town of Baie Verte (2019), Environment Canada (2019), Baie Verte Community Survey (2018-2019)
		44.4% of survey respondents indicated they always conserved energy (electricity, gas, and oil) in their household, and 51.1% did so sometimes	
		Baie Verte region ranked as a low health risk area for air quality	

5.4.3 Ecosystem Health and Protection

For analysing the functioning of the town's ecosystems, goals of preserving the terrestrial and aquatic ecosystems guided the selection of relevant indicators for this purpose (see table 5.1). These included indicators such as availability of protected forest reserves, availability of marine protected areas, and availability of provincial or national parks (see Appendix E3 for the list of indicators).

Adequate data was not readily available to allow for a complete analysis of this stock, and for comparisons to be made with the peer communities and provincial averages. Baie Verte does not have any provincial or national park within its boundaries, but there is a provincial park reserve, Flatwater Pond, located 23 kilometers from the town (NL, TCII, 2018). Municipal data on land use zoning also indicate that about 67.5 km^2 of municipal land has been demarcated as forest reserve, and approximately 0.035 km^2 as marine protected area (NL, Department of Municipal Affairs and Environment, 2018). These protected areas were suggested to be intact at the time of the study. Further research is needed to ascertain the health and details regarding

protection of ecosystems in and around Baie Verte. See table 5.16 below for a summary of ecosystems status in Baie Verte.

Table 5. 16: Status Summary for Ecosystem Health and Protection

Stock	Status	Summary	Data Sources
Ecosystem Health and Protection	**Insufficient Data**	No provincial or national park or reserve within town boundaries but a provincial park reserve, Flatwater pond, is close to the town. About 67.5 km2 of land area has been demarcated as forest reserves, and approximately 0.035km2 as marine protected area	NL Municipal Affairs and Environment (2018)
		Adequate data not readily available to allow for a complete assessment of this stock	

5.4.4 Land Use

For analysing the functioning of the town's land use, goals of enhancing land availability for business, residential, agricultural, and recreational developments guided the selection of relevant indicators for this purpose (see table 5.1). These included indicators such as availability of a municipal land use plan, access to crown lands, land size allocated for business, residential, agricultural, and recreational developments (see Appendix E3 for the list of indicators).

Baie Verte has a land use plan, and this is quite uncommon for small communities in NL, in which lack of community land planning has been identified as a major challenge to municipal governance (Vodden et al., 2016). Municipal data on land use zoning depicts the allocations of sizeable portions of land in Baie Verte for various forms of developments in the town. Out of Baie Verte's total 371.09 km2 land area, 0.62 km2 has been allocated for business development, 2.25 km2 for residential development, 1.61 km2 for agricultural development, and 0.46 km2 for recreational development (NL, Department of Municipal Affairs and Environment, 2018).

Despite having a land use plan, it was indicated that the town's inability to differentiate between municipal lands and crown lands negatively affects further land use developments in the town. This perhaps indicates why 87.3% of survey respondents identified land use as a very important ecological sustainability concern in the town. A statement by a regional economic development official, participant BVI04, further emphasizes the land use challenges facing the town:

> We have people who would want to start up businesses, they find lands, but the town doesn't want to sell it to them, because the town doesn't know if they own it or not… that's kind of a gray area. I think they (municipality) are trying to work it out. But there still isn't a lot of land.

In a supporting statement, a municipal government official, participant BVI03, acknowledged the land use challenges experienced in the town and indicated that the municipality is making efforts to resolve the problem.

> We do have land use issues in Baie Verte, and we've only recently been able to identify is this crown land, is this municipal land, who owns this land… our new Chief Administrative Officer (CAO) has a good land planning background and is going to help with that … If you can't figure that out, people can't buy it (land), or they can't lease it in the case of crown lands.

The above statement indicates that the town is now getting a better understanding of the municipal and crown lands within its jurisdiction. The recently launched provincial land use inquiry map is a useful tool in this regard (The Telegram, 2018). The map has enhanced the ability to identify crown lands in the province, thereby making it more accessible. Like other municipalities in NL, perhaps the main issue for Baie Verte now is to access the crown lands within their jurisdictions and make them available for development (CBC, 2015; Municipalities NL, 2016). See table 5.17 below for a status summary of land use in Baie Verte.

Table 5. 17: Status Summary for Land Use

Stock	Status	Summary	Data Sources
Land Use	**Moderate to Poor**	Land use mainly targeted to agricultural production, recreational developments, business development, and residential developments	NL Municipal Affairs and Environment (2018), Baie Verte Community Survey (2018-2019), Community Stakeholder Interview (2019)
		The municipality has a land use plan and getting a better understanding of municipal and crown lands; access and use of crown lands is the main challenge now	
		Most of the survey respondents and interview participants consider land use as very important concern for the ecological capital of Baie Verte	

5.4.5 Waste Materials Management

For analysing the functioning of the town's waste materials management, goals of reducing waste generation and enhancing waste diversion guided the selection of relevant indicators for this stock (see table 5.1). These included indicators such as volume of waste generation, availability of a green depot and community composter, and residents' waste reduction and diversion habits (see Appendix E3 for the list of indicators).

Baie Verte has a once per week waste collection schedule that feeds into the municipal dumpsite, which is part of the Green Bay Waste Management Authority (Rethink Waste NL, 2019). The dumpsite receives about 120 tonnes of waste per week (Personal Communication, Municipal Government Official, September 2019). Even though the municipal dumpsite is meant for receiving residential wastes, it was indicated by municipal government participants that industrial wastes are occasionally dumped at the site. The industrial wastes were noted as being hazardous in nature and a threat to the dumpsite and surrounding areas.

In terms of waste generation, adequate data was not readily available on the exact volumes of waste generated at the municipal level. It was discovered that a good waste reduction

culture was not present in Baie Verte, as only 38.5% of survey respondents indicated that they always tried to reduce the waste generated in their households, and 52.6% indicated they did so sometimes. The lack of a waste reduction culture in Baie Verte reflects the provincial situation. NL is one of the Canadian jurisdictions with the highest rate of waste generation per capita (Statistics Canada, 2014). In 2014, the waste generated in the province was approximately 45% above the national average (Statistics Canada, 2014).

Waste diversion seems fairly good in Baie Verte. The town has a local green depot that encourages residents to collect recyclable beverage containers to obtain refunds, and a good number of residents subscribe to this service. For example, 90.3% of survey respondents indicated they often engage in household waste recycling and use the green depot. The municipal government is determined to enhance waste diversion in the town, as it has applied for funding to obtain a community composter. Once the funding is procured, the municipality has plans to divert a significant portion of its organic waste to a community compost and garden program, which it hopes to set up by the end of the year 2020 (Personal Communication, Town Clerk, August 2019). Given that NL is the Canadian jurisdiction with the second lowest rate of waste diversion, diverting only about 10% of its generated waste in 2016 (Statistics Canada, 2016), the above discussion indicates that Baie Verte is performing moderately well on waste diversion. See table 5.18 below for a status summary of waste materials management in Baie Verte.

Table 5. 18: *Status Summary for Waste Materials Management*

Stock	Status	Summary	Data Sources
Waste Materials Management	**Moderate**	No data on volume of municipal waste generated by the town.	Baie Verte ICSP, 2010, Baie Verte Community Survey (2018)
		Lack of good waste reduction culture in the town, as only 38.5% of survey respondents tried to reduce the waste they generated in their households.	

		Industrial waste occasionally posing a threat to municipal waste system.	
		Local green depot encourages residents to recycle. 90.3% of survey respondents often engaged in household waste recycling.	
		Community composter to be procured for the diversion of organic waste	

5.5 General Conclusions from Chapter 5

This chapter has assessed the sustainability strengths and weaknesses of Baie Verte in relation to the Telos framework. Table 5.19 below gives a general summary of the performance of all the stocks for the three capitals, as discussed in the chapter.

The economic capital of Baie Verte has been rated as moderate based on the statuses of its stocks. The labour market in Baie Verte seems quite good due to the employment opportunities created by the mining and healthcare, including social services. The town's economic structure, however, does not seem strong in that its economy is mainly dependent on mining and healthcare, even though development opportunities are believed to exist for other industries such as forestry, fishery, and tourism. Also, both the physical and knowledge infrastructures of the town are quite poor. For physical infrastructure, the town's transportation network (road) is in a state of disrepair and in dire need of maintenance, and for knowledge infrastructure, the town has a college, one of a few of its kind in rural NL, but the college is under-utilized due to less industry relevant course offerings than in the past and decreasing enrolment.

The socio-cultural capital of Baie Verte has been rated as good based on the statuses of its stocks. Both health and well-being and sense of place in Baie Verte are relatively good, compared to the peer communities and the provincial average. Furthermore, the population of Baie Verte even though an ageing one, seems to have been stabilizing in recent times. This could

be attributed to the decline in out migration following increased mining operations in the area. Also, the development of housing in Baie Verte has resulted in a sectional division of the town (old town site and new town site). However, the inability of the municipal government to deal with municipal-crown land uncertainties is adversely affecting the further development and availability of housing in the town. The presence of the mining industry has also resulted in reports of increasing costs of housing in the town in recent times.

The ecological capital of Baie Verte has also been rated as moderate, based on the statuses of its stocks. Unlike other rural communities in NL, Baie Verte has a working water treatment facility; hence, its drinking water is of good overall quality. In fact, unlike other rural communities in Canada that have been on boil water advisories for more than a decade (Water Today, 2019), Baie Verte has not recorded any major boil water advisories in the past five years (NL, Department of Municipal Affairs and Environment, 2018). Furthermore, at the time of this study, the local air quality of the region where Baie Verte belongs was rated as good with no health risks, despite the presence of the mines in the area. Also, with the presence of a green depot and plans to secure funding for a community composter, the Baie Verte municipality seems determined to enhance waste diversion in the town. Finally, even though adequate data was not available for a thorough analysis of the ecosystems and their health in Baie Verte, both the terrestrial and aquatic ecosystems in the town did not seem disturbed at the time of the study. Further research is however, required to ascertain this.

Table 5. 19: *Overall Status Summary for Sustainability in Baie Verte*

Capital	Status	Stock	Status
Economic	**Moderate**	Labour Market	Moderate
		Economic Structure	Moderate to Poor
		Knowledge Infrastructure	Moderate
		Physical Infrastructure	Moderate to Poor
Socio-Cultural	**Good**	Population and Demography	Moderate
		Health and Well-Being	Moderate
		Housing and Living Conditions	Moderate
		Education	Moderate
		Sense of Place and Cultural Identity	Good
		Participation and Governance	Moderate
Ecological	**Moderate**	Water Quality, Use, and Infrastructure	Moderate to Poor
		Air Quality	Good
		Ecosystem Health and Protection	Insufficient Data
		Land Use	Moderate to Poor
		Waste Materials Management	Moderate

The discussions from this chapter indicate that the socio-cultural capital of Baie Verte is more developed or stronger for the most part, than the economic and ecological capitals. Given that the analytical framework (Telos framework) used in the study defines sustainability as a balanced development of all three forms of capital (see section 4.3.2 of the previous chapter), there is the need to develop and sustain all aspects of Baie Verte's capitals. This is perhaps even more important considering the town's current role as the hub of the Baie Verte Peninsula Region (Town of Baie Verte, 2004). The next chapter will build on the discussions of this chapter, as it assesses the impacts of mining on the various aspects of Baie Verte's sustainability that were discussed in this chapter.

Chapter 6: Impacts of Mining on Community Sustainability in Baie Verte - Results and Discussions

This chapter presents the results and discusses the findings that relate to the third objective of the study, which is to examine the impacts of mining on community sustainability in Baie Verte in relation to how sustainability has been defined by the municipality and residents, and also in relation to the findings on the sustainability assessment in chapter 5. Similar to chapter 5, the results and discussions of this chapter follow the structure of the Sustainability Balance Sheet (SBS) of the Telos framework. Section 6.1 discusses the impacts of mining on the economic capital, 6.2 discusses the impacts of mining on the socio-cultural capital, and 6.3 discusses the impacts of mining on the ecological capital. The findings are discussed in comparison to the literature on mining communities in other locations, building on the discussions from the literature review chapter.

6.1 Impacts of Mining on Economic Capital in Baie Verte

This section discusses the impacts of mining on the economic capital of Baie Verte in relation to the Telos framework, the findings in chapter 5, and the observations from the literature discussed in section 2.4.1 of chapter 2. These include discussions of the results related to the four stocks identified in table 4.1 as relevant to the economic capital of Baie Verte, namely: labour market, economic structure, knowledge infrastructure, and physical infrastructure.

6.1.1 Labour Market

Baie Verte has experienced both boom and bust periods of mining operations from the time of the old mines in the 1960s until recently. These cycles created ups and downs in job

availability and the labour market in the town. This was highlighted by a community group leader, participant BVI01:

> It (Baie Verte) was always a mining region but … the old mines closed down due to markets and stuff. So, then there were few years that there was really not much work around at all. But then, the mines all started again and right now, … the labour market in this area is fairly good, …. seems like anyone that want to work right now is working.

The above statement is evident in the variation in mining employment reported between the 1996 and 2016 census data, where 5.5% of Baie Verte's labour force were employed in mining and related industries in 1996 (bust period), and 16.5% in 2016 (boom period) (Statistics Canada, 1996; Statistics Canada 2016), with further employment growth in the mining sector since 2016. The observation made in Baie Verte is similar to ones made in the boom-bust cycle literature, including that of Black et al. (2005), which identified a direct relationship between the boom and bust periods of mining and the local labour markets in the Appalachian region.

With mining being noted in section 5.2.1 as the key industry in Baie Verte together with healthcare, most interview participants indicated that the current mines and their supporting industries have hired more of Baie Verte's labour force in recent times than any other industry. This was highlighted by a municipal government official, participant BVI08: *"Outside of the mines, I can't see any other industry that has grown or experienced new hires".* In relation to this, it was discovered that the mining industry was creating direct, indirect, and induced employment in the Baie Verte region. This is similar to the observation made in other mining regions in the literature (Dungan and Murphy, 2007; McPhail, 2009; Cordes et al., 2016).

The two mines in the region, Rambler Metals and Anaconda Mining, together with their on-site aggregates contractor Guy J Bailey Ltd have created over 300 direct jobs in the region. For example, 80% of Rambler Metal's 200 employees are from the region (160 employees), 26%

of which (or 42 employees) are from the Town of Baie Verte (Personal Communication, Rambler Metals HR Manager, November 2019). Furthermore, 78% of Anaconda Mining's 76 employees are from the region (59 employees), 51% of which (30 employees) are from the Town of Baie Verte (Personal Communication, Company Official, November 2019). Also, almost half of the 150 employees of Guy J. Bailey were noted as being residents of the Town of Baie Verte (Hurley, 2017b; Personal Communication, Company Official, November 2019). Of these, 60% are employed on site and therefore represent an additional 45 direct jobs in the sector (see definitions provided in Chapter 2). Therefore, as of 2019, approximately 146 direct jobs have been created in the sector for residents of Baie Verte, an increase from 90 jobs recorded in the 2016 census (see section 5.2.1).

In terms of indirect employment, the off-site service of Guy. J Bailey to the mines (such as equipment operation and maintenance, construction, transportation and courier) was noted as the main source of indirect mining jobs in the region, including the Town of Baie Verte. Some participants further highlighted the existence of mining induced employment in the region as being the result of the spending of income obtained from the direct and indirect mining employments on accommodation, healthcare, food, grocery, hardware, etc. The Town of Baie Verte, being the service hub to the region, is likely to be the main beneficiary of the induced employments. This may explain why a significant number of the town's labour force are employed in the healthcare and social services, and sales and service sectors (see section 5.2.1 and table 5.). Given that the indirect and induced employments created by the mining industry in general has been noted in the literature as being very significant (see section 2.4.1), the indirect and induced employment contribution of mining in the Baie Verte region is likely to be significant as well. Considering that the mines are planning to expand their operations to extend

their life span to over 20 years (NL Department of Natural Resources, 2018; CBC, 2018b), the employment contributions of mining to Baie Verte's labour market is also likely to increase in the near future.

Most municipal government and community group participants suggested that the full-time, year-round, and high wage employment opportunities provided by the mining companies in Baie Verte have also attracted the workforce from other industries to the mines. This was highlighted in a statement made by a community group leader, participant BVI02:

> Those that work seasonal, a lot of them are now fulltime… part of them were construction workers that were seasonal that worked on the highways in the summer and couldn't work because its winter, so now they are working in the mining industry as a structured long-term fulltime employment.

In a supporting statement, a community group leader, participant BVI01, further explained the impacts of the mining sector for other industries, including competition for local workers:

> …The mining industry has taken a lot of mechanics from where I work with the school board, and we have a very big job to get mechanics now… the mines is taking all of the heavy equipment mechanics, because they are able to pay a lot more higher wages than what government is giving right now.

This observation supports Evans and Sawyer (2009)'s assertion in the literature that the high wage structures of the mining industry usually attract a large number of workers from other industries in mining communities. While resulting employment and income is a positive aspect of mining for communities, the case of Baie Verte illustrates that the mining industry can also create labour force challenges for other seasonal and/or lower paying sectors. These challenges seem to have affected the attainment of economic diversity in Baie Verte, thus, impacting the town's economic structure. This will be discussed further in section 6.1.2 below.

6.1.2 Economic Structure

The economy of Baie Verte was noted in section 5.2.2 as being mainly dependent on mining and healthcare and social services. However, with an increasing portion of the town's labour force being attracted to the mining industry, as mentioned above, most interview participants suggested that Baie Verte's economic dependence in recent times was gravitating towards the mining industry. This was highlighted by a community group leader, participant BVI01:

> As of right now I would say the mining industry is probably the biggest… there is a bit of logging going on around the area, but harvesters and heavy equipment have taken over that, and there is not a lot of human labour being put into that now… there is not also a big fishery, there is only a very short season. So mining, I guess being twelve months of the year is pretty much taking over the area right now…. it seems to be providing more jobs to people than the other industries.

The above statement is supported by the observation in section 6.1.1, that the percentage of Baie Verte's labour force employed in mining and related industry increased from 5.5% to 16.5% between the 1996 and 2016 censuses (Statistics Canada, 1996; Statistics Canada 2016). Furthermore, as discussed above, recent data obtained from the current mines operating in the region show a further increase in mining employment in the town. For instance, the number of Rambler Metals' employees from the Town of Baie Verte increased from 24 persons in 2016 to 42 persons in 2019, an increase of about 75% (Personal Communication, Rambler Metals HR Manager, November 2019). As deduced from data obtained from the companies, the number of Anaconda Mining's employees from the town seems to have increased by 20% from 25 persons in 2016 to 30 persons in 2019. Further, the employment of Guy J. Bailey (onsite mine workers) seems to have more than doubled from 22 persons in 2015 to 45 persons living in the town in 2019. While total employment and mining employment (direct, indirect, and induced) in the

community in 2019 is unknown, the recent growth suggests that the direct employment contribution of mining to the economy of Baie Verte is above the 16.5% revealed in the 2016 census (see section 5.2.2). As there is no evidence of employment growth in other sectors within the community, the total direct employment in mining is likely to exceed 20% and, therefore, exceed employment in Healthcare and Social Services (19.7%) thereby meeting the economic dependency criterion of Randall and Ironside (1996). The total direct employment could also perhaps, be approaching the 30% economic dependency criterion posited by Clemenson (1992). Also, taking the indirect and induced jobs created by mining in the town into account (as discussed above), the mining related employment in Baie Verte represents an even higher proportion of jobs in the community.

As identified in section 5.2.2, most municipal and community group participants indicated that even though there are development potentials for other industries outside of mining in Baie Verte, there have not been enough opportunities created for the development of those industries. This was highlighted in a statement by a community group leader, participant BVI12:

> In terms of development of other industries (outside of mining), that is a challenge. I don't see an opportunity being there for something. But, we always reflect on the ability of other industries like tourism to attract new money into the town.

In response to this, most participants expressed fears about the possible recurrence of the adverse consequences of dependence on mining once faced by the town after the shutdown of the old mines in the 1990s. Further, the current mines operating in the area have an estimated lifespan of only 20 years, compared to the previous ones that lasted for over 30 years (NL Department of Natural Resources, 2018; CBC, 2018). The lack of economic diversification observed in Baie Verte was also noted as a concern in other mining communities across the country, for example

by Kuyek and Coumans (2003) in their review of mining dependent communities in Canada (see Chapter 2).

With regard to the contribution of mining to the development of local businesses, unlike the old mines of the 1970s, the current mines in Baie Verte were noted as not contributing much to the spin-off of new local businesses in the town, with the exception of Guy J. Bailey Ltd. This contrasts with evidence in the literature that spin-off benefits generally occur in mining communities (Evans & Sawyer, 2009, Petkova et al. 2009, Garnett 2012). This may be due to the mines' small production capacities compared to the old mines. The current mines were noted as mainly helping to sustain local businesses rather than creating new spin-offs. However, Guy J. Bailey Ltd, an aggregates contractor to the mines, was identified as a major spin-off local business. The company is now the second largest industrial employer in the Baie Verte region, as it has created about 150 employment opportunities in the area (Hurley, 2017b).

The local businesses that the current mines in Baie Verte were noted as helping to sustain local businesses, including the hotel, convenient stores, grocery store, hardware stores, and restaurants, the interviewees argue, would otherwise have collapsed without them. This was reflected by a municipal government official, participant BVI08:

> … Local companies like Baileys have been successful here, because they are tied to the mining industry (as contractors). And a lot of I guess other businesses here kind of rely on that business in order to maintain what they do, from the hardware companies to businesses that do repair vehicles or deal in parts or what not.

A mining contractor, participant BVI09, added: "*Everything here is around the mining industry… like the hotel, the restaurants, etc., everything is sustained by the mining industry right now" (BVI09).*

6.1.3 Knowledge Infrastructure

The impact of mining on the knowledge infrastructure in Baie Verte was again traced back to the time of the old mines in the 1960s and 1970s. During that period, many residents where seen to be taking up trades programs in order to gain employment at the mines. This was reflected in a statement made by a college staff member, participant BVI07:

> I grew up here. If you go back to the Advocate mine days, we've got I think at least 600 people very trades oriented like mechanics, millwrights, welders, labourers, etc. It became a family thing too, your father works there, your uncle works there, you work there. So, as an educational institution, we were very focused on what the mines wanted; so, when this campus opened in 1973, it was very heavy into trades because that was the demand.

In support of the above statement, it was discovered that as of 1991, the era in which the asbestos mine shutdown (see table 3.1 in chapter 3), about 40% of Baie Verte residents 15 years and above who were enrolled in post-secondary programs were pursuing mining related trades programs (Statistics Canada, 1991). This interest in mining related trades programs was noted to have declined since the shutdown of the old mines, indicating why the town's college is currently offering fewer courses (see section 5.2.3). In relation to this, the college staff added: *"You would think with the current mining companies' people will be interested in the trades, but no, like the last year we had welding, we had only 2 applicants. So, the trades went away because of lack of applicants"* (College Staff, Participant BVI07).

The current situation in Baie Verte with regard to knowledge infrastructure is contrary to the observation made by Azapagic (2004), Bowes-Lyon et al. (2009), and Scott et al. (2012) in the literature, that the presence of a mine in an area typically leads to a high demand for training and skills relevant to the mining industry. In trying to improve the situation in Baie Verte, the current mines in the town were noted as often collaborating with the college and other educational institutions to develop the interest of residents in training relevant to mining. Some of the

approaches they use include, research and development, and industry awareness creation (McNeish, 2019). This was explicit in a statement made by a mining company official, participant BVI14:

> I think the kids need to be a part of research…. I think what kids got to realize is how a mine looks like today, that's one thing that is missing. I don't think kids understand what mining looks like, their vision of mining is not what mining is…. So, we are taking it on ourselves to get out to schools and show them what we are doing. And we are partnering with the university and the college on research so they can get a better look at what we are doing and the opportunities in that for them.

A high school staff member, participant BVI08, suggested that the efforts by the mines seem to be yielding positive results, as a good number of high school students are beginning to express interest in pursuing mining related careers after school:

> Mining companies come to make presentations to the students…. Many students are expressing interest in the mining industry. Like my current grade 12 students have expressed a lot of interest in heavy equipment repair and those kinds of things that would be beneficial to the mining industry.

In relation to the above statement, the mining companies were noted as supporting students with interests in mining careers by providing them internship placement opportunities. Given the efforts of the mining companies noted above, it is expected that the interest in mining training programs among Baie Verte residents will improve over time. This will help revive the town's college, which has been noted in section 5.2.3 as being under-utilized due to fewer course offerings and enrolments.

In addition to developing the interest of residents in programs relevant to mining, one of the mining companies (Anaconda Mining) was also noted as liaising with the town's college in the provision of skills development and capacity building training programs to its local employees. The aim is to make them successful in their careers in the mining industry and beyond

as noted by Karim et al. (2014). In thinking about their employees' careers beyond the mine, Anaconda Mining's effort appears to be supportive of the suggestion made in the literature that providing local mine workers with skills and capacities which could be transferred to other industries can contribute to the sustainability of communities after mines' closure (MMSD, 2002, Azapagic, 2003).

6.1.4 Physical Infrastructure

The mining industry has contributed a lot to the physical infrastructure in Baie Verte. This is because most of the town's physical infrastructure, including roads, water and sewage systems, and recreational facilities were described to have been inherited from the old mines that existed in the town in the 1960s and 1970s (Town of Baie Verte, 2004). Municipal government participants indicated, however, that the town's infrastructure, such as the roads, is currently in a state of disrepair and in need of maintenance (as discussed in section 5.2.4). Both municipal government and community group participants feel that unlike the old mines, the current mines are not doing enough to support the town's transportation infrastructure, even though they also make use of it. *"… the roads, the bridges and all that kind of stuff…, all that is being used by their big vehicles… and if they weren't here, the roads would probably be in better conditions"* (Municipal Government official, BVI03).

Mining company officials, however, feel differently. They noted that unlike the old mines, the current mines have less production capacities and therefore, lack the financial ability to provide support like the old mines. They, thus, suggested that the expectation of the current mines in Baie Verte should be for both the municipal and provincial government to use part of the taxes

they pay to support the town's infrastructure. This was made explicit by a mining company official, participant BVI05:

> I guess the few equipment that we use in our site are decent equipment that generates a lot of taxes that are designed to repair the roads. But we don't see that translate into the roads, and that infrastructure is core and has to be maintained.

Among the two mines operating in the area, Rambler Metals, which has its whole property within the taxable boundaries of the town, indicated that it has paid more than $1,245,000 in the form of taxes to the municipal government since it commenced operations in 2008 (Personal Communication, Company Official, January 2018). Anaconda Mining, whose property is outside the boundaries of the town, noted it does not traditionally pay municipal taxes to Baie Verte, but pays provincial taxes. It was indicated that the company paid $932,261 as mining tax to the provincial government for the 2018 fiscal year alone (NL Department of Finance, 2018). Further, Guy J Bailey would be paying a royalty to the Province on the volume excavated from their quarry on La Scie road. As stated above, the expectation of these mining companies is for both the municipal and provincial governments to draw from the tax monies and payments they make to maintain the town's physical infrastructure, rather than expect them to do so.

The observation made in Baie Verte is similar to that of Johnson (2017) in their study of mining and local infrastructural development in Asia Pacific, which indicated that junior mining companies usually lack the financial capacity to contribute to local infrastructure development. The observation also supports the assertion made by Kotey and Rolfe (2014) that mining companies today usually expect governments to use some of the taxes they pay for local infrastructure development.

Even though the municipal government expects the mining companies currently in Baie Verte to contribute more to local infrastructure development (such as roads) like the old mines

did, they also commended the mining companies for supporting other aspects of the town's physical infrastructure, such as the maintenance of recreational facilities, and the funding of recreational programs. For example, it was discovered that Anaconda Mining has made several contributions to the town and region. These include: $70,000 towards the maintenance of the town's stadium, $1,000 towards the renovation of the high school playground, $50,000 towards summer swimming lessons to children in the region for five years, and $10,000 to the Pulmonary Function Testing Unit of the town's hospital (Personal Communication, Company Official, August 2019). These are very important contributions, especially the ones on the town's recreational infrastructure, given that it was discussed in section 5.2.4 of the previous chapter, as being key and in need of investment. The below comments highlight some participants' commendation of the mining companies' efforts in support of other aspects of Baie Verte's physical infrastructure:

> These new mines I think are giving back to the town in different ways … Like Anaconda sponsors free swim lessons so all the kids get an opportunity to take swim lessons … I think at one point in time the stadium went into trouble, and they threw in some money… They are not very big companies, but I think they are doing the best they can with what they've got. But the day of building community centers, schools, roads, etc. I don't think they are big enough for that. But they are finding other ways (College staff, and Community Group Leader, BVI07).

> The mining companies do help us with our rec programs in the summer… like Anaconda help put together one of the playgrounds I believe, that was few years ago… I should actually say that there has been some conversation with Anaconda that they would support us to some degree with the new community center that we are trying to build…So, I should actually give them credit for that (Municipal Government Official, Participant BVI03).

It can be deduced from the above discussions that the impacts of mining on infrastructure in Baie Verte have shifted from the provision of physical infrastructure to contributions to social infrastructure, between the two mining eras that have existed in the town (old mines and new

mines). The impacts of the old mines, by virtue of their large production capacity and financial resources, included a complete set-up of most of the town's physical infrastructure such as roads, schools, stadium, etc. The impacts of the current mines, on the other hand, at least in part by virtue of their small production capacity and limited financial resources, have instead been in the form of maintenance of existing infrastructure (mainly recreational) and funding of community programs and services. Even within the current mining era, the two mines operating in the region seem to be having varying impacts. For instance, Anaconda Mining was noted by most participants as making more contributions to the town than Rambler Metals, despite the latter being located within the municipal taxation boundary.

6.2 Impacts of Mining on Socio-Cultural Capital in Baie Verte

This section discusses the impacts of mining on the socio-cultural capital of Baie Verte in relation to the Telos framework, the findings in chapter 5, and the observations from the literature discussed in section 2.4.2 of chapter 2. These include discussions of the results related to the six stocks identified in table 4.1 as relevant to the socio-cultural capital of Baie Verte, namely: population and demography, health and well-being, housing and living conditions, education, sense of place and cultural identity, and participation and governance.

6.2.1 Population and Demography

Mining was noted to have had varying impacts on the population and demography of Baie Verte from the time of the old mines to the current mines. As stated in the 2004 Baie Verte Economic Action Plan, the development of the mining industry in Baie Verte led to the rapid expansion of the town's population from 1,000 to about 2,500 from the 1960s to the late 1970s

as a result of the influx of mine workers. This was highlighted by a community group leader, participant BVI07: *"… for us, at one time nobody was originally from Baie Verte, but I think the mining brought people to the area… mining did contribute to the growth of the community, the people stayed and made it home."* Participant BVI12, a former mine worker and community group leader who had moved to the town for work, added:

> I came here in 1974 as a young engineer to work in the asbestos mine, several people moved here too … at that time, there were two mines operating here. The asbestos mine at that time was employing about 650 people, and Consolidated Rambler mine had about 350 people, so roughly a thousand people directly employed in the mining industry. It was very vibrant.

The shutdown of mining operations in the town, from the mid-1990s to the early 2000s (see table 3.1 in chapter 3), was noted to have led to a decline in the town's population, especially of young people, due to the lack of economic opportunities and resulting out-migration (see figure 6.1 for the population trend of Baie Verte from 1986 to 2016). The impact of the mines' shutdown on Baie Verte's population was explained by one mining industry official (Participant BV09): "*When the asbestos mine shutdown we saw lots of migration out of Baie Verte; we have seen probably thousands of people and their families leave"*. Participant BVI07, a community group leader, recounted a family experience in support of this:

> That day in August when the mine announced it was closing down, there was a lot of devastation. People didn't know what to do. My brother who was very young, probably 23 years old at the time, left to the west and never came back, so it took a lot of that cohort of young people outside of the town.

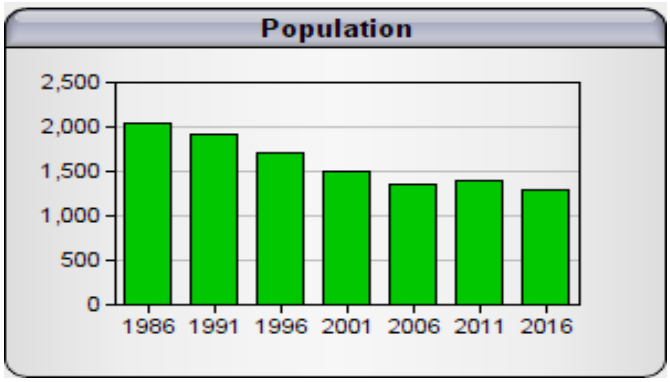

Figure 6. 1: Baie Verte's Population from 1986 to 2016

Source: Community Accounts (2016)

The impact of the boom and bust periods of mining on Baie Verte's population confirms the assertion made in the literature by some scholars (e.g. Taylor, 1969; Emery, 1992) that a strong relationship exists between mining cycles and population migration. Two forms of mining related migratory behaviors identified by social impact researchers (see section 2.4.2) were observed in Baie Verte with regard to the operation of the old mines. The first form was the in-migration of newcomers seeking new economic opportunities in the town in the boom period (Gilberthorpe et al., 2016; Bainton et al., 2017), and the second was the out-migration of both newcomers and young skilled locals due to lack of economic opportunities in the town in the bust period (Hollywood, 2002; Nyame et al., 2009).

Unlike the old mines, most participants suggested that the current mines in Baie Verte were not having as much of an impact on the town's population as the old mines had. This is because the current mines are operating on a small-scale with less demand for labour, and also in an era where most industrial operations are increasingly automated. This was reflected in the statement made by a volunteer group leader, participant BVI01:

> I guess the population hasn't grown much, because the mines seem to be working with a smaller scale of employees than 20 years ago. To get minerals out of the ground 20 years ago, it took a lot of manpower, now it's more heavy equipment and less workers. So, it hasn't grown the population of the area a lot.

Most participants, however, suggested that the current mines have helped to stabilize the town's declining population, following the shutdown of the old mines. This was highlighted by a municipal government official, participant BVI10:

> We have finally stop losing our population and gradually increasing again, and that's due to the mining industry being here again. Without that, I could easily see our numbers just continuing to drop and drop and drop.

Other participants further explained that the mines have created employment opportunities in the town for locals, resulting in more young people staying home.

> … They (the mines) hired a lot of young people… and so their average age is around 46 or 47 at Anaconda, which is a very young age in the mining sector. So that was what they did, they hired all the youth, they didn't let them go, they kept them here (Community Group Leader, Participant BVI02)

The employment opportunities created by the mines were also suggested as contributing to the return of some residents who had moved away to work elsewhere during the downturn.

> In the last 5 or 10 years our company has brought a lot of people back home to work. People who were working in Alberta, Ontario, some of these guys came back to our companies, and they are still at home working in our company (Mining Company Official, participant BVI09).

In a supporting statement, a community group leader, participant BV02, added:

> I think that many people have moved away and worked up west… they came back and settled here, built their houses here, and went to work in the mine. We have a lot of younger people that did that.

Some participants suggested that the current mines have not brought in an influx of outsiders to Baie Verte, like the old mines did because, as part of their corporate policies (to be discussed

further in chapter 7), they have employed more of the local people from within Baie Verte and surrounding communities. This was evident in the statement made by a volunteer group leader, BVI01:

> The mines haven't brought in an influx of people as such, it's just the people from around the area that is working there…. so, I guess it has kept our population for about the same, there hasn't been any influx because of the mines.

The above observation is contrary to the experience of the old mines, and also to the observations made in the boom town studies literature that suggests that foreigners or newcomers moving into mining communities in search of economic opportunities usually results in rapid population growth in mining areas (Gilberthorpe et al., 2016; Bainton et al., 2017). This also reaffirms the assertions made in other parts of the literature that mining has come in a new era where technological innovation has resulted in a reduced demand for mine staff (Martinez-Fernandez & Wu, 2007).

6.2.2 Health and Well-Being

The impacts of mining on health and well-being in Baie Verte were described as four-fold, namely: impact on the living environment, direct impact on mental and physical health, impact on mine workers' family life, and indirect impact on healthcare infrastructure. Most of these various forms of impacts were traced back to the time of the old mines in the 1960s. With regard to the impact of mining on the living environment and physical health, the operation of the old asbestos mine was noted to have had adverse effects on both workers' health and public health in Baie Verte, mainly as a result of air pollution from the mine tailings piles (Rennie, 1998). In fact, the occupational and public health and safety threats posed by the asbestos mine in Baie Verte in the 1970s were reported to have led to a 14-week workers' strike that was accompanied

by mass demonstrations (Rennie, 1998). In 2013, a provincial government registry of 1,003 former Baie Verte asbestos mine workers revealed 169 individual cases of asbestos related diseases, such as lung cancer, asbestosis, gastrointestinal cancers, etc., as a result of exposure to asbestos over a lengthy period from the mid-1950s through the mid-1990s (SafetyNet Centre, 2013; CBC, 2013). Most of the surviving affected mine workers, who did not receive any compensation from the mine after its shutdown have been reported as seeking for such compensations from the provincial government (CBC, 2006; Global News, 2014).

Most participants in the study suggested that unlike the old mines, the current mines in Baie Verte are not posing any visible threat to public health and safety as their operations seem to be environmentally friendly at the moment. This was echoed in the statement of a community group leader, participant, BVI13:

> Unlike back in the days, the mines here now are very conscious about the environment. They care about their workers' health, they care about the people's health, they are from here, and the workers and Baie Verte people are their friends. They grew up with them… and they wouldn't want anything bad to happen to them.

The corporate policies of the current mines in Baie Verte (to be discussed further in chapter 7) to hire locally at all company levels, including the managerial level, could be contributing to the 'responsible' mindset of the mines' management evident in the above quote.

With regard to the impact of mining on the family life of mine workers, most participants indicated that with Baie Verte being a close-knit community, mine workers are usually seen spending time with their families on their off days. This probably suggests less negative impacts from mining on mine workers' family life in general. This was highlighted in the statement of a community group leader, BVI11:

> A friend of mine works at one of the mines on 7 days on and 7 days off schedule, and I see him going all out for his family during his off days; so I think that most of the mine workers here are able to balance well between their work life and their family life.

This observation is contrary to the one made by Gibson and Klinck (2005) in their study on the impacts of mining on communities in northern Canada, in which, the busy nature of mine work schedules was noted to have adversely affected the relationship between mine workers and their families. The observation in Baie Verte is also contrary to the one made by Shandro et al. (2011) in British Columbia, that identified family stress issues and violence towards women as some of the visible impacts of mining on family health in the community of Tumbler Ridge, where mine work was also typically a 12 -15 hours shift per day schedule like in the case of Baie Verte.

With regard to the impact of mining on the physical and mental health of individual workers, some participants suggested that some mine workers are probably among the rising mental and emotional health cases in the town, as mentioned in section 5.3.2:

> I think the people (miners) have emotional, physical, and even mental health too because they are down on the ground. They are working alone in a lot of cases, so, I think it takes a toll on them …especially the night shifts…; like it's hard to get their bodies to adjust all the time, and I think that takes a bit of a toll on them mostly (Community Group Leader, BVI05).

A mining company official, BVI09, added:

> … I am seeing it more as supervisor and operations manager… that people are dealing with lots more mental issues right now. I have seen people come to me to talk very openly about situations in their lives, and don't know what they can do. I have never seen that 10 or 20 years ago.

As indicated in section 5.3.2, drug addiction was suggested as one of the reasons behind the rise in mental health cases in Baie Verte, with mine workers suggested as making enough money to purchase illegal drugs. It is, however, worth noting that no drug testing was being done at the

two mine sites in the area at the time of the study to confirm this assertion. Healthcare participants confirmed the increase in mental health cases in the region, including the Town of Baie Verte but did not directly associate it to the mines or illicit drugs.

While healthcare in Baie Verte is considered as very good in the context of rural Newfoundland, as indicated in section 5.3.2, with regard to the impact of mining, participants indicated that healthcare services in the town have been reduced considerably from what they used to be. Participants further suggested that the shutdown of the old mines might have led to this situation. This was echoed in the statement of a community group leader, participant BVI12:

> …Back in the days, we had a full-fledged hospital here. It was not just a healthcare. For instance, I had children born up here. There were actually operations or surgeries being done up here, and so the industry had a significant influence.

In a supporting statement, a resident and provincial government official, participant BVI13, added: *"… the hospital went down years back, when the mines closed down first. That's when the hospital took a big dive… I guess the funds for supporting it was gone".* This observation is similar to the one made by Hanlon and Halseth (2005) in their study on healthcare provision in resource communities in northern British Columbia. The authors identified that the shutdown of resource developments resulted in a reduction in healthcare provision in those communities due to several factors, including population decline.

6.2.3 Housing and Living Conditions

It was observed that the mining industry has had some impacts on the development, cost, and accessibility of housing in Baie Verte. With regard to development of housing, most participants suggested that mining had contributed to the two-sectional division of the town (old

town site and new town site, discussed further below). This was reflected in a statement by a mining company official, BVI11:

> Housing here in Baie Verte, no doubt because of the mining industry it grew… the old part of BV was what was built around the old mines in the seventies, eighties and early nineties. With the development of the new houses in the new part of the town, the mining industry might not be the main reason, but I think it has played a big role in that.

The old section of the town or what is referred to as "the old town site" was noted to have developed around the old mines. Most of the houses and apartments in that section of the town were built as settlements for mine workers during the previous mining regime. The new section of the town or what is also referred to as "the new town site" was, on the other hand, noted to have developed due to the lack of building space in the old town site and increase in land demand by residents, including mine workers, public service workers, and FIFO workers (mostly travelling to work in Alberta) in the current mining era.

Related to current housing demand, it was suggested that most of the people working in the mines are locals who live in and around Baie Verte and have either already built or bought their homes. It was also suggested that the few outsiders who come to Baie Verte to work at the mines, usually come in temporarily, and like Taylor (1969) and Emery (1992)'s reference to mine workers as 'industrial gypsies' (see section 2.4.2), these outsiders who do not have any ties to Baie Verte jump to other opportunities at different mines elsewhere after some time. It was indicated that the above factors have resulted in somewhat higher demands for rental properties than house purchases in Baie Verte. This was highlighted in the statement of a municipal government official, participant BVI03: *"The sales for houses do not turn-over very fast… people don't want to buy houses because they don't have that staying power here, so a lot of people want to rent"*, the official further stated: *"…there doesn't seem to be enough rental properties,*

because you see a lot of people who are desperately seeking rentals and can't find any". Despite the fact that the Baie Verte mines have an estimated 20 years lifespan (CBC, 2018), and also that they are providing well-paying permanent jobs to residents of the Baie Verte peninsula and a few outsiders, the demand for house purchases in Baie Verte was found to be low as compared to home rentals.

In terms of the cost of housing, the presence of the mines was suggested to have resulted in an increasing cost of both houses and home rentals in Baie Verte compared to surrounding communities in recent times, as discussed in section 5.3.3. This was echoed in the below statement by a municipal government official, BVI03:

> The cost of housing here is more inflated than it would be in a lot of neighboring towns. In other words, the cost of a home here is greatly higher than the cost of a home in Westport, and the reason for that is the mines… Rental properties go for very high prices here too. I know when my husband first got a job here, we were renting at $1,200 a month, which is a very high number for a town of this size in the middle of nowhere.

Homes in Baie Verte Old Town Site, October 2019
Photo by author

Homes in Baie Verte New Town Site, October 2019
Photo by author

The observation made in Baie Verte is similar to the ones made in case studies in parts of Australia (Lawrie et al., 2011; Haslam McKenzie & Rowley, 2013) and North America (Stedman et al., 2004; Wilson, 2004), in which the boom period of mining was often noted as resulting in housing shortages and high costs of housing. Even though the current situation in Baie Verte is not considered a boom mining period compared to the ones in these studies, it still has resulted in high demand for rental homes and an increasing cost of housing, relative to surrounding communities. Also, the social exclusion, based on income levels and engagement with a dominant industry syndrome identified in the literature, as discussed in section 2.4.2 (e.g. Sachs & Warner, 2011; Scott et al. 2012) could be present in Baie Verte. This is because some participants indicated that most high-income residents of Baie Verte such as mine workers lived in expensive homes, whereas low-income residents lived in less expensive homes. It is, however, worth mentioning that this split in housing is also typical of the general functioning of the housing market, in which people with higher incomes live in more expensive houses and those with lower incomes in less expensive houses.

6.2.4 Education

The impact of mining on education in Baie Verte was observed to have varied from the time of the old mines to the current mines, as discussed above in the section on knowledge infrastructure. The old mines were noted to have contributed a lot to primary, secondary and post-secondary education in Baie Verte. Participants suggested that those mines operated at a time when people needed to be attracted to settle in the town. As a result, they were noted to have supported the town's educational infrastructure in several ways, including putting up a primary school, funding educational programs, etc.

> The school was here because back then the old asbestos mine, and other mining companies promoted education, promoted the schools, so we had quality of education here and we had two schools…. I mean one-time years ago, they would pay all the money for educational programs like back in the 60s…. because, they had to build the town around the mines…. they came and had to start bringing people in, so they encouraged all these other activities to keep people here (Community Group Leader, BVI02)

The presence of the mining industry in Baie Verte in the seventies was also noted to have increased the rate of post-secondary education literacy among residents in the town. Several residents where noted to have taken up trades courses in order to gain employment at the mines, as discussed in section 6.1.3.

> This campus opened in 1973, it was very heavy into trades because that was the demand, the mines were where our students went for their work term and where they went to work when they finished school until it closed. So, if you wanted to stay in the area and you wanted to have a good livelihood, then you would gravitate towards the trades (College Staff, Participant BVI07)

The current mines operating in Baie Verte were suggested as contributing to education in ways different from the previous ones. Their contributions were noted as mainly in the form of scholarship funds for students rather than physical infrastructure development, like the case of the old mines.

Old Primary School in Baie Verte, October 2019
Photo by author

> Unlike the old mines that had to build the town around the mines and attract people to it, the current mines rather had to build the mine around the town… So, the people and the educational infrastructures are already here, and all they have to do is to support (High School Staff, Participant BVI11).

It was discovered that the contributions of the current mines in support of Baie Verte's educational infrastructure have been modest. For example, only Rambler Metals contributed $1,000 annually to the Baie Verte Scholarship Committee to fund two students every year (Personal Communication, Mining Company Official, January 2019).

In terms of the contributions of the current mines to the literacy rate in Baie Verte, it was suggested that even though the town had a full-fledged college, the mines do not attract a lot of student enrolment like they did in the seventies. Thus, as indicated in section 5.2.4, educational facilities are available in the town, but are mostly (particularly the college) under-utilized. This was highlighted in the statement of a community leader and former dean of the college, participant BVI12:

> The sustainability of this college is very much tied to bodies in place, such as people coming into it for its principal mandate, which is training. At some point, somebody is going to question the viability of this college, because it has limited resources (student enrolment). It is worrisome particularly to me, because I have a big history with this college.

The observation made in Baie Verte is contrary to the ones made in studies conducted primarily in Jordan (Al Rawashdeh et al., 2016) and Australia (Petrova & Marinova, 2013) which identified higher enrolments and inadequate educational facilities as present in some mining communities. In the case of Baie Verte, the educational facilities are present, but the enrolment (mainly at the college) is low.

College of the North Atlantic, Baie Verte Campus, October 2019
Photo by author

6.2.5 Sense of Place and Cultural Identity

The feeling of community attachment and sense of place was very high among Baie Verte residents, as illustrated in section 5.3.4. Therefore, the presence of the mining industry was not suggested to have had any negative impact on the sense of place and cultural identity in Baie

Verte in any of the forms identified in the literature such as: displacement of residents, destruction of local heritage sites, etc. (O'Faircheallaigh, 2008; IUCN, 2011; Owen & Kemp, 2015; Askland, 2018; Leonard, 2018). In fact, most of the municipal and community group participants indicated that the identity of Baie Verte as a town was strongly attached to the mining industry.

> This town came into existence because of mining. Most of us who moved here, moved here because of the mines. Even if you are not involved with it directly, you are providing some kind of support to it, so, there is a mining culture here, and we are strongly attached to it (Community Group Leader, BVI12)

Another community group leader, participant BVI02, commented on how the mines themselves are vital to the existence of Baie Verte (and vice versa): *"… the mines are on the peninsula, most of the mine workers live in Baie Verte, so the mines have a good connection with Baie Verte…. anything that happens in Baie Verte is of direct concern to the mines".* This statement indicates that both residents and the mining companies in Baie Verte acknowledge that the identity of the town is strongly attached to the mining industry.

Baie Verte Coat of Arms, November 2019
Photo by author

In fact, the images of a pickaxe, shovel, cogwheel, and miner in the town's seal or coat of arms symbolize this strong attachment (Memorial University, 1993).

With the cultural heritage and local identity of Baie Verte noted above as tied to the mining industry, some participants suggested that the presence of a miners' museum, an open pit mine, and an underground mine in the town provide great industrial tourism potential. They indicated that this potential should be harnessed by the town for the development of its tourism industry, one that has been noted in section 5.3.4 as almost non-existent in the town to date. The observation made in Baie Verte with regard to the link between mining heritage and tourism not yet being exploited is contrary to the experience of other Canadian communities described in the literature (such as Bell Island, Sudbury, Town of Cobalt, the Town of Bruce Mines, Malartic, Bancroft, Glace Bay, etc.), where mining heritage led to the development of local tourism (Clark, 2017).

Baie Verte Miners' Museum, December 2018
Photo by author

6.2.6 Participation and Governance

Mining, according to municipal government participants, is not playing any major role in local governance and municipal government affairs in Baie Verte. This was highlighted by a municipal government official, participant BVI03:

> The (current) mining companies don't play much of a political role… We have had conversations with them with respect to taxation …but, we have never seen them at council since I have been here with recommendations that they would like to see this regulation changed, or they would like to introduce this regulation, or they would like to review the governance framework for this or that… we have never seen that happen.

This is contrary to the assertion made by Cheshire et al. (2014) that mining companies usually play local governance roles in mining communities. The old mines that operated in Baie Verte in the seventies, on the contrary, were noted as supportive and involved in local governance. It was indicated that their officials occasionally sat on council meetings and made donations to the municipal government. In fact, it was discovered that the furniture currently in use at the town council chamber was donated by the Advocate and Rambler mines in 1981. It is, however, worth stating that an official of the current mines is advocating for collaboration between the mines and the municipal government to foster the concept of branding the town as a mining centre or hub in the province (Hurley, 2018c).

The current mines, instead of being heavily involved in municipal governance, were rather noted as playing active roles in the governance of regional development organizations such as the Baie Verte Peninsula Chamber of Commerce. The mines were noted as constantly supporting the Chamber's flagship Annual Mining Conference, which brings together community, industry, and government stakeholders to Baie Verte every year to discuss matters pertaining to the development of the mining industry and the sustainability of the region. Some

of the topics that have been discussed at the conference over the years in relation to the sustainability of the region have included the need for developing local businesses, involving more women in mining, and adopting strategies to enhance the environmental performance of the mining industry (Personal Communication, Chamber of Commerce Official, December, 2018).

Baie Verte Council Chamber Furniture, December 2018
Photo by author

In addition to the support the that mines provided to regional development organizations such as the Chamber of Commerce, mining company officials also noted that the current mines lobby the provincial government for the improvement of infrastructure and services in Baie Verte. For example, one mining company official, participant BVI05, indicated that one of the main things the mines are currently lobbying for is a revamp of the Baie Verte highway. This is not surprising, especially when the mines also rely on the highway for transporting their goods and services. Some community group participants thus suggested the mines mostly lobby only for things that are beneficial to them.

With regard to the impact of mining on community volunteerism, the spirit of volunteerism in Baie Verte seemed very high, as highlighted in section 5.3.5. Some participants, however, suggested that the participation rate of resident mine workers in volunteer activities is very low and almost non-existent. They indicated that this is probably due to the busy work schedules at the mines. This was confirmed in a statement made by a mining company official, participant BVI09:

> … This (community participation) has been a problem, and I am very much guilty as anybody else for not volunteering and doing stuff. The structure of work that we are involved in (mining), some of us we don't work only 8 hours a day. Like my normal day is 11, 12, 13 hours every day, 5 days a week. So, when you get home on the weekend, you would like to do something for yourself and family. So, if I see someone doing something as a volunteer, I appreciate that person because, they are giving up their free time to do something for my kids, somebody else's kid, or some organization in town or whatever.

The above observation is similar to the one made by Gibson and Klinck (2005) in their study on the impacts of mining on communities in northern Canada, where they discovered that the busy nature of mine work schedules adversely affected how mine workers engage with their families and communities.

Even though the community participation rate of resident mine workers was suggested by some participants as being low in Baie Verte, the mining companies were noted by municipal government officials as supporting social and recreational activities and events in the town:

> The mining companies support the mining conference, they support the summer spree dances, they do have soft ball tournament, they do support hockey among themselves… they also do support their kids in minor hockey, minor swimming, and they do support programs that their employees' kids are in… yes they do! (Municipal Government Official, BVI03).

The above observations suggest that the mining companies in Baie Verte attempt to make up for the lack of community involvement of their employees by supporting community programs and events. However, in reality, their efforts cannot fully make up for this, as residents' participation has been identified as key to the social fabric of a community (Liu & Besser, 2003).

6.3 Impacts of Mining on Ecological Capital in Baie Verte

This section discusses the impacts of mining on the ecological capital of Baie Verte in relation to the Telos framework, the findings in chapter 5, and the observations from the literature discussed in section 2.4.3 of chapter 2. These include discussions of the results related to the five stocks identified in table 4.1 as relevant to the ecological capital of Baie Verte, namely: water quality, use, and infrastructure; air quality; ecosystems; land use; and waste materials.

6.3.1 Water Quality, Use, and Infrastructure

There was no suggestion from participants of any adverse impact of mining on Baie Verte's source water of Southern Arm pond, or on the town's tap water. This was evident in the statement of a community group leader, BVI05:

> I do drink directly from the tap, I do cook from it, I don't see anything wrong with it, and I don't think mining has polluted it in any way …. I know some people don't drink from it (tap water), but I doubt it has something to do with the mines being here, you know... it's probably just because it doesn't taste too good… you know… from the chlorine and stuff from the treatment process, I suppose.

Even though participants indicated mining had no adverse impacts on the town's drinking water (source or tap water), it was discovered that some residents preferred to drink from a natural or roadside spring or purchased bottle water than use the tap water. This, they stated, was due to the

changes in the appearance and smell of the tap water from the treatment (chlorination) process. As stated in the previous chapter, this observation is similar to the one made in a study by Daniels and Vodden (2015) in the Town of Sunnyside also in NL, which discovered that some residents found the tap water unsafe to drink due to the aesthetic properties (unpleasant appearance and smell) it attains from the chlorination process.

Also, despite mining being suggested in the literature as a water intensive industry that usually competes for water with other local users in communities (Bebbington & Williams, 2008, Kemp et al., 2014), no suggestions were made by study participants of any adverse impacts of mining on the availability and use of water in Baie Verte. In fact, the mining companies where noted as managing their own water system and not relying on the town for water for use in their operations (Personal Communication, Municipal Government Official, September 2019).

With regard to water infrastructure in Baie Verte, as highlighted in section 5.4.1, the town's water infrastructure is in a state of disrepair, with lots of breaks and leakages. The infrastructure was inherited from the old mines in the 1970s and is, therefore, over 40 years old. The infrastructure is, therefore, about three years above the 36.8 years useful life span of water supply systems in Canada (Gagnon et al, 2008). Given that water supply systems in NL have been noted as usually above their average expected life span (Gagnon et al, 2008), it can be concluded that situations similar to Baie Verte can be found province-wide. The frequent leaks from Baie Verte's old and worn out water infrastructure may pose a threat to the town's water bodies and aquatic life. For instance, in 2018, chlorine leaks from the town's worn-out infrastructure were reported to have polluted the town's salmon river (Hurley, 2018d).

Unlike the old mines, the current mines in Baie Verte were noted as not providing any form of support to the town's water infrastructure:

> The majority of our infrastructure was put here way back when the asbestos mine was there, and as such, that means the infrastructure is very old. And it was put in by the mines, or in collaboration with the mines, or as a result of the mines… and I mean the asbestos mine may have provided assistance, but we've got no offer of assistance from the current mines (Municipal Government Official, BVI03).

As discussed under physical infrastructure in section 6.1.4, the lack of infrastructure support from the current mines was noted by mining company participants as being the result of their limited financial resources to support every aspect of the town's infrastructure.

6.3.2 Air Quality

It was suggested by community group and municipal government participants that the operations of the current mines in Baie Verte were not having any visible adverse impact on local air quality, from both particulate matter and gas emissions, at the time of the study. This is contrary to observations in the literature that such impacts generally occur (Kumar, 1994; UNCTAD, 1997; Söderholm, 2000). This was highlighted by a municipal government official, participant BVI03:

> My understanding is we don't really test for air quality within the town itself, but I have never seen any difficulty with it. I mean the two mines operating here are not mines that would normally create air pollution in any ways, I mean not to any major degree…. they are not coal mines, they are not those kinds of mines. I mean they wouldn't normally create that kind of pollution.

The above statement, especially when coming from a municipal government official, raises some questions and concerns. For a community like Baie Verte, where mining operations are still on-going and where remnants of an abandoned asbestos mine in the form of tailings pile up still exist, one might assume that a regular monitoring of the local air quality would be a necessity. In support of the suggestion, that the mines had no visible impacts on local air quality in Baie

Verte, mining company officials further indicated that air pollution precautionary measures were factored in mining operations to reduce adverse impacts on local air quality. This was illustrated by a mining contractor, participant BVI09, in the below statement:

> … As aggregates contractors for the mines, we work with crushers, so lots of dust. The mining companies are pushing us as a company to use crush breakers, water, etc. to keep the dust down. The mining companies themselves have also invested in dust collection systems and all that stuff, to keep the environment and their workers safe from all those contaminants that can hurt our bodies…. The equipment that the companies are purchasing these days is also going more green and they are encouraging us to do same. Like just for an example, the trucks that we bought right now, and all the other equipment that we are operating at our site got very low emissions… 'cos we have DPF filters on them to take out the contaminants going in the air.

The fact that the mining companies in Baie Verte are operating machines with lower emissions on their sites is not surprising. This is likely to be a response to provincial, federal, and even global policies on GHGs and other forms of pollution reduction in heavy industries, including mining. For example, the most recent federal policy (Canadian Minerals and Metals Plan - CMMP) and NL provincial policy (Mining the Future 2030 Plan) (discussed in section 3.2.3) both call on mining companies to enhance environmental sustainability by utilizing technologies that reduce their GHGs emissions. The mining related policies being used, or that could be used, to enhance environmental sustainability in Baie Verte, specifically, and NL in general will be discussed further in Chapter 7.

Even though the current mines' operations were suggested above as having no visible impacts on local air quality in Baie Verte, some participants expressed worry about the tailings pile up at the abandoned asbestos mine site located few kilometers from the Baie Verte town office. Those participants saw the tailings as a major threat to the good local air quality currently being enjoyed in the town and surrounding areas.

> I am sure air quality in Baie Verte is a lot better than what it was. But you've got open tailings from an asbestos mine that has been there since the 1960s. When we were kids, you could wipe it off your car… now, when the wind went a certain way, dust particles from these tailings I believe suspend in the air, and that doesn't sound good for us. (Community Group Leader, BVI07).

In support of the suggestions that local air quality in Baie Verte was threatened by the tailings from the abandoned asbestos mine in the town, a provincial government official, participant BVI16, added:

> NL Department of Natural Resources has kind of focused on immediate safety hazards. They have done some air monitoring to do some testing for asbestos… the conclusion of the air monitoring report was that there weren't any immediate concerns that am aware of. But there is waste rock and there is about… am not sure, probably around 70 or 80 million tonnes of tailings that are potential sources of asbestos, so yes, there are some environmental concerns.

It was discovered that an ambient air monitoring test was done in Baie Verte over a 10-month period between 2010 and 2011 to measure the levels of airborne asbestos fibres around the mine site and town hall (NL Department of Natural Resources, 2011). The report revealed that the quantities of asbestos fibres in the test areas were below the provincial exposure limit of 0.1 fibres/cm^3 and, therefore, not a major threat to local air quality and public health in Baie Verte (NL Department of Natural Resources, 2011). Most participants, however, expressed fears that the tailings could still have adverse environmental and public health consequences in Baie Verte in the near future, if not cleaned up. While waiting on a clean-up to be done, a regular monitoring of the local air quality around the site seems necessary, especially when the last monitoring was done about 10 years ago. The old asbestos mine site in Baie Verte is on the remediation list of the National Abandoned and Orphaned Mines Initiative (NOAMI) (see section 5.4.2), yet no major remediation exercise has been done at the site so far. In fact, the Town mayor was reported

in a recent news article as calling on the provincial government to pay more attention to the remediation of the site (Hurley, 2018e).

6.3.3 Ecosystems

As mentioned in section 5.4.3, Baie Verte has a good area demarcated as forest reserves (67.5 km2) and a marine protected area (0.035 km2) (NL, Department of Municipal Affairs and Environment, 2018). At the time of the study, the operations of the current mines were not suggested to have had any visible impacts on those areas or other terrestrial and aquatic ecosystems within the boundaries of the town. This was highlighted in a statement made by a community group leader, BVI01: *"… … there doesn't seem to be any decline in any of our… you know, moose, rabbits, all that kind of stuff… it doesn't seem to have affected much of the wildlife and stuff"*, and in a related statement made by another resident and provincial government official, BVI06: *"…. there is a salmon river here in Baie Verte, we still get salmon every summer from it, so that river is good. No impact whatsoever from mining on it".*

The mining companies indicated that the mines have corporate environmental policies (to be discussed further in chapter 7), which are mainly guided by legislative requirements and make provisions for environmental protection practices, such as mine waste water treatment, land reclamation and rehabilitation, mine waste recycling, etc. in mining operations, as a way of preserving ecosystems and safeguarding the environment. This was confirmed by most participants and highlighted in a statement made by a mining contractor, participant BVI09:

> … Any wood that's cut at various areas to expand an ore body or whatever, is done by a professional contractor…the wood is not pulled over, it's not pushed into a ditch or whatever. And reclamation work is done. Things are seeded again, grass grown back again, trees are planted again on the reclamation site, so, they (mining companies) are doing their part with regards to that, which is great to see. I think the government is pushing for that too. We don't want to do things we have done 30 or 20 years ago.

This observation confirms the assertion made in the literature (and discussed further in chapters 3 and 7) that the mining industry and governments in a number of developed jurisdictions, including Canada, ensure that mining is carried out in such a way as to reduce the negative impacts on local ecosystems by enforcing policies that promote good environmental practices like ecosystem preservation and restoration in mining operations (Lloyd et al. 2002; NRCan, 2018).

Even though the current mining operations in Baie Verte have been suggested not to have had any significant negative impact on ecosystems, some government participants indicated that past mining operations in the region did have some adverse impacts on the aquatic ecosystem of adjacent areas:

> Not much impact in Baie Verte, but there is a river across the highway before you get to Ming's Bight. That water has to my knowledge a pH level of 0, but it should be 7 for life-a fish or frog to live in it. So that is a dead river from the mining from the sixties and seventies… you put a fish in it, it dies (Baie Verte Resident and Government Official, Participant BVI06)

This confirms the assertion made in the literature that the impact of mining on ecosystems is not only localized, but usually crosses local borders and is felt in adjacent areas (Meech et al. 1998; Jacobsen, 1998; Tarras-Wahlberg et al., 2001).

6.3.4 Land Use

Mining was not suggested to have had any major impact on land use in Baie Verte. No incidence of land scarcity was suggested as resulting from mining operations. In fact, the operations of one of the mining companies (Anaconda Mining) is outside the town's boundaries, as noted earlier (Municipal Government Official, BVI03). The issue of land scarcity in Baie Verte

was rather attributed to the fact that the municipality was unable to release land for development, as a result of their inability to differentiate or to access the crown lands in their jurisdiction- a problem related to several municipalities in NL (Skeard et al., 2013), as discussed in section 5.4.4. This was highlighted by a municipal government official, BVI03:

> We have had a major issue with land use (inability to access crown lands). That has nothing to do with the mines. The mines, particularly Rambler has a huge wharf of land inside our jurisdiction that nobody can touch, because they have a mining lease for it…. But our borders are so big that it really doesn't impact the availability of the land itself. Like the mines really don't have a big impact. They are not taking up extra land. We do have a lot of crown lands and municipal land inside of our jurisdiction.

This observation is contrary to the one made in the literature that mining usually disrupts land use patterns and affects the availability and use of land by residents (for subsistence purposes such as hunting, trapping, etc.), and by other industries in local communities, thereby resulting in land use conflicts (Söderholm, 2000; Hilson, 2002; Kemp et al., 2011; Mclntyre et al., 2016). In fact, in the case of Baie Verte, participants noted that mining did not affect the use of land by residents for hunting, trapping, etc., but rather suggested that it, to some extent, has contributed to the development and use of land for local businesses in the town:

> I have seen since the mining picked up here again, probably, in the last 10 or 12 years, Subway, Robins, a new seniors' home, new car garages, etc., all came to town, because, I guess the land was available for them to set up on… so I don't see mining taking up all the land and affecting other sectors of Baie Verte's economy… I mean forestry is still going on around here (Community Group Leader, BVI11).

Mining has been noted in the literature as usually resulting in land degradation in local communities (Kusimi, 2008; Schueler et al., 2011; Sonter et al., 2014). In the case of Baie Verte, except for the un-remediated old asbestos mine site, which is on the remediation list of the National Orphaned and Abandoned Mines Initiative (NOAMI) (see section 5.4.2), most

participants suggested that current mining operations have not had any adverse impact on land in Baie Verte to the extent of affecting its availability and usage. In relation to this, a mining industry contractor, participant BVI18, commended the sound environmental practices of one of the current mines:

> I am very fortunate to be involved with Anaconda Mining since day one… That company has really impressed me with the way they handle the environment, very impressive. I have had people like heavy equipment people, engineers, etc. from the States come see what they are doing, and every one of those people have said, what an environmentally friendly site…. every single piece of land is put back to its original state after being touched.

This was supported by a resident and provincial government official, participant BVI13, in the below statement:

> The major problem we have here with site remediation is with the abandoned asbestos mine site…. but the mines here now are very conscious about the environment…. like, I have been to Anaconda's mine site, and I am very pleased with those guys. Every single hole dug is literally taken care of.

It was discovered that unlike the past mines, the operations of the current mines did not have any adverse impact on the availability and use of land in Baie Verte at the time of the study. As evident in the above statements, one of the mining companies (Anaconda Mining) was even commended for its land restoration efforts. In fact, it was also discovered that the company was collaborating with researchers from the Boreal Ecosystems and Agricultural Sciences (BEAS) program of Memorial University's Grenfell Campus on innovative approaches to land reclamation and revegetation at their site (Personal Communication, Lead Researcher, August 2019).

6.3.5 Waste Materials

Mining waste rock or tailings was noted as the main issue of concern with regard to the environmental impact of mining in Baie Verte. This is not surprising, as mine waste disposal has been identified as one of the major challenges facing the minerals industry (Bridge, 2004; Franks et al., 2011). It was discovered that tailings pond disposal has been the main mine waste disposal method used by Baie Verte mines over the years. For example, Rambler Metals proposed to build a new tailings pond on its site to extend its operational life span to over 20 years (CBC, 2018b). Even though the tailings pond disposal method has been flagged in the literature as having high tendencies to cause catastrophic disasters (Bridge, 2004), no tailings pond spillage or failure was suggested to have occurred in Baie Verte at the time of the study. However, tailings pile up from the abandoned asbestos mine - a legacy left behind by mining operations in the 1960s and 1970s - was noted as a major environmental concern that threatens public health and safety in the town. These points were highlighted in the statement of a municipal government official, participant BVI03:

> … The only other thing that is of concern is the tailings pond and things of that nature. We've not had any major breakages or leakages, but I don't know if that has been the luck of the Irish, or if there are enough provisions in place at the mines to have prevented it. But there are lots of contaminated areas around… and they are created by the mines, what the mines are going to do when they decide to leave, I don't know. I mean we certainly see what the asbestos mine did…. And I don't know that Rambler or Anaconda would do any better when they decide to stop mining here, I hope they will, but you know, I don't know.

In response to the skepticism about the strategies in place at the mines to prevent disasters and clean up after closure, as highlighted in the above statement, mining company participants indicated that the current mines in Baie Verte were very conscious about reducing the environmental impacts of their operations. They further noted that the mines have constantly

sought for avenues to divert the waste generated in their operations, mainly through recycling. Anaconda Mining, for example, collaborated with Shore Line Aggregates, a subsidiary of its local contractor - Guy J. Bailey Limited, to ship about 3 million tonnes of mine waste rock to a market in South Carolina in 2017 (Anaconda Mining, 2016; Boone, 2017). It was discovered that the company was also product testing its mine tailings to be used as a soil enhancement product to support the agricultural industry (Anaconda Mining, 2018). A company official, participant BVI14, shared the company's efforts further:

> So, we are doing a couple of big projects, one is to re-purpose our mine waste. We have been successful in working with our partners, Guy J. Bailey, to ship about 3 million tonnes to a US construction project….so, we have actually recycled 3 million tonnes of waste rock. And we are doing work now for re-purposing our tailings… and again, a real opportunity for a 2.5 million tonnes that could have a great role in a primary agricultural production. So that what's new, and that's the 21st century, it's not yesterday's mines.

Abandoned asbestos mine in Baie Verte, October 2019
Photo by author

6.4 General Conclusions from Chapter 6

The observations made in the study on the impacts of mining on community sustainability in Baie Verte in comparison to the literature, as presented in the results and discussions of this chapter, have been summarized in table 6.1 below.

Table 6. 1: Summary of Observations on Impact of Mining in Baie Verte and Comparison with Literature

Type of Impact	Observations made in Baie Verte	Comparison to Literature
Economic Impacts		
Labour Market	- Presence of current mines has enhanced the labour market through direct and indirect jobs creation	- Similar to observations in the boom-bust cycle literature, on the existence of a direct relationship between the boom and bust period of mining and the local labour markets (Bowes-Lyon et al.,2009; Rodon & Lévesque, 2015)
	- High wage structure of the mines attracting the workforce of other seasonal industries to it	- Similar to assertion in the literature by Evans and Sawyer (2009) that the high wage structures of the mining industry usually attract the workforce from other industries to mining
Knowledge Infrastructure	- Less demand for mining relevant programs in the town's college than in the previous mining era	- Contrary to the observation made by Azapagic (2003), Bowes-Lyon et al. (2009), and Scott et al. (2012) that the presence of a mine in an area typically leads to high demand training and skills relevant to the mining industry
	- Mines liaising with town's college to provide skills development and capacity building training programs to their employees	- Commensurate with recommendation in the literature that developing the skills and capacities of local employees helps to enhance the sustainability of communities (MMSD, 2002, Azapagic, 2003)
Economic Structure	- Economy gravitating towards mining with less development opportunities for other industries	-Similar to the lack of economic diversification observed by Kuyek and Coumans (2003) with other mining dependent communities in Canada and by others elsewhere
	- Mines not necessarily causing spin-offs of local businesses but rather sustaining the existing businesses	- Contrasts with evidence in the literature that spin-off benefits generally occur in mining communities (Evans & Sawyer, 2009, Petkova et al. 2009, Garnett 2012)
Physical Infrastructure	- Infrastructure (roads, schools, etc.) mainly inherited from former mines, but current mines are junior companies	- Supports discovery in the literature that junior mining companies usually lack the financial

	with limited financial resources to support local infrastructural development	capacity to contribute to local infrastructural development (Johnson, 2017)
Socio-Cultural Impacts		
Population and Demography	- Current mines helping to stabilize the town's population rather than growing it	- Contrary to observation in the boom town studies literature that the boom period of mining is usually accompanied by rapid population growth (Gilberthorpe et al., 2016; Bainton et al., 2017)
Health and Well-Being	- Unlike old mines, current mines not posing much threat to residents (worker, family, women, public) health and safety	- Contrary to observations in the literature that such threats generally exist in mining communities (Gibson & Klink, 2009, Shandro et al. 2011, Hendryx, 2015)
	- Shutdown of previous mines negatively impacted healthcare provision, resulting in reduced services in the town's hospital	- Supports Hanlon and Halseth (2005)'s observation that the shutdown of resource developments usually results in the reduction in healthcare provision in most resource communities in Canada
Housing and Living Conditions	- Shortages of rental properties and increasing cost of housing relative to surrounding communities	- Similar to observations in the literature that the boom period of mining is associated with shortages and high cost of housing (Stedman et al., 2004; Wilson, 2004; Haslam McKenzie & Rowley, 2013)
	- Resident exclusion based on engagement with the mines likely to be present, due to the split of housing (old and new town sites) within the town, based residents' level of income level	- Likely to confirm the assertion in the literature of the general presence of the mono-economy syndrome in mining communities due to high incomes earned from mines (Lockie et al., 2009; Sachs & Warner, 2011, Scott et al., 2012)
Education	- Educational facilities present but (the college) mainly under-utilized (due to fewer enrolled)	- Contrary to observations made in other studies in Jordan (Al Rawashdeh et al., 2016) and Australia (Petrova & Marinova, 2013) which identified higher enrolments, inadequate educational facilities and lack of investment in educational expenditure in mining communities.
Sense of Place and Local Identity	- High sense of place and community attachment to the mines	- Contrary to observations made in literature which identified displacement of residents, destruction of local heritage sites, etc. as impacts of mining on communities (Owen & Kemp, 2015; Askland, 2018; Leonard, 2018)
	- Cultural heritage tied to the mines but little opportunity created for the development of tourism around it	- Contrary to observations made in other communities in the literature where local tourism has been developed around mining heritage (Conlin & Jolliffe, 2010)

Participation and Governance	- Minimal interactions between mines and local government	- Contrary to the assertion made by Cheshire et al. (2014) that mining companies usually assume local governance roles in mining communities
	- Resident mine workers less involved in community activities due to busy work schedules	- Similar challenges with mine workers volunteerism as noted by Gibson and Klink (2005) in their study of mining communities in northern Canada
Ecological Impacts		
Water Quality, Use, and Infrastructure	- No visible impact on source water and water use	- Contrary to observations in the literature that mining usually pollutes sources of drinking water and also causes water scarcity in local communities (Akabzaa et al., 2007; Thomson, 2018; Bebbington & Williams, 2008; Kemp et al., 2014)
Air Quality	- No visible impact on local air quality arising from particulate matter, airborne dust, or gas emissions from current mining observed. Tailings pile-up from the abandoned asbestos mine site, however, considered a threat to local air quality	- Contrary to observation in the literature that particulate matter, air-borne dust, and gas emissions from mining reduce local air quality in communities (Kumar, 1994; UNCTAD, 1997; Söderholm, 2000)
Ecosystem Health and Protection	- Legacies of past mining operations such as pollution of water bodies and land degradation of surrounding areas present	- Support the assertion in the literature that the impact of mining on ecosystems is not only localized but usually crosses local borders and is felt in adjacent areas (Meech et al. 1998; Jacobsen, 1998; Tarras-Wahlberg et al., 2001)
	- Current mines have reduced impacts on ecosystems due to sound environmental practices	- Supports the assertion in the literature that the mining industry and government in several developed jurisdictions, including Canada, enforce policies that promote good environmental practices (Lloyd et al. 2002; NRCan, 2018)
Land Use	- No impacts on land use except for the mine site areas itself, and no land use conflict with other land users observed	- Contrary to observations in the literature that mining usually disrupts land use patterns, and affects the availability and use of land by residents and other industries in local communities, thereby resulting in land use conflicts (Söderholm, 2000; Hilson, 2002; Kemp et al., 2011; Mclntyre et al., 2016)
Waste Materials Management	- No tailings spillages or failures recorded; but tailings pile up at former asbestos mine noted as a major environmental threat	- In line with observation in the literature that mine waste (tailings) threatens public health and safety and biodiversity (ICME & UNEP, 1998; Mining Watch Canada, 2001; Canadian Mining Innovation Council, 2013)

	- Mine wastewater treated prior to disposal, and mine waste rock diversion strategies being constantly explored	- Contrary to observations made in other communities in the literature where mine wastes are dumped haphazardly

In terms of the impacts of mining on the economic capital of Baie Verte, it was observed that the current mines in Baie Verte did not create as many employment opportunities as the old mines, due to their small-scale production capacities and their use of automated systems. Nonetheless, they have been noted earlier as providing employment to 16.5% of the town's labour force as of 2016, with an increased number of jobs in recent years (Statistics Canada, 2016). Furthermore, the current mines were noted as attracting the workforce from other industries due to the industry's high wage structure. This was suggested to have created a deficit in the labour force for other industries in Baie Verte. Also, unlike the old mines, it was observed that the current mines do not have much impact on the knowledge infrastructure in Baie Verte. This was evident in the underutilization of the town's college. Some mining research and development projects are, however, underway at the college. Finally, it was also observed that the mines' contributions to the town's infrastructure had shifted from physical infrastructure support with the old mines to social infrastructure support with the current mines, including support for scholarships and sports programs, for example.

With regard to the impact of mining on the socio-cultural capital of Baie Verte, it was discovered that unlike with the old mines, the current mines in Baie Verte have not caused a rapid growth in the town's populations, but have rather helped stabilize it in recent times. Furthermore, unlike the old mines, the current mines were suggested not to have had much of a negative impact on the health and well-being of Baie Verte residents; however, the provision of healthcare services in the town was reduced following the shutdown of the old mines. This was suggested

as mainly being the result of the decline in the town's population after the shutdown. The demand and cost of housing in Baie Verte in recent times was also suggested to have increased relative to surrounding communities as a result of the mines' presence. Also, the sense of place and cultural identity in Baie Verte was revealed as strongly attached to the mining industry; however, aside from the miners' museum, which operates mostly in the summer, few opportunities have been created for the development of local tourism around the town's rich mining heritage. Finally, it was observed that community participation among resident mine workers is almost non-existent, likely due to the busy mines work schedules. Similarly, the current mining companies' (and senior officials') interaction with the municipal government was also seen to be limited compared to the previous companies.

Concerning the impact of mining on the ecological capital of Baie Verte, the current mines were suggested not to be having any significant adverse impact on water quality and use, air quality, land use and ecosystems. Mine waste material (tailings) was, however, noted as mining's major threat to the ecological capital of Baie Verte. The tailings pile up at the old asbestos mine site was particularly identified as a major issue of concern. The lack of regular air quality monitoring at the site was also identified as a related area of concern.

In summary, discussions from this chapter have revealed that mining's impacts on community sustainability in Baie Verte have varied between its two mining eras (old mines and current mines). The old mines seemed to have had more positive impacts on several aspects of the town's economic and socio-cultural capitals (such as: labour market, physical infrastructure, knowledge infrastructure, education, housing development, governance, etc.) than the current mines. At the same time, the operations of the old mines also seemed to have been more environmentally destructive and compromising on worker health and safety than the current

mines. This is evident with the presence of the abandoned asbestos mine site in the town, and the media reports on ailing former Baie Verte mine workers seeking government compensation. Given the study's observation that the adverse environmental impacts of the old mines became mostly visible after the mines' shutdown, it is hoped that the observed 'environmentally-friendliness' of the current mines will stand the test of time.

Chapter 7: Discussion, Summary, Conclusions and Recommendations

This chapter discusses the findings that relate to the fourth objective of the research, which is to identify mining related policies (government and corporate) being used or that could be used to enhance community sustainability in Baie Verte, specifically, and in mining communities in NL in general. The chapter also presents the general summary and conclusions and recommendations from the research. Section 7.1 discusses the role of mining related policies in enhancing community sustainability in Baie Verte and NL; section 7.2 presents a summary of how all the research objectives have been met; section 7.3 presents general conclusions from the research; section 7.4 makes some recommendations based on the study findings; and section 7.5 highlights areas for future research, and the contributions of the study to literature.

7.1 The Role of Mining Policies on Community Sustainability in Baie Verte and NL

This section discusses the research findings for the fourth objective of the study, which is related to how the mining policies (federal and corporate) discussed in chapter 3 have helped enhance sustainability in Baie Verte. Section 7.1.1 presents the findings related to government policies, while section 7.1.2 presents the findings on how industry and corporate policies have shaped environmental and socio-economic sustainability in the town.

7.1.1 Contributions of Government Mining Policies

7.1.1.1 Environmental Policies

It was discovered that the environmental legislation and regulations at both the federal and NL provincial levels, discussed in section 3.2.2, ensure that mining companies in NL and in Baie Verte specifically, operate in a more environmentally sustainable manner than the mines of the past. The Canadian Environmental Protection Act (1999) and the NL provincial

Environmental Protection Act (2002) are two important policy tools worth mentioning in this regard. The NL Environmental Protection Act (2002) has a number of regulations, such as Air Pollution Control Regulation, Waste Management Regulations, Waste Materials Disposal Areas Regulations, and the Environmental Assessment Regulations that regulate mining operations in the province. These policies and regulations have been very useful in enhancing the environmental performance of the mines operating in Baie Verte, and indeed in other parts of the province. For example, provisions under the Canadian Environmental Assessment Act (1999) (see table 3.2 in section 3.2.3) and the NL provincial Environmental Assessment Regulation (2003) require all mining companies in the province, including those in Baie Verte, to undergo a rigorous environmental assessment process prior to the commencement of development projects.

In addition to the environmental assessment requirement, the NL Mining Act (1999) requires mining companies operating in the province to present a mine development and operation plan and a mine closure and rehabilitation plan, as part of any project application and prior to its commencement (see section 3.2.3). Participants indicated that the mine closure and rehabilitation plans based on the Mining Act (1999) required the mining companies in Baie Verte to provide financial assurance for the closure and rehabilitation of their mine site before they commenced operations. They noted that this will help prevent the recurrence of another abandoned mine site in the town. The capabilities of the aforementioned policies in enhancing the environmental sustainability of mining communities in NL were highlighted in the following statements by provincial government officials:

> There are now provincial legislations that require mining companies to have a development plan. Initially, when you start up you have to go through an environmental assessment process. The first part of the process is to take into account any emissions, or any impact on water, etc.… That is to say, you have to look at a long-term planning for the project (Provincial Government Official, participant BVI13).

> …. If you think back to the rehabilitation and closure plan, before a mine can start, we want to see what the proponent proposes for their plan, that when the mine ceases they will rehabilitate the site to a condition that is obviously safe, and, where possible, can be used for other opportunities (Provincial Government Official, participant BVI17).

All participants expressed their confidence in the ability of the legislation and regulations discussed above to ensure environmental sustainability in mining communities in NL, including Baie Verte.

In addition to the mandatory legislation and regulations discussed above, provincial government participants indicated that mining companies in NL, including Baie Verte, were encouraged by government to embed in their operations the core environmental principles of other voluntary policies, like the Minerals and Metals Plan, and those of the most recent Canadian Minerals and Metals Plan and Mining the Future 2030 Plan (see chapter 3). The principles of these policies, as discussed in section 3.2.3, are mainly focused on the preservation of the natural environment and innovative mining practices that seek to reduce the adverse environmental impacts of mining operations. In response to this, it was discovered that one of Baie Verte's mining companies (Anaconda Mining) has turned to innovative mining techniques, such as the recycling of mine waste rock, as a way of reducing the environmental impacts of its operation. This will be discussed further under corporate policies in section 7.1.2 below.

While it was found that current policies are effectively ensuring environmental sustainability in the mining community of Baie Verte, it was identified in the study that most of these government policies and related pieces of legislation that are helping to enhance environmental sustainability in mining communities in NL, came into existence in the 1990s and 2000s. This was mainly after the era of the old mines that existed in Baie Verte from the 1960s to the mid 1990s. This suggests that the poor environmental performance of the old mines was

due to the establishment of those mines at a time when environmental policies were almost non-existent, or not strictly enforced where they existed at all. One official explained:

> Current legislation is effective, but we have the legacy of abandoned and orphaned mines in the province… For the Baie Verte area, it's the old Advocate Mine property… So we still have the legacy of the past. But current legislation is pretty sound (Provincial Government Official, participant BVI13).

Regarding the legacy left behind by old mines, highlighted in the above statement, several abandoned mine sites in NL are part of the inventory list of the National Orphaned and Abandoned Mines Initiative (NOAMI), a government policy initiative dedicated to reducing the environmental impacts of abandoned and orphaned mines across Canada. Some abandoned mine sites in NL, in areas like Hope Brook and Buchans have been remediated under this initiative (NOAMI, 2013). About $6.4 million has also been spent on the removal of unsafe mine infrastructure at two abandoned mine sites in the Baie Verte peninsula region, namely the Advocate Mine (old asbestos mine) and the Consolidated Rambler Mine (NOAMI, 2013). It is, however, worth noting that actual remediation work is yet to be done at the old asbestos mine site, as indicated in section 6.3.5. A complete remediation of this abandoned mine site is necessary for the full attainment of environmental sustainability in the Town of Baie Verte.

7.1.1.2 Socio-Economic Policies

It was discovered in the study that both federal and NL provincial government policies related to mining focus more on the environmental than socio-economic aspects of sustainability of communities. In the case of Baie Verte, most participants raised concerns about the economic vulnerability of the region to the boom-bust cycle of the mining industry and other socio-economic issues encountered following the shutdown of the old mines. These include decline in

population and reduction in healthcare services and college enrolment, which have all been discussed extensively in chapter 6. Yet, community participants indicated they were not aware of any federal or provincial government policies in place for ensuring socio-economic sustainability in Baie Verte. Some of these participants also pointed out to the Integrated Community Sustainability Plan (ICSP) as a municipal government policy initiative that was not making any impacts because it did not address the above mentioned issues. The mining company and government participants, however, argued that policies for ensuring socio-economic sustainability of mining communities in NL, including Baie Verte, do exist. They noted that unlike the environmental policies and regulations, these policies are mostly in the form of standards, voluntary actions and economic instruments (e.g. taxes and grants in lieu of taxes). A study by Porter and Vodden (2012) referenced earlier in chapter 3, supports the above claims of the community group participants, as it highlights the limitations of provincial policies with regard to local benefits and provincial benefits of industrial development revenues.

> A part of the reason these host/ adjacent communities have not seen as many benefits (from industrial development revenues) as they would like is that benefits are defined on a provincial level: there is no particular obligation to provide specific benefits at a local level to host/ adjacent communities (p.12).

With regard to the policies that are helping to enhance the socio-economic sustainability of mining communities in NL, provincial government participants made reference to the principles and objectives of the Minerals and Metals Plan (1993), the Environmental Assessment Regulation (2003), and Impacts and Benefits Agreements (IBAs), each reviewed in section 3.2.3. of this thesis. They indicated that these policies were designed to ensure mining companies develop resources in such a way as to maximise socio-economic benefits and minimize risks to local communities. It was discovered that due to the limited impacts made by these policies, the

notion of Benefit Agreements, initially applicable to only the oil and gas sector in the province, have also been adopted in the mining sector. Unlike IBAs, which are signed between mining companies and indigenous communities, Benefit Agreements are signed between mining companies and the provincial government on behalf of local communities (Municipal Government Official, Participant BVI17). Provincial government participants noted that Benefit Agreements are helping to enhance socio-economic sustainability in mining communities across the province, through revenue generation, job creation, local business development, infrastructural development, etc.

> Mining companies in the province are now required as part of the provincial environmental assessment process to present benefit agreements, which are different from IBAs…. The benefit agreements are between the mining companies and the provincial government…. to ensure that the people of the province, usually local communities, have first rights benefits… such as employment, education, business development…, and that type of thing (Provincial Government Official, participant BVI17)

It was indicated that the mining companies currently operating in Baie Verte did not have any Benefit Agreements, as their operations commenced prior to the requirements for such agreements in the province, which only began in 2014 (Municipal Government Official, BVI17). Thus, not all mining communities in the province benefit from such agreements. It is, however, worth noting that even though the mining companies in Baie Verte were not signatories to any Benefit Agreement at the time of the study, they seem to be operating in accordance to the general objectives of those agreements. This is evident in the significant contributions they have made to the economic and socio-cultural capital of Baie Verte, as discussed in chapter 6.

The provincial government participants also noted that the recently launched federal and NL provincial mining policies, namely the Canadian Minerals and Metals Plan (CMMP) and Mining the Future 2030 Plan (see section 3.2.3 for details), include well defined socio-economic

development strategies (see table 3.4 and 3.6) that can help enhance the socio-economic sustainability of mining communities in the province. In a comment on the relationship between the CMMP and Mining the Future 2030 Plan, an industry association official, participant BVI15, stated:

> The province had undertaken an analysis to see whether the provincial Mining the Future Plan and the CMMP are aligned. Those two do align very well in terms of a number of the initiatives put forward. So, the province does intend to work with the federal government as they develop their implementation plan. So, they (the federal government) are at the same stage that the province is. They have identified the actions, and now the next step is ok, how do we actually implement the action.

In relation to one of the key perspectives on mining community sustainability introduced in chapter 2, which defines sustainable mining communities as ones that are able to survive even after the closure of mines (Veiga et al., 2001), provincial government participants noted that both the CMMP and Mining the Future 2030 Plan focus on ensuring the sustainability of communities even after the closure of mines. In commenting on the objective of Mining the Future 2030 Plan, an industry association official, participant BVI15, stated:

> … Having a plan or an approach that would be able to look into where are the gaps, where are the positives, where are the opportunities to grow the sector sustainably in the province, and to realize longer-term benefits for communities, public treasuries, and companies. So that process just started in the fall of 2018, where the actual document or plan was launched.

The participant also indicated that the association of mining companies in NL (Mining Industry NL) was involved in the development of these two plans (CMMP and Mining the Future 2030 Plan) and is committed to work together with both the federal and provincial government in their implementation. Considering the fact that both plans are still awaiting implementation, it is unclear the extent to which they will make positive contributions to the socio-economic sustainability of mining communities in the province.

In summary, the discussions in this section indicate that government policies have made more positive contributions to the environmental sustainability of mining communities in NL, including Baie Verte, than to their socio-economic sustainability. In the case of Baie Verte, outstanding socio-economic issues, as noted above, still remain, despite improvements in mining policy since the previous mining era. It can thus be concluded that the role of government policies in enhancing the overall sustainability of mining communities in NL remains a challenge, with room for further improvements, some of which have been highlighted in the recommendations section towards the end of this thesis.

7.1.2 Contributions of Corporate Mining Policies

7.1.2.1 Environmental Policies

The research revealed that in addition to the government environmental legislation and regulations, the two mining companies in Baie Verte also have corporate policies for ensuring environmental sustainability in their operations. This was highlighted in the statement of a company official, participant BVI14: *"... as a company dedicated to the protection of the environment, we do have our own corporate environmental policy that guides our day-to-day activities".* The environmental policy of Anaconda Mining, for example, focuses on "identifying and managing environmental risks and developing mitigation strategies to protect the environment, the community, and employees" (Anaconda Mining, 2018, para.1). That of Rambler Metals also focuses on "…. causing no damage to the environment, no harm to people, and continuous improvements beyond compliance" (Rambler Metals, 2019, para. 3). The mining company and industry participants also acknowledged the effort of the Mining Association of Canada (MAC) in enhancing the sustainability of mining communities through its flagship

Towards Sustainable Mining (TSM) policy initiative (see section 3.2.4 and table 3.7). They noted that even though the mines in Baie Verte were junior mining companies and, therefore, not big enough to be members of MAC, they still incorporate some of the TSM principles in their operations. A mining industry official, participant BVI15, explained:

> We (as an association) have larger companies like Rio Tinto and Vale, and small companies like Anaconda and Rambler. The larger companies would turn to follow TSM and be a part of MAC's perspectives. The smaller companies may have more customized or specific approaches. As an association, we encourage them to do the positives.

In a supporting statement, another mining company official, participant BVI14, highlighted his company's efforts:

> We are not quite big enough for TSM…, but we certainly follow the principles… Anaconda has got a recognition provincially, nationally, and internationally, for its great mining environmental responsibilities… We are constantly doing things to improve the approaches … like narrow vein mining, which is meant to improve and reduce tailings.

It was also found that the mining companies in Baie Verte are members of the Prospectors and Developers Association of Canada (PDAC) and, hence, incorporate the principles of the association's e3Plus (see section 3.2.4 and table 3.8) in their operations. It was, however, interesting to discover that between the two mining companies operating in Baie Verte, Anaconda Mining was more proactive in reducing the environmental impacts of its operation. For example, as mentioned in section 6.3.5, the company has devised innovative ways of diverting its waste materials, which include the recycling of mine waste rock and researching the potential use of mine waste as a soil additive. In fact, a senior official of the company who is from Baie Verte has received among other awards, a Business Excellence Award from the NL Environmental Industry (NEIA, 2018). The official was also called to the International Mining Technology's Hall of Fame in 2018 for spearheading most of the company's environmental initiatives in the

Baie Verte region (IM, 2018). These awards, among others, attest to the company's sound environmental performance and stewardship in the Baie Verte region.

7.1.2.2 Socio-Economic Policies

It was discovered in the study that just like most of the environmental policies, the policies on socio-economic sustainability for the mining companies in Baie Verte are mostly voluntary and informal in nature and implemented as part of the companies' corporate social responsibility commitments. In addition to this, the company officials noted that they adhere to some of the socio-economic sustainability dimensions of the TSM and e3 Plus, such as community engagement, community development, employment of local personnel, etc. In terms of community engagement, it was discovered that the mining companies mainly engage with the community through the region's annual mining conference organized by the Baie Verte Chamber of Commerce in the spring of every year. The conference has served as an avenue used by the mining companies to update community stakeholders on their operations and to obtain feedback. The companies were also noted as occasionally engaging with the town through other means like town hall meetings and social media interactions. This was highlighted by participant BVI14:

> We have hosted town hall meetings to talk about what we are doing… We have done that on a number of occasions, and we have a Facebook account that we also use to keep people aware of what we are doing.

With regard to community development, it was found that the mining companies have supported the development of Baie Verte's social infrastructure by funding recreational facilities and programs in the town, as discussed in section 6.1.4. Anaconda Mining was awarded the 2016 Miner of the Year award by the NL branch of the Canadian Institute of Mining in recognition of its community development efforts (Anaconda Mining, 2016). In terms of employment, it was

indicated that the corporate policies of the mining companies ensure local personnel are hired at all levels, including for the top managerial positions. This was highlighted in the discussions of the previous chapter, where it was noted that approximately 80% of employees at both Rambler and Anaconda, including middle and top level managers, are residents of the Baie Verte region. In fact, in 2017, Anaconda Mining received an Employer of Distinction Award from the Newfoundland and Labrador Employers' Council in recognition of this, and of other reasons, including productivity, innovation, and maintaining a safe, healthy, and motivated workforce (Anaconda Mining, 2017).

The study has also found that the policy of the mining companies to procure goods and services locally, wherever possible, has helped in sustaining several local businesses, such as the hotel, restaurants, gas stations, hardware stores, grocery store, etc., consequently creating mining induced jobs in the area. In commenting on the efforts of the mining companies to procure goods and services locally, a mining company official, participant BVI14, stated:

> Baie Verte and Springdale are particularly built up as a service to support the mining industry… So, we have industrial services and products in and around Baie Verte… one of the things that mining has now is that, it relies on the procurement of goods locally. If you look back to the 1960s when the mines first started here, they procured everything outside of the region and province. But now, people have started to develop businesses in and around the town to support the mines, which removes the necessity to go outside…. So, it's cheaper for the mines to have that immediate inventory available in the town and region.

In relation to the above statement, Guy J. Bailey Limited, the main local spin-off business from the mines, was noted earlier as now being the second largest industrial employer in the Baie Verte peninsula region (Hurley, 2017b). The company has created about 150 jobs in the region, through the provision of onsite and offsite services to the mines. From a provincial outlook, about 24% of the total 4,130 direct jobs created within the NL mining industry in 2018 are from mining

support activities (NRCan, 2018). In the case of the Baie Verte region, considering that both Rambler and Anaconda generated approximately 280 direct jobs in 2018 (NL Department of Natural Resource, 2018), and Guy J. Bailey Ltd. generated about 75 direct jobs as a mining support business, the percentage of employment opportunities created as a result of mining support activities in the Baie Verte region (21%) is similar to that of the province.

In summary, the discussions in this section indicate that the corporate policies of the current mines in Baie Verte have helped improve the environmental performance of the mining industry in the region. The corporate policies have also made significant contributions to the economic and socio-cultural capitals of Baie Verte, mainly through job creation and social infrastructure development.

7.2 Thesis Summary

This section summarizes how this thesis has addressed the four objectives of the study, as outlined in chapter one. The first objective of the study was to identify the sustainability vision and goals of the Town of Baie Verte as defined by the municipality and residents. Findings related to this objective were discussed in section 5.1 of chapter 5. These findings were obtained from the review of relevant community sustainability documents and stakeholder consultations (see section 4.4 on data collection). A survey was conducted to understand the residents' perceptions of the town's sustainability in relation to that of the municipality. This resulted in the identification of 15 stocks and 30 goals relevant to the town's economic, socio-cultural, and ecological capitals. The identified goals include, for example, provision of adequate economic development opportunities, attainment of a strong knowledge-base, population stabilization, access to adequate healthcare, improvement of physical infrastructure, increased resident

participation in local governance, and efficient waste and land use management systems (see table 5.1 for a complete list). The findings related to this objective showed alignment between the municipality's sustainability vision and goals and the perceptions of residents. The findings also showed some variations in the perception of residents by age group. For example, for the socio-cultural capital, survey respondents who were 60 years and older considered cultural heritage and local identity as very important sustainability concerns, whereas those between 15-29 years considered them as less important. These variations, as noted earlier, appear to reflect the different priorities humans attach to things, based on their levels within the developmental life cycle (Armstrong, 2007). As indicated in chapter 4, even though there were some minor variations based on gender, income, and occupation, the differences were not apparent, unlike those by age group.

The second objective of the study was to identify the strengths and weaknesses of Baie Verte from a sustainability perspective. Relying on the Telos framework, a Sustainability Balance Sheet (SBS) was developed for Baie Verte. Findings from the SBS have been discussed in chapter 5. For the economic capital, while the town has strengths such as a labour market supported by the mining and healthcare and social services sectors and potentials for development in other industries (like forestry, fishery, and tourism) it also has challenges, such as a deteriorating physical infrastructure and an under-utilised college. For the socio-cultural capital, the study found that while the town has strengths such as a stable population, a strong residents' sense of place, and a high spirit of volunteerism, it also has challenges, such as an increasing housing cost and low resident participation in local governance. Finally, for the ecological capital, while the town has strengths such as a fairly good drinking water quality, a seemingly healthy ecosystem, and good local air quality, it also has challenges, such as a shortage

of land for further business and housing development due to land use policy challenges, and environmental sustainability threats from the abandoned asbestos mine site.

The third objective of the study was to examine the impacts of mining on community sustainability in Baie Verte based on the municipality's vision and goals, the residents' perceptions, and the results of the SBS. Findings pertaining to this objective have been discussed in chapter 6. The key impacts of mining on the town's economic capital were highlighted as including job creation and revenue generation, mainly through the sustenance of local businesses. At the same time, there were concerns about the attraction of workers from other industries, which is further contributing to the town's increasing dependence on the mining sector, as well as concerns on the non-existence of physical infrastructure support from the mines. Section 6.2 also highlighted the impacts of mining on the town's socio-cultural capital as including: population stabilization, shortages in rental homes and increasing housing costs, and a strong attachment of cultural heritage and sense of place to the mining industry. Finally, in section 6.3, the abandoned asbestos mine site was highlighted as the major threat to the town's ecological capital.

The last objective of the study was to identify mining related policies (government and corporate) being used, or that could be used, to enhance community sustainability in Baie Verte specifically, and in other mining communities in NL in general. The findings related to this final objective have been discussed in section 7.1, which highlighted how the government and industry policies on mining introduced in chapter 3 have contributed to community sustainability in Baie Verte. The limitations of those policies, including the fact that they have been skewed more towards environmental sustainability than socio-economic sustainability issues, and yet, have been unable to fully address the environmental risks associated with closed or abandoned mines

were also discussed. Some policy recommendations on how community sustainability could further be enhanced in Baie Verte and in other mining communities in NL will be provided below.

7.3 General Conclusions

The research findings discussed in chapters 5 and 6 indicate that mining has had various impacts on the economic, socio-cultural and ecological capitals of Baie Verte. For the economic capital, it can be concluded that mining plays a very important role in the economy of Baie Verte, and that fewer opportunities have been created for the development of other industries, like forestry or fisheries (which could diversify the town's economy), despite the apparent potential for these sectors as well in the region (as discussed in chapter 5). Given that the current mines in Baie Verte have an estimated lifespan of 20 years, if care is not taken the town will experience yet another economic breakdown in the future, as it did after the shutdown of the former mines in the mid 1990s. The study findings also indicate that even though the current mines in Baie Verte have created fewer direct employment opportunities (due to their small production capacities) compared to the previous mines, they have made significant indirect and induced employment contributions in the town and region as well. Another interesting conclusion that can be drawn from the study findings is that, unlike the old mines, the current mines have not contributed as much as local leaders would hope to further development of the town's knowledge infrastructure around mining. This is evident in the study's discovery that the town's college no longer offers industry relevant courses at the moment due to reduced demand. However, recent collaborations between the mining companies in the region and post-secondary educational institutions, including the town's College of the North Atlantic campus and Grenfell and St.

John's campuses of Memorial University on mining related training, research and development could help improve the situation.

For the socio-cultural capital, it can be concluded from the study findings that the current mines in Baie Verte, again by virtue of their low production capacity, have not caused a rapid growth of the town's population, but rather have helped stabilize it. This is because, as noted earlier, the mines have mainly employed local people from the Baie Verte region, making it possible for some people to stay home for mine work. Without the current jobs in mining and related industries in the region the population declines experienced in Baie Verte would have likely been worse. Other socio-cultural impacts of mining that could be inferred from the study findings are the reported increasing costs of housing in Baie Verte relative to surrounding communities and the shortages of rental homes, which have all been extensively discussed in chapter 6. The findings on the mining sector's impacts on health and well-being in Baie Verte, such as the lung related ailments among former asbestos mine workers, the suggested rise in mental health cases among some current mine workers, and the reduction in healthcare services after the shutdown of the old mines are also worth highlighting. Another interesting discovery made in the study is that few opportunities have been created for the development of local tourism around Baie Verte's rich mining heritage. This is contrary to observations made in other Canadian communities, where mining heritage has led to the development of local tourism.

With regard to the ecological capital, it can be concluded from the study findings that the old mines that operated in Baie Verte in the 1960s and 1970s have had more adverse environmental impacts than the current mines. Most study participants noted the abandoned old asbestos mine site as a major threat to the environment, public health and safety in the town. The poor environmental performance of the old mines, as indicated earlier, appears to be due to the

lack of adequate environmental legislation and regulations at the time and/or the non-strict enforcement of the ones that existed.

The study has confirmed that mining has impacted the economic, socio-cultural, and ecological capitals of Baie Verte. Both government and corporate mining policies and related plans and regulations, as discussed in section 7.1, seem to have played more of an environmental role in enhancing community sustainability in Baie Verte than a socio-economic one. The environmental policies at both the government and corporate levels are advanced and have helped enhance the environmental performance of mining in the Baie Verte region in recent times. The government and corporate socio-economic policies are rather still evolving. Although the government policies related to sustainable mining have had limited socio-economic impacts in Baie Verte, the corporate policies have made significant impacts, mainly in the form of job creation, social infrastructure support and local business development. Given that further development opportunities are being explored for the mining industry in the Baie Verte region, the role of policy in enhancing the overall sustainability (economic, socio-cultural, and environmental) of the Town of Baie Verte, the service hub of the Baie Verte region, is paramount to the industry's development in the region. The sustainable mining policies recently launched by both the federal and the NL provincial governments, namely the Canada's Minerals Metals Plan (CMMP) and Mining the Future 2030 Plan have the potential to supplement other existing mining policies to further enhance the sustainability of mining communities across the province, including Baie Verte. The question of whether and how these plans can be implemented is beyond the scope of this thesis; however, collaboration between stakeholders in government, industry, and local communities will be required and some initial recommendations for moving in this

direction, and towards enhanced sustainability in Baie Verte and its mining sector, are provided below.

7.4 Recommendations

The findings and discussions of this thesis indicate that the sustainability of mining communities in NL, which are mostly rural in nature, will require a clear long-term vision by all levels of government. In the light of this, some recommendations on how community sustainability could be enhanced in Baie Verte and other mining communities in NL are discussed in this section. The recommendations were mainly derived from the study findings and conclusions discussed above and from the key insights of interview participants and reviewed government documents and reports. The recommendations are as follows:

- The mineral development potentials of the Baie Verte peninsula should be capitalized on through collaboration between the provincial government and the mining sector. This could be done through the provision of more financial assistance or incentives to attract more mineral investors to the region, for example. If this is done responsibly it will help enhance the region's sustainability, as it will generate more revenue and jobs.
- A collaboration should be created between the provincial and federal government, under the recently launched federal and provincial mining policies (Canada's Minerals and Metals Plan, and Mining the Future 2030 Plan) to invest in the development of local infrastructure (such as roads and communications networks) in the Baie Verte region. This will help make the region more accessible and attractive for mineral investment.
- Opportunities should be created for the development of other industries outside of mining in Baie Verte, such as forestry, fishery, etc., which are areas noted as having good potentials

(Harris Centre, 2018), as discussed in chapters 5 and 6. This will help diversify the area's economy and make it more sustainable even after the exhaustion of mineral resources.

- In relation to the need for economic diversification noted above, the Baie Verte peninsula region has been noted as having a rich mining heritage, which is evident in the presence of the Dorset Soapstone Quarry National Historic Site, the miners' museum, an open pit mine, an underground mine, and an abandoned asbestos mine. This rich mining heritage gives the region strong industrial tourism development potential that could be connected with other regional tourism networks within the province. This could help boost the region's economic sustainability and should be investigated further as a development opportunity for the community and region.
- Given the strategic role of Baie Verte as the service hub of a region with an active mining industry, the municipal government should make efforts to purchase more crown lands, which are now becoming increasingly accessible through provincial government initiatives, such as the newly launched land use inquiry map mentioned in chapter 6. The purchase of more crown lands will enable the town to accommodate any future need for business and housing developments that might arise from the growth of the mining industry or other industries in the region.
- Once lands are available for developments, more financial assistance and business development support services should be made available to promote the development of local businesses in the town. In order to achieve this, like in other municipalities in NL, the Town of Baie Verte could create an economic development officer position (Municipalities NL, nd). Once this is done, collaborations should then be initiated between relevant government departments and agencies, such as the Department of Tourism, Culture, Industry, and

Innovation (TCII), Atlantic Canada Opportunities Agency (ACOA), Community Business Development Corporation (CBDC), and the newly created economic development office of the town.

- The presence of an open pit mine, an underground mine, and mineral exploration activities in the Baie Verte peninsula region offer it a practical edge in mining related teaching, learning, and research. Provisions should be made by the provincial government to develop the region as the mining center of excellence for the island of Newfoundland, if not the province. This could be achieved by further fostering the relationships between the mining companies in Baie Verte and existing post-secondary educational institutions like the College of the North Atlantic and Memorial University in teaching, research and development in mining.
- More efforts should be made by both the provincial and federal governments, under the National Orphaned and Abandoned Mines Initiative (NOAMI) to completely remediate the abandoned asbestos mine site in Baie Verte. Prior to that, ongoing air monitoring tests should be conducted at the site. This will allow for a timely detection of any hazards that could potentially affect the good local air quality being enjoyed in the town.
- Partnerships should be created between the provincial government and the provincial mining industry association (Mining Industry NL) for the development of incentive programs that will encourage and support mining companies in the province to explore innovative operation techniques to improve their environmental performance.
- Benefit agreements, which have been noted as a recent adoption in the NL mining sector, should be made a mandatory requirement for all mining companies operating within the province. Relevant community stakeholders, including municipalities should be involved in

the development of such agreements. This will help make mining communities first right beneficiaries of mineral developments in the province and thus make them more sustainable.

- Two recently launched federal and NL provincial government sustainable mining policy initiatives, namely the Canadian Minerals and Metals Plan (CMMP) and Mining the Future 2030: a Plan for Growth in the NL Mining Industry, have been noted as having the potential to supplement other existing mining policies and to enhance the overall sustainability of mining communities in NL. Collaborations should be created between the relevant government, industry and community stakeholders to ensure implementation of these plans.

7.5 Areas for Future Research and Contributions to Literature

7.5.1 Areas for Future Research

Even though all the study's objectives have been met, as illustrated in section 7.2, its findings have also highlighted two main areas that require further investigation. The first is the need for a similar kind of study to be conducted on a regional scale in the Baie Verte peninsula region. This kind of research is worth pursuing because, as mentioned earlier, the study findings have revealed that the impacts of mining also extend to other surrounding communities in the region.

The second research and policy analysis need identified is the need for further investigation of how the two recently launched federal and NL provincial mining policy initiatives (CMMP and Mining the Future 2030 Plan) can and will be implemented, and the extent to which they could help enhance the sustainability of mining communities in NL. A study of this nature will provide useful information to policy makers and mining and community stakeholders in evaluating the plans during and after their implementation.

7.5.2 Contributions of the Study to Literature

The study aimed to contribute to existing literature, inform policy, and improve practice on mining communities' sustainability in NL. With regard to its contributions to the literature, the study's findings and conclusions have contributed to the advancement of knowledge in the field of rural community sustainability, particularly within communities and regions with mining-based economies. This was achieved by using the Town of Baie Verte as a case study to advance knowledge on the impacts of mining on community sustainability, particularly on the island of Newfoundland, and the contributions made by government and corporate mining policies. This helped to fill a previous gap on mining in NL, especially on the island.

Another contribution of the study to the literature is that it is the first academic research attempt that has employed a sustainability assessment model to comprehensively explore the impacts of mining on all aspects of community sustainability (economic, socio-cultural, and environmental) in NL. The study has, thus, contributed to the growing body of knowledge on mining's impacts on community sustainability. Given that the study explored government (federal, and NL provincial) and industry mining policies on sustainable mining operations, it has also further expanded the literature on the opportunities that exist within the area of policy on mining community development in NL and Canada.

With regard to the policy implications of the study, it is my hope that the findings, conclusions, and recommendations made provide some useful information for the formulation, reformulation, or implementation of policies, programs, or initiatives related to mining and community sustainability in NL and beyond. For example, findings from the study have revealed some of the sustainability challenges faced by Baie Verte and how current policies have helped to address the current environmental challenges, but paid less attention to economic and socio-

cultural ones or to fully addressing previous environmental damages. Reflecting on the potentials of the recently launched federal and NL provincial sustainable mining policies (CMMP and Mining the Future 2030 Plan) to fill this policy gap, the study highlights the need for collaboration between government, industry and local community stakeholders to implement these plans.

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Appendix A: Informed Consent Form

Title: *Exploring Policy options for mining and community sustainability in Newfoundland: A case study of Baie Verte*

Researcher: *Rashidatu Mohammed Uthman, Environmental Policy Institute, Memorial University, Grenfell Campus, rmohammeduth@genfell.mun.ca*

You are invited to take part in a research project entitled *"Exploring Policy options for mining and community sustainability in Newfoundland: A case study of Baie Verte."*

This form is part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. It also describes your right to withdraw from the study at any time. In order to decide whether you wish to participate in this research study, you should understand enough about its risks and benefits to be able to make an informed decision. This is the informed consent process. Take time to read this carefully and to understand the information given to you. Please contact the researcher, Rashidatu Mohammed Uthman on rmohammeduth@grenfell.mun.ca or (709)216-9798 if you have any questions about the study or for more information not included here before you consent.

It is entirely up to you to decide whether to take part in this research. If you choose not to take part in this research or if you decide to withdraw from the research once it has started, there will be no negative consequences for you, now or in the future.

Introduction

I am a Masters' Student researcher from Grenfell Campus, Memorial University of Newfoundland. As part of my Masters' thesis, I am conducting research under the supervision of Dr. Kelly Vodden and Dr. John Dagevos entitled: "Exploring Policy options for mining and community sustainability in Newfoundland: A case study of Baie Verte."

Purpose of study

The purpose of this study is to understand the state of community sustainability in Baie Verte, identify the role of the mining industry, and explore policy options that can help reduce any negative impacts of mining and maximize its contribution on community sustainability. I am

interviewing people who have knowledge about these topics, with the aim to gather as much information as possible on the subject.

If you consent to participate in this interview, I will ask you about your knowledge on one or more of the following themes:

1. The state of community sustainability in Baie Verte.
2. The role of the mining industry on community sustainability in Baie Verte.
3. Policy related ideas that can help reduce the impact of mining and maximize its contribution on community sustainability.

The information gathered will be used for academic conference presentations and publications. The information will also be used to prepare a report on community sustainability assessment and policy recommendations for the town of Baie Verte.

Length of time

The interview will typically last between 30-60 minutes, but the actual length will depend on how much you have to say. I expect to conduct only one interview, but I may request a brief follow-up interview in person or by phone for added clarification.

Withdrawal from the study

Participation in the interview is free and voluntary. You may refuse to participate. You may refuse to answer specific questions. And you may decide to end the interview at any point without having any negative consequences now, or in the future.

Possible Benefits

Your participation in this research will contribute to the overall knowledge base for understanding the contributions of mining to community sustainability as well as ways by which those contributions can enhance community development.

Possible Risks

This study is of low risk to potential participants as it involves no physical, social, or financial risks. However, considering the fact that some aspects of the study focuses on the possible impacts of mining on community sustainability, the study may expose potential participants to psychological/emotional risks in instances where any existing costs of mining on community

sustainability are being discussed. This risk factor is acknowledged, and efforts will be made to make the research a minimal risk by giving potential participants the free will to skip questions that may make them psychologically or emotionally uncomfortable.

Anonymity

Efforts will be made in this research to ensure the anonymity of all participants, this will include not using your name in any written report or publication unless you explicitly state otherwise. However, considering the fact that Baie Verte is a small community, residents may be able to identify participants associated with certain comments.

Recording and Storage of Data

If you agree, interviews will be recorded by note taking and using a digital audio device. This will ensure all the information provide are accurately captured. All interviews will later be transcribed into Microsoft Word documents and be used for the analysis of data. Interview transcripts will be safely and securely stored in password-protected files. Interview notes will be stored in a locked filing cabinet, digitized later and then hardcopies destroyed. All digital interview data will be retained for up to 5 years after the completion of the project in accordance to Memorial University's research guidelines. To maintain confidentiality, each interview will be assigned a number and all original transcripts will be stored in a master list with the names of interviewees kept separate in password protected files. Only the researcher and research supervisory committee will have access to the interview files.

Sharing of Results

Results of this study will be compiled into a concise report and shared with the Baie Verte municipality, the mining companies and other participants upon their request. A comprehensive thesis report of this study will also be made available on Memorial University's online research repository. Sections of the thesis report will also be converted into academic conference papers and articles for journal publications.

Questions:

You are welcome to ask questions at any time during your participation in this research. If you would like more information about this study, please contact:

Rashidatu Mohammed Uthman

E-mail: rmohammeduth@grnefell.mun.ca

Phone: (709)216 -9798

OR

Dr. Kelly Vodden

E-mail: kvodden@grenfell.mun.ca

Phone: (709) 639-2703

Dr. John Dagevos

E-mail: j.f.l.m.m.dagevos@uvt.nl

Phone: +31 (13)466-2334

Ethical Research

The proposal for this research has been reviewed by the Grenfell Campus-Research Ethics Board and found to be in compliance with Memorial University's ethics policy. If you have ethical concerns about the research (such as the way you have been treated or your rights as a participant), you may contact the Chairperson of the GC-REB through the Grenfell Research Office (GCREB@grenfell.mun.ca) or by calling (709) 639-2399.

Consent

Your signature on this form means that:

- You have read the information about the research.
- You have been able to ask questions about this study.
- You are satisfied with the answers to all your questions.
- You understand what the study is about and what you will be doing.
- You understand that you are free to withdraw from the study at any time, without having to give a reason, and that doing so will not affect you now or in the future.
- You understand that any data collected from you up to the point of your withdrawal will be destroyed.

If you sign this form, you do not give up your legal rights and do not release the researchers from their professional responsibilities.

Your signature

I have read what this study is about and understood the risks and benefits. I have had adequate time to think about this and had the opportunity to ask questions and my questions have been answered.

- ___ I agree to participate in the research project understanding the risks and contributions of my participation, that my participation is voluntary, and that I may end my participation at any time.
- ___ I agree to be audio-recorded during the interview
- ___ I agree for interview notes to be taken
- ___ I understand that every reasonable effort will be made to assure my identity will be kept confidential and that my name will not be identified in any reports and publications without explicit permission. I also understand that in some circumstances, it may be difficult to assure my identity is not revealed.
- ___ I understand that if I indicate in the interview that there are certain comments I would like to be on the record, it means my name and affiliation can be included in any reports and publications where those comments are cited.
- ___ I agree to be contacted for follow-up interviews if further clarification is needed.
- ___ I hereby consent to participate in this study.

A copy of this Informed Consent Form has been given to me for my records.

_____ _____

Signature of participant **Date**

Researcher's Signature:

I have explained this study to the best of my ability. I invited questions and gave answers. I believe that the participant fully understands what is involved in being in the study, any potential risks of the study and that he or she has freely chosen to be in the study.

_____ _____

Signature of Principal Investigator **Date**

Appendix B: Interview Guide for Community Leaders/Community Organization Officials

Participant Code: _____
Date & Time: _____
Position/Role in Community: _____

Section A: Understanding Community Sustainability in Baie Verte and the Impact of Mining

I am going to ask you some questions on different aspects of community sustainability in Baie Verte. Based on your expertise, which of the following aspects of sustainability in Baie Verte would you prefer to talk about.

a. Ecological (Environmental Sustainability) (if (a), move to section A1)
b. Socio-Cultural Sustainability (if (b), move to section A2)
c. Economic Sustainability (if (c), move to section A3)
d. All aspects of Sustainability (if (all) ask questions from all sections)

Section A1: Ecological Sustainability and Impact of Mining

1. After reviewing and analyzing community documents (such as the Integrated Community Sustainability Plan, the Economic Action Plan, the Baie Verte Peninsula Thriving Regions Report), the following were identified as important components of ecological sustainability in Baie Verte: ***Water Quality, Air Quality, Ecosystem Health, Natural Resources, Waste Materials,*** *and* ***Land Use***
    a. To what extent do you agree that these are important ecological sustainability areas of concern in Baie Verte?
        i. Strongly agree
        ii. Agree
        iii. Somewhat Agree
        iv. Disagree
        v. Strongly Disagree

2. Would you please explain why (these issues are particularly important, or not)?
3. What other ecological issues do you think are important components of ecological sustainability in Baie Verte?

4. Do you think mining in Baie Verte has impacted any of the identified components in anyway? if so, please explain how?
5. Are there any policy measures that have been taken by any level of government (municipal, provincial, federal) to address these impacts (e.g. enhance positive impacts or minimize negative ones)?
6. Are there other measures that could be taken?
7. Do you have any other comments to make on the topic of mining and community sustainability in Baie Verte?
8. Is there anyone else you would suggest I talk to?

Section A2: Socio-Cultural Sustainability and Impact of Mining

1. After reviewing and analyzing community documents (such as the Integrated Community Sustainability Plan, the Economic Action Plan, the Baie Verte Peninsula Thriving Regions Report), the following were identified as important components of socio-cultural sustainability in Baie Verte: ***Population & Demography, Health & Wellbeing, Housing & Living Conditions, Education, Food Security, Sense of Place & Cultural Identity***
    a. To what extent do you agree that these are important socio-cultural sustainability areas of concern in Baie Verte?
        i. Strongly agree
        ii. Agree
        iii. Somewhat Agree
        iv. Disagree
        v. Strongly Disagree

2. Would you please explain why (these issues are particularly important, or not)?
3. What other socio-cultural issues do you think are important components of socio-cultural sustainability in Baie Verte?
4. Do you think mining in Baie Verte has impacted any of identified components in anyway? if so, please explain how?
5. Are there any policy measures that have been taken by any level of government (municipal, provincial, federal) to address these impacts (e.g. enhance positive impacts or minimize negative ones)?

6. Are there other measures that could be taken?
7. Do you have any other comments to make on the topic of mining and community sustainability in Baie Verte?
8. Is there anyone else you would suggest I talk to?

Section A3: Economic Sustainability and Impact of Mining

1. After reviewing and analyzing community documents (such as the Integrated Community Sustainability Plan, the Economic Action Plan, the Baie Verte Peninsula Thriving Regions Report), the following were identified as important components of economic sustainability in Baie Verte: ***Labour Market, Economic Structure, Knowledge Infrastructure (Education & Training),*** *and* ***Physical Infrastructure***
    a. To what extent do you agree that these are important economic sustainability areas of concern in Baie Verte?
        i. Strongly agree
        ii. Agree
        iii. Somewhat Agree
        iv. Disagree
        v. Strongly Disagree
2. Would you please explain why (these issues are particularly important, or not)?
3. What other economic issues do you think are important components of economic sustainability in Baie Verte?
4. Do you think mining in Baie Verte has impacted any of the identified components in anyway? if so, please explain how?
5. Are there any policy measures that have been taken by any level of government (municipal, provincial, federal) to address these impacts (e.g. enhance positive impacts or minimize negative ones)?
6. Are there other measures that could be taken?
7. Do you have any other comments to make on the topic of mining and community sustainability in Baie Verte?
8. Is there anyone else you would suggest I talk to?

Appendix C: Interview Guide: Government Officials

Participant Code: _____
Date & Time: _____
Position/Role: _____

Section A: Understanding Community Sustainability in Baie Verte and the Impact of Mining

Applicable to ONLY Municipal Government Officials

I am going to ask you some questions on different aspects of the future of community sustainability in Baie Verte. Based on your expertise, which of the following aspects of sustainability in Baie Verte would you prefer to talk about.

a. Ecological (Environmental Sustainability) (if (a), move to section A1)
b. Socio-Cultural Sustainability (if (b), move to section A2)
c. Economic Sustainability (if (c), move to section A3)
d. All aspects of Sustainability (if (all) ask questions from all sections)

Section A1: Ecological Sustainability and Impact of Mining

1. After reviewing and analyzing community documents (such as the Integrated Community Sustainability Plan, the Economic Action Plan, the Baie Verte Peninsula Thriving Regions Report), the following were identified as important components of ecological sustainability in Baie Verte: ***Water Quality***, ***Air Quality, Ecosystems, Natural Resources, Waste Materials*** *and* ***Land Use***

    a. To what extent do you agree that these are important ecological sustainability areas of concern in Baie Verte?

        i. Strongly agree
        ii. Agree
        iii. Somewhat Agree
        iv. Disagree
        v. Strongly Disagree

2. Would you please explain why (these issues are particularly important, or not)?
3. What other ecological issues do you think are important components of ecological sustainability in Baie Verte?

4. Do you think mining in Baie Verte has impacted any of the identified components in anyway? If so, please explain how?

Section A2: Socio-Cultural Sustainability and Impact of Mining

1. After reviewing and analyzing community documents (such as the Integrated Community Sustainability Plan, the Economic Action Plan, the Baie Verte Peninsula Thriving Regions Report), the following were identified as important components of socio-cultural sustainability in Baie Verte: ***Population & Demography, Health & Wellbeing, Housing & Living Conditions, Education, Food Security, Sense of Place & Cultural Identity***
    a. To what extent do you agree that these are important socio-cultural sustainability areas of concern in Baie Verte?
        i. Strongly agree
        ii. Agree
        iii. Somewhat Agree
        iv. Disagree
        v. Strongly Disagree
2. Would you please explain why (these issues are particularly important, or not)?
3. What other ecological issues do you think are important components of socio-cultural sustainability in Baie Verte?
4. Do you think mining in Baie Verte has impacted any of the identified components in anyway? if so, please explain how?

Section A3: Economic Sustainability and Impact of Mining

1. After reviewing and analyzing community documents (such as the Integrated Community Sustainability Plan, the Economic Action Plan, the Baie Verte Peninsula Thriving Regions Report), the following were identified as important components of economic sustainability in Baie Verte: ***Labour Market, Economic Structure, Knowledge Infrastructure,*** *and* ***Physical Infrastructure***
    a. To what extent do you agree that these are important economic sustainability areas of concern in Baie Verte?
        i. Strongly agree
        ii. Agree

iii. Somewhat Agree
iv. Disagree
v. Strongly Disagree

2. Would you please explain why (these issues are particularly important, or not)?
3. What other ecological issues do you think are important components of economic sustainability in Baie Verte?
4. Do you think mining in Baie Verte has impacted any of the identified components in anyway? if so, please explain how?

Section B: Exploring Government Policies on Mining and Community Sustainability

Applicable to BOTH Municipal & Provincial Government Officials

1. Are there any policies and or initiatives that have been used at the government level to address the impact of mining (reduce any negative impacts and enhance positive ones) on community sustainability in Baie Verte or in NL in general? If so, please explain. (if not so move to questions 6,7, 8 and 9)
2. How were the policies or initiatives developed?
3. How effective are those policies or initiatives in ensuring community sustainability in Baie Verte or NL in general?
    a. Very effective
    b. Somewhat effective
    c. Not effective
    d. Unsure
4. If answer to previous question is (a), please explain how?
5. If answer to previous question is (b, c, d), please explain why? and what might be done to improve the situation.
6. What policy ideas would you recommend for ensuring community sustainability in Baie Verte and other mining communities in Newfoundland?
7. Which actors should be involved in the policy development process?
8. What systems or processes should be put in place to make it effective?
9. Do you have any other comments to make on the topic of mining and community sustainability in Baie Verte or NL?
10. Is there anyone else you would suggest I talk to?

Appendix D: Interview Guide: Mining Company Officials

Participant Code: _____
Date & Time: _____
Position/Role in Company: _____

Section A: Understanding Community Sustainability in Baie Verte and the Impact of Mining

Section A1: Ecological Sustainability and Impact of Mining

After reviewing and analyzing community documents (such as the Integrated Community Sustainability Plan, the Economic Action Plan, the Baie Verte Peninsula Thriving Regions Report), the following were identified as important components of ecological sustainability in Baie Verte: ***Water Quality***, ***Air Quality, Ecosystems, Natural Resources, Waste Materials*** *and* ***Land Use***

1. Do you think mining in Baie Verte has impacted or contributed to any of those components in anyway? Please explain how?
2. Are there other ecological issues you consider as important to ecological sustainability in Baie Verte that you think mining has also impacted on or contributed to? Please explain?

Section A2: Socio-Cultural Sustainability and Impact of Mining

After reviewing and analyzing community documents (such as the Integrated Community Sustainability Plan, the Economic Action Plan, the Baie Verte Peninsula Thriving Regions Report), the following were identified as important components of ecological sustainability in Baie Verte: ***Population & Demography, Health & Wellbeing, Housing & Living Conditions, Education, Food Security, Sense of Place & Cultural Identity***

1. Do you think mining in Baie Verte has impacted or contributed any of those components in anyway? Please explain how?
2. Are there other socio-cultural issues you consider as important to socio-cultural sustainability in Baie Verte that you think mining has also impacted on or contributed to? Please explain?

Section A3: Economic Sustainability and Impact of Mining

After reviewing and analyzing community documents (such as the Integrated Community Sustainability Plan, the Economic Action Plan, the Baie Verte Peninsula Thriving Regions Report), the following were identified as important components of ecological sustainability in Baie Verte: ***Labour Market, Economic Structure, Knowledge Infrastructure,*** *and* ***Physical Infrastructure***

1. Do you think mining in Baie Verte has impacted or contributed to any of those components in anyway? Please explain how?
2. Are there other economic issues you consider as important to economic sustainability in Baie Verte that you think mining has also impacted on or contributed to? Please explain?

Section B: Exploring Corporate Policies on Mining and Community Sustainability

1. Are there any policies and or initiatives that have been used at the corporate level to address the impact of mining (reduce any negative impacts and enhance positive ones) on community sustainability in Baie Verte or in NL in general? If so, please explain. (if not so move to questions 6,7, and 8)
2. How were the policies or initiatives developed?
3. How effective are those policies or initiatives in ensuring community sustainability in Baie Verte?
    a. Very effective
    b. Somewhat effective
    c. Not effective
    d. Unsure
4. If answer to previous question is (a), please explain how?
5. If answer to previous question is (b, c, d), please explain why? and what might be done to improve them.
6. What policy ideas would you recommend for ensuring community sustainability in Baie Verte and other mining communities in Newfoundland?
7. Which actors should be involved in the policy development process?
8. What systems or processes should be put in place to make it /them effective?

9. Do you have any other comments to make on the topic of mining and community sustainability in Baie Verte or NL?
10. Is there anyone else you would suggest I talk to?

Appendix E: Sustainability Balance Sheet for Baie Verte

E1: Fact Sheet for Economic Capital of Baie Verte

Name of Stocks	Goals	Description of Indicators	Geographical Level of Measurement	Unit of Measurement	Measured Value	Data Source
Labour Market	Ensure the availability of adequate employment opportunities for all residents	Employment rate for population 15 years and older	Municipal	Percentage (%)	44.6	Community Accounts (2016)
		Unemployment rate for population 15 years and older	Municipal	Percentage (%)	18.3	Community Accounts (2016)
		Labour force participation rate	Municipal	Percentage (%)	55.7	Community Accounts (2016)
		Self reliance ratio	Municipal	Percentage (%)	79.6	Community Accounts (2016)
Economic Structure	Continue to support the growth of the mining industry	Percentage of population 15years and above employed in mining and related sector	Municipal	Percentage (%)	16.2	Statistics Canada (2016)
		Percentage of sample residents who consider mining as significant to economic development in Baie Verte	Municipal	Percentage (%)	92.8	Baie Verte Community Survey (2018- 2019)
		Percentage of sample residents satisfied with municipal support of the mining industry	Municipal	Percentage (%)	52.2	Baie Verte Community Survey (2018-2019)
	Diversify economy by supporting the development of other industries (forestry, fishery, tourism, etc.)	Percentage of population 15years and above employed in the agriculture, forestry, and fisheries sector	Municipal	Percentage (%)	7.8	Statistics Canada (2016)
		Percentage of sample residents satisfied with municipal support for the development of other industries	Municipal	Percentage (%)	52.2	Baie Verte Community Survey (2018)
Knowledge Infrastructure	Promote training and skills development programs relevant to industry	Number of training colleges	Municipal	Number	1	Town of Baie Verte (2019)
		Average number of industry relevant training and skills course offerings per year	Municipal	Number	1	College of North Atlantic, Baie Verte (2018)
		Average number of student enrolment per year	Municipal	Number	15	College of North Atlantic, Baie Verte (2018)
		Percentage of population 15 years and above with certificate or diploma in apprenticeship or trades	Municipal	Percentage (%)	28	Statistics Canada (2016)

Physical Infrastructure	Preserve town's pristine nature and culture through beautification	Number of outdoor recreational facillities	Municipal	Number	5	Baie Verte Economic Action Plan (2004)
		Number of indoor recreational facillities	Municipal	Number	3	Baie Verte Economic Action Plan (2004)
		Percentage of sample residents satisfied with municipality's town beautification efforts	Municipal	Percentage (%)	40.5	Baie Verte Community Survey (2018-2019)
	Enhance transportation infrastructure	Total length of roads	Municipal	Kilometers	16	Baie Verte Economic Action Plan (2004)
		Total length of road that require maintenance	n/a	n/a	n/a	n/a
		Frequency of major road maintenance works	Municipal	Years	5 - 10	Baie Verte Town Office (2018)
		Percentage of sample residents satisfied with transportation infrastructure	Municipal	Percentage (%)	19.6	Baie Verte Community Survey (2018-2019)
	Enhance communication infrastructure	Number of communication networks	Municipal	Number	4	Baie Verte Economic Action Plan (2004)
		Network speed	Municipal	Kbps - Mbps	56 - 1.5	Baie Verte Economic Action Plan (2004)
		Percentage of sample residents satisfied with communication infrastructure	Municipal	Percentage (%)	21.5	Baie Verte Community Survey (2018-2019)

E2: Fact Sheet for Socio-Cultural Capital of Baie Verte

Name of Stocks	Goals	Description of Indicators	Geographical Level of Measurement	Unit of Measurement	Measured Value	Data Source
Population & Demography	Ensure population stabilization	Population growth rate	Municipal	Percentage (%)	(-) 7.8	Community Accounts (2016)
		Birth rate index	Municipal	Percentage (%)	8.4	Community Accounts (2016)
		Residual net-migration	Municipal	Percentage (%)	(-) 0.22	Community Accounts (2015)
	Enhance youth rentention	Median age	Municipal	Years	48	Community Accounts (2015)
		Percentage of population 54yrs and younger	Municipal	Percentage (%)	60	Community Accounts (2016)
		Percentage of population 55yrs and older	Municipal	Percentage (%)	40	Community Accounts (2011)
Health & Well-Being	Ensure good physical, emotional, and mental health among residents	Percentage of population who have access to a physician for their physical, emotional, or mental health	Municipal	Percentage (%)	94	Community Accounts (2013-2014)
		Percentage of sample residents staisfied with healthcare	Municipal	Percentage (%)	75.9	Baie Verte Community Survey (2018-2019)
	Ensure residents have adequate access to healthcare	Median death age	Municipal	Years	80	Community Accounts (2016)
		Percentage of hospital morbidity in Rural Secretariat Region (over 3 years period)	Regional	Percentage (%)	6	Community Accounts (2014)
		Percentage of residents aged 12yrs and older who rate their health status as execellent or very good	Municipal	Percentage (%)	64.9	Community Accounts (2016)
		Percentage of residents aged 12yrs and older who rate their mental health as execellent or very good	Municipal	Percentage (%)	54.2	Community Accounts (2014)

Housing & Living Conditions	Enhance the development of housing	Land size available for residential development	Municipal	Square Kilometer (sqkm)	2.25	Town of Baie Verte (2004)
		Percentage of private dwellings constructed between 2011-2016	Municipal	Percentage (%)	7.3	Statistics Canada (2016)
	Ensure housing availability and affordability for all residents	Average monthly cost of shelter for homeowners	Municipal	Canadian Dollars	621	National Household Survey (2011)
		Average monthly cost of shelter for renters	Municipal	Canadian Dollars	716	National Household Survey (2011)
		Percentage of owner households spending more than 30% of household income on shelter	Municipal	Percentage (%)	3.6	National Household Survey (2011)
		Percentage of tenant households spending more than 30% of household income on shelter	Municipal	Percentage (%)	26.9	National Household Survey (2011)
Education	Ensure residents have access to high-quality primary & secondary education	Percentage of residents aged 15yrs and above with at least a high school diploma	Municipal	Percentage (%)	75.7	Community Accounts (2011)
		Number of elementary and high school	Municipal	Number	1	Baie Verte Economic Action Plan (2004)
		Number of post-secondary institution	Municipal	Number	1	Baie Verte Economic Action Plan (2004)
	Encourage residents to pursue post-secondary education	Percentage of residence aged 15years and above with bachelor's degree or higher	Municipal	Percentage (%)	10.4	Community Accounts (2011)
Sense of Place & Cultural Identity	Ensure good residents community connectedness	Percentage of residents who feel very strong or somewhat strong sense of belonging to their community	Municipal	Percentage (%)	92.3	Community Accounts (2016)
		Percentage of residents who feel very satisfied or satisfied with life in general	Municipal	Percentage (%)	88.8	Community Accounts (2016)
	Protect cultural heritage and local identity	Number of heritage sites	Municipal	Number	2	Baie Verte Economic Action Plan (2004)
		Percentage of sample residents who felt the cultural heritage and local identity of Baie Verte was being protected	Municipal	Percentage (%)	85.9	Baie Verte Community Survey (2018)
Participation & Governance	Increase residents' involvement in local governance	Municipal election voter turnout	Provincial	Percentage (%)	49	NL Vital Signs (2018)
		Percentage of sample residents satisfied with municpal performance	Municipal	Percentage (%)	60	Baie Verte Community Survey (2018)
	Enhance residents' participation in community through volunteerism	Number of community volunteer groups	Municipal	Number	40	Baie Verte Town Office (2018)
		Volunteerism rate	Provincial	Percentage (%)	46.4	NL Vital Signs (2016)

E3: Fact Sheet for Ecological Capital of Baie Verte

Name of Stocks	Goals	Description of Indicators	Geographical Level of Measurement	Unit of Measurement	Measured Value	Data Source
Water Quality Use and Infrastructure	Ensure that all residents have uninterrupted access to quality drinking water	Number of long-term boil water advisories (over 1 year) in the past five years	Municipal	Number	0	NL Water Resources Portal (2019)
		Number of water treatment facility	Municipal	Number	1	Baie Verte ICSP (2010)
		Average THM concentration in drinking water 2017/2018	Municipal	microgram/litre (µg/l)	113.5	NL Water Resources Portal (2018)
		Age of water distribution infrastructure	Municipal	Years	40+	Baie Verte Economic Action Plan (2004)
		Volume of water lost due to leaking or damaged pipelines	N/A	N/A	N/A	N/A
		Percentage of sample resident satisfied with drinking water quality	Municipal	Percentage (%)	52.3	Baie Verte Community Survey (2018-2019)
	Ensure that wastewater is treated prior to disposal	Average load of sweage	Municipal	tonnes	173,000	NL Department of Municipal Affairs and Environment (2017)
		Number of sewage treatment facility	Municipal	Number	0	Baie Verte ICSP (2010)
		Age of sewage treatment facility	Municipal	Age	45	NL Department of Municipal Affairs and Environment (2017)
		Combined average value of CBOD (Carbonaceous Biochemical Oxygen Demand) substances in sewage outfall in 2018	Municipal	metres/litre (m/l)	47.25	Town of Baie Verte (2018)
		Combined average volume of suspended solids in sewage outfall in 2018	Municipal	metres/litre (m/l)	39.25	Town of Baie Verte (2018)
Air Quality	Ensure good local air quality for all residents	Air Quality Health Index	Regional	range	2-3	Environment Canada (2019)
	Reduce GHGs emmisions	Green house gas emissions per capita	n/a	n/a	n/a	n/a
		Total muncipal carbon footprint	Municipal	tonnes	1,766	Town of Baie Verte (2017)
		Percentage of sample resident always engaged in household energy conservation	Municipal	Percentage (%)	44.4	Baie Verte Community Survey (2018-2019)

Ecosystems Health & Protection	Ensure terrestrial ecosystem is preserved	Protected forest reserves per sqkm	Municipal	Square Kilometer (sqkm)	67.5	Baie Verte Land Use zoning (2018)
		Number of provincial parks reserves	Municipal	Number	1	NL Department of Tourism, Culture, Industry, and Innovation (2018)
		Number of national parks reserves	Municipal	Number	0	NL Department of Tourism, Culture, Industry, and Innovation (2018)
	Ensure aquatic ecosytem is preserved	Marine conserved/protected areas per sqkm	Municipal	Square Kilometer (sqkm)	0.035	Baie Verte Land Use zoning (2018)
Land Use	Ensure land availability for the development of the agricultural sector	Total land size allocated for agricultural development	Municipal	Square Kilometer (sqkm)	1.61	Baie Verte Land Use zoning (2018)
		Percentage of residents engaged in the agricultural sector	Municipal	Percentage	7.8	Statistics Canada (2016)
	Ensure land availability for the development of local businesses	Total land size available for business developments	Municipal	Square Kilometer (sqkm)	0.62	Baie Verte Land Use zoning (2018)
		No of local businesses	Municipal	Number	70	Town of Baie Verte (2019)
		Local Business Development Index	n/a	n/a	n/a	n/a
	Ensure land availaibility for residential developments	Total land size available for residential developments	Municipal	Square Kilometer (sqkm)	2.25	Baie Verte Land Use zoning (2018)
		Rate of housing developments between 2011-2016	Municipal	Percentage	7.3	Statistics Canada (2016)
	Ensure land availability for the development of tourism and recreational facilities	Total land size allocated for tourism and recreational facilities developments	Municipal	Square Kilometer (sqkm)	0.46	Baie Verte Land Use zoning (2018)
		Number of tourism/recreational facilities	Municipal	Number	9	Town of Baie Verte (2018)
		Percentage of sample resident who identified landuse as challenging sustainability concern	Municipal	Percentage (%)	87.3	Baie Verte Community Survey (2018-2019)
Waste Materials Management	Reduce waste generation	Waste generation per capita	n/a	n/a	n/a	n/a
		Dumpsite waste volume per week	Municpal	tonnes	120	Town of Baie Verte (2019)
		Percentage of sample resident engaged in household waste reduction	Municipal	Percentage (%)	38.5	Baie Verte Community Survey (2018-2019)
	Enhance waste diversion	Number of Green Depot	Municipal	Number	1	Baie Verte Town Office (2018)
		Number of Community Composter	Municipal	Number	0	Baie Verte Town Office (2018-2019)
		Percentage of sample resident always engaged in houeshold recycling	Municipal	Percentage (%)	90.3	Baie Verte Community Survey (2018-2019)

Appendix F: Comparison Balance Sheet

F1: Comparison Fact Sheet for Economic Capital

Name of Stocks	Goals	Description of Indicators	Unit of Measurement	Baie Verte	Buchans	St.Lawrence	Wabush	NL	Canada	Data Source
Labour Market	Ensure the availability of adequate employment opportunities for all residents	Employment rate for population 15 years and older	Percentage (%)	44.6	23.6	43.4	64.2	49.5	60.2	Community Accounts (2016)
		Unemployment rate for population 15 years and older	Percentage (%)	18.3	27.5	19.6	11.3	15.6	7.7	Community Accounts (2016)
		Labour force participation rate	Percentage (%)	55.7	-	-	72.2	58.7	65.8	Community Accounts (2016)
		Self reliance ratio	Percentage (%)	79.6	64.3	72.1	-	80.6	86.6	Community Accounts (2016)
Economic Structure	Continue to support the growth of the mining industry	Percentage of population 15years and above employed in mining and related sector	Percentage (%)	16.2	7.6	4.9	24.2	3.8	1.5	Statistics Canada (2016)
		Percentage of sample residents who consider mining as significant to economic development in Baie Verte	Percentage (%)	92.8	-	-	-	-	-	Baie Verte Community Survey (2018- 2019)
		Percentage of sample residents satisfied with municipal support of the mining industry	Percentage (%)	52.2	-	-	-	-	-	Baie Verte Community Survey (2018-2019)
	Diversify economy by supporting the development of other industries (forestry, fishery, tourism, etc.)	Percentage of population 15years and above employed in the agriculture, forestry, and fisheries sector	Percentage (%)	7.8	0	7.8	0	3.4	2.4	Statistics Canada (2016)
		Percentage of sample residents satisfied with municipal support for the development of other industries	Percentage (%)	52.2	-	-	50	34.4	-	Baie Verte Community Survey (2018)

Knowledge Infrastructure	Promote training and skills development programs relevant to industry	Number of training colleges	Number	1	0	0	0	17	-	CNA (2019)
		Average number of industry relevant training and skills course offerings per year	Number	1	-	-	-	-	-	College of North Atlantic, Baie Verte (2018)
		Average number of student enrolment per year	Number	15	-	-	-	-	-	College of North Atlantic, Baie Verte (2018)
		Percentage of population 15 years and above with certificate or diploma in apprenticeship or trades	Percentage (%)	28	38	41	47.1	22	17.7	Statistics Canada (2016)
Physical Infrastructure	Preserve town's pristine nature and culture through beautification	Number of outdoor recreational facillities	Number	5	-	-	-	-	-	Baie Verte Economic Action Plan (2004)
		Number of indoor recreational facillities	Number	3	-	-	-	-	-	Baie Verte Economic Action Plan (2004)
		Percentage of sample residents satisfied with municipality's town beautification efforts	Percentage (%)	40.5	-	-	-	-	-	Baie Verte Community Survey (2018-2019)
	Enhance transportation infrastructure	Total length of roads	Kilometers	16	-	-	-	-	-	Baie Verte Economic Action Plan (2004)
		Total length of road that require maintenance	n/a	n/a	-	-	-	-	-	n/a
		Frequency of major road maintenance works	Years	5 - 10	-	-	-	-	-	Baie Verte Town Office (2018)
		Percentage of sample residents satisfied with transportation infrastructure	Percentage (%)	19.6	-	-	-	-	-	Baie Verte Community Survey (2018-2019)
	Enhance communication infrastructure	Number of communication networks	Number	4	-	-	-	-	-	Baie Verte Economic Action Plan (2004)
		Network speed	Kbps - Mbps	56 - 1.5	-	-	-	-	-	Baie Verte Economic Action Plan (2004)
		Percentage of sample residents satisfied with communication infrastructure	Percentage (%)	21.5	-	-	-	-	-	Baie Verte Community Survey (2018-2019)

F2: Comparison Fact Sheet for Socio-Cultural Capital

Name of Stocks	Goals	Description of Indicators	Unit of Measurement	Baie Verte	Buchans	St.Lawrence	Wabush	NL	Canada	Data Source
Population & Demography	Ensure population stabilization	Population growth rate	Percentage (%)	(-) 7.8	(-) 7.9	(-) 4.4	(+) 2.4	(+) 1.0	(+) 5.0	Community Accounts (2016)
		Birth rate index	Percentage (%)	8.4	-	0.8	10.5	7.6	-	Community Accounts (2016)
		Residual net-migration	Percentage (%)	(-) 0.22	(+) 1.59	(-) 3.25	(-) 4.0	(+) 0.63	(+) 0.75	Community Accounts (2015)
	Enhance youth rentention	Median age	Years	48	60	51	36	46	41	Community Accounts (2015)
		Percentage of population 54yrs and younger	Percentage (%)	60	40	57	81	58	69	Community Accounts (2016)
		Percentage of population 55yrs and older	Percentage (%)	40	60	43	19	42	31	Community Accounts (2011)
Health & Well-Being	Ensure residents have adequate access to healthcare	Percentage of population who have access to a physician for their physical, emotional, or mental health	Percentage (%)	94	-	87.9	68.7	78.9	75.3	Community Accounts (2013-2014)
		Percentage of sample residents staisfied with healthcare	Percentage (%)	75.9	-	-	-	-	-	Baie Verte Community Survey (2018-2019)
	Ensure good physical, emotional, and mental health of residents	Median death age	Years	80	80	80	67	78	81	Community Accounts (2016)
		Percentage of hospital morbidity in Rural Secretariat Region (over 3 years period)	Percentage (%)	6	4	27	9	1.7	-	Community Accounts (2014)
		Percentage of residents aged 12yrs and older who rate their health status as execellent or very good	Percentage (%)	64.9	62.8	62	81.6	62	61.5	Community Accounts (2016)
		Percentage of residents aged 12yrs and older who rate their mental health as execellent or very good	Percentage (%)	54.2	39.9	-	55	73.5	71.1	Community Accounts (2014)
Housing & Living Conditions	Enhance the development of housing	Land size available for residential development	Square Kilometer (sqkm)	2.25	-	-	-	-	-	Baie Verte Land Use Zonig Map
		Percentage of private dwellings constructed between 2011-2016	Percentage (%)	7.3	-	3.1	9.5	7.3	6.9	Statistics Canada (2016)
	Ensure housing availability and affordability for all residents	Average monthly cost of shelter for homeowners	Canadian Dollars	621	446	688	1,262	984	1,313	National Household Survey (2011)
		Average monthly cost of shelter for renters	Canadian Dollars	716	603	677	915	836	1,002	National Household Survey (2011)
		Percentage of owner households spending more than 30% of household income on shelter	Percentage (%)	3.6	10.2	8.4	9.4	10.6	16.6	National Household Survey (2011)
		Percentage of tenant households spending more than 30% of household income on shelter	Percentage (%)	26.9	-	25	-	39.4	40	National Household Survey (2011)

Education	Ensure residents have access to high-quality primary & secondary education	Percentage of residents aged 15yrs and above with at least a high school diploma	Percentage (%)	75.7	66.4	79.9	88.6	76.6	81.7	Community Accounts (2011)
		Number of elementary and high school	Number	1	1	1	1	258	-	NL English Schools District (2019)
		Number of post-secondary institution campuses	Number	1	0	0				
	Encourage residents to pursue post-secondary education	Percentage of residence aged 15years and above with bachelor's degree or higher	Percentage (%)	10.4	6.6	8.5	9.1	14.8	23.3	Community Accounts (2011)
Sense of Place & Cultural Identity	Ensure good residents community connectedness	Percent of residents who feel very strong or somewhat strong sense of belonging to their community	Percentage (%)	92.3	83.7	85.2	84.8	79.6	-	Community Accounts (2016)
		Percent of residents who feel very satisfied or satisfied with life in general	Percentage (%)	88.8	87.9	93.2	96.3	-	-	Community Accounts (2016)
	Protect cultural heritage and local identity	Number of heritage sites	Number	2	-	-	-	-	-	Baie Verte Economic Action Plan (2004)
		Percentage of sample residents who felt the cultural heritage and local identity of Baie Verte was being protected	Percentage (%)	85.9	-	-	-	-	-	Baie Verte Community Survey (2018)
Participation & Governance	Increase residents' involvement in local governance	Municipal election voter turnout	Percentage (%)	49	-	-	-	49		NL Vital Signs (2018)
		Percentage of sample residents satisfied with municpal performance	Percentage (%)	60	-	-	-	-	-	Baie Verte Community Survey (2018)
	Enhance residents' participation in community through volunteerism	Number of community volunteer groups	Number	40	-	-	-	-	-	Baie Verte Town Office (2018)
		Volunteerism rate	Percentage (%)	n/a	n/a	n/a	n/a	46.4	43.6	Harris Centre (2015)

F3: Comparison Fact Sheet for Ecological Capital

Name of Stocks	Goals	Description of Indicators	Unit of Measurement	Baie Verte	Buchans	St.Lawrence	Wabush	NL	Canada	Data Source
Water Quality Use and Infrastructure	Ensure that all residents have uninterrupted access to quality drinking water	Number of long-term boil water advisories (over 1 year) in the past five years	Number	0	0	0	0			NL Water Resources Portal (2019)
		Number of water treatment facility	Number	1	1	1	1	-	-	NL Department of Municipal Affairs and Environment (2017)
		Average THM concentration in drinking water 2017/2018	microgram/litre (µg/l)	113.5	80.35	102	85.7	-	-	NL Water Resources Portal (2018)
		Age of water distribution infrastructure	Years	40+	-	-	-	-	36.8	Baie Verte Economic Action Plan (2004); Gagnon et al, 2008
		Volume of water lost due to leaking or damaged pipelines	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		Percentage of sample resident satisfied with drinking water quality	Percentage (%)	52.3	-	-	-	-	-	Baie Verte Community Survey (2018-2019)
	Ensure that wastewater is treated prior to disposal	Average load of sweage	tonnes	173,000	18,360	-	869,850	-	-	NL Department of Municipal Affairs and Environment (2017)
		Number of sewage treatment facility	Number	0	0	0	0			Baie Verte ICSP (2010)
		Age of sewage treatment facility	Year	45	7	-	4	-	-	NL Department of Municipal Affairs and Environment (2017)
		Combined average value of CBOD (Carbonaceous Biochemical Oxygen Demand) substances in sewage outfall in 2018	metres/litre (m/l)	47.25	-	-	-	-	-	Town of Baie Verte (2018)
		Combined average volume of suspended solids in sewage outfall in 2018	metres/litre (m/l)	39.25	-	-	-	-	-	Town of Baie Verte (2018)
Air Quality	Ensure good local air quality for all residents	Historical Air Quality Health Index	range	2-3	2-3	2-3	2-3	2-3	2-3	Environment Canada (2019)
	Reduce GHGs emmisions	Green house gas emissions per capita	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		Total muncipal carbon footprint	tonnes	1,766	n/a	n/a	n/a	n/a	n/a	Town of Baie Verte (2017)
		Percentage of sample resident always engaged in household energy conservation	Percentage (%)	44.4	-	-	-	-	-	Baie Verte Community Survey (2018-2019)

Ecosystems Health & Protection	Ensure terrestrial ecosystem is preserved	Protected forest reserves per sqkm	Square Kilometer (sqkm)	67.5	-	-	-	-	-	Baie Verte Land Use zoning (2018)
		Number of provincial park reserves	Number	1	0	0	0	10	-	NL Department of Tourism, Culture, Industry, and Innovation (2018)
		Number of national park reserves	Number	0	0	0	0	1	39	NL Department of Tourism, Culture, Industry, and Innovation (2018)
	Ensure aquatic ecosytem is preserved	Marine conserved/protected areas per sqkm	Square Kilometer (sqkm)	0.035	-	-	-	-	-	Baie Verte Land Use zoning (2018)
Land Use	Ensure land availability for the development of the agricultural sector	Total land size allocated for agricultural development	Square Kilometer (sqkm)	1.61	-	-	-	-	-	Baie Verte Land Use zoning (2018)
		Percentage of residents engaged in the agricultural sector	Percentage	7.8	0	7.8	0	3.4	2.4	Statistics Canada (2016)
	Ensure land availability for the development of local businesses	Total land size available for business developments	Square Kilometer (sqkm)	0.62	-	-	-	-	-	Baie Verte Land Use zoning (2018)
		No of local businesses	Number	70	-	-	-	-	-	Town of Baie Verte 2019
		Local Business Development Index	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Ensure land availaibility for residential developments	Total land size available for residential developments	Square Kilometer (sqkm)	2.25	-	-	-	-	-	Baie Verte Land Use zoning (2018)
		Rate of housing developments between 2011-2016	Percentage	7.3	-	3.1	9.5	7.3	6.9	Statistics Canada (2016)
	Ensure land availability for the development of tourism and recreational facilities	Total land size allocated for tourism and recreational facilities developments	Square Kilometer (sqkm)	0.46	-	-	-	-	-	Baie Verte Land Use zoning (2018)
		Number of tourism/recreational facilities	Number	9	-	-	-	-	-	Town of Baie Verte (2018)
		Percentage of sample resident who identified landuse as challenging sustainability concern	Percentage (%)	87.3	-	-	-	-	-	Baie Verte Community Survey (2018-2019)
Waste Materials Management	Reduce waste generation	Average waste generation per capita	Kilograms (kg)	n/a	n/a	n/a	n/a	743	720	Conference Board of Canada (2012)
		Dumpsite waste volume per week	tonnes	120	-	-	-	-	-	Town of Baie Verte (2019)
		Percentage of sample resident engaged in household waste reduction	Percentage (%)	38.5	-	-	-	-	-	Baie Verte Community Survey (2018-2019)
	Enhance waste diversion	Number of Green Depot	Number	1	1	0	1	56	-	Green Depot NL (2019)
		Number of Community Composter	Number	0	-	-	-	-	-	Baie Verte Town Office (2018-2019)
		Percentage of sample resident always engaged in houeshold recycling	Percentage (%)	90.3	-	-	-	-	-	Baie Verte Community Survey (2018-2019)