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HOW TO LEAD FROM THE TOP: SUPPORT TO CANADIAN ARMED FORCES EXTENDED OPERATIONS IN THE ARCTIC

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Master of Defence Studies

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ABSTRACT

The issue of climate change is affecting the world, and this is no different than the challenges currently presented in the Canadian Arctic. This paper aims to address the research question: how does the changing arctic environment impact support to the defence of the Canadian Arctic? The broader concept of the environment expressed here is not only the physical and climatic environment, but also the subsequent effects such as increased competition, and thus a potential for increased threats to Canadian safety, security, and sovereignty. The 2019 Government of Canada framework policy for the Canadian Arctic and northern Canada was put into place to shape and direct change in the region, but lacks specific details which govern the Canadian Armed Forces response. This paper will address those issues which are specific to the research question, in particular, the *support to defence operations* in northern Canada.

Key concerns being addressed in relation to supporting such defence operations are direction required from the Government of Canada, required policy changes, the environment (isolated geography, austere conditions, competition, and reaction by the tri-polar states – Russia, China and the United States), as well as funding and resource considerations. There are certain limitations in what the Canadian Armed Forces can achieve outside of receiving more detailed direction and governance from the Government of Canada – this becomes evident in the research conducted. Also of utmost importance is the need to work in collaboration with other governmental departments (both federal and provincial/territorial), industry, local communities, as well as international partners and allies, given the severity of the aforementioned environment. With proper attention from the Government of Canada, and a re-envisioning of current CAF priorities and general disposition, an increased CAF presence and its associated support operations are possible in the Canadian Arctic and across northern Canada.

DEFINITIONS

Arctic operations: Any military operations conducted in the North or Arctic, North of the 50° latitude, to include the military activity itself and all of its support requirements such as logistics and engineering. These operations are considered synonymous with winter warfare operations in the context of this paper.

Environment: The surroundings, to include aspects of land, water, and air, as well as weather conditions. The environment is also encompassing of the social influences (i.e., competition for resources and economic gains) which might be shaped by the physical environment (i.e., ice melt and more accessible waterways). This is the context in which the research question is developed.

Extended operations: These are prolonged military operations. Such operations are considered synonymous with sustained operations in the context of this paper.

Northern CAF Installations: Specific geographic locales where infrastructure belongs to the Canadian Armed Forces (CAF), or is rented by the CAF, in order to conduct military employment. These installations are found in the Canadian Arctic, or North of the 50° latitude.

Northern Canada: This defines the Canadian geography North of the 50° latitude, but mostly the Canadian Territories – Yukon, Northwest Territories, and Nunavut. In the context of this paper, these terms will be used interchangeably with the *Canadian Arctic*.

Support: In accordance with Canadian doctrine, "In sustainment, administrative and logistic aid provided to a formation, to a unit, or to an individual."[1] The varying activities which make-up support within the CAF are: logistics, contracting, vehicle and equipment maintenance, military engineering, communication and information, military police, health, and personnel services.

Support Infrastructure: As per the definition of *support* within the context of this paper, support infrastructure is any infrastructure which is required to execute support tasks.

Sustainment: In accordance with Canadian doctrine, this is "the ability of a nation or a force to maintain effective military power to achieve desired effects".[2]

Sustained operations: These are military operations which run consistently over a prolonged period of time. In the context of this paper, the specific timeline is associated with operations which persistent for longer than six months.

Winter Warfare Operations: These are cold-weather military operations conducted in an Arctic-like environment (i.e., austere conditions of snow and ice). These operations are considered synonymous with Arctic operations in the context of this paper.

[1] Government of Canada, *Canadian Forces Joint Publication 4-0 – Support, 1st Edition*, (Ottawa: Canadian Joint Operations Command), 6 Oct 2016, p.GL-9.

[2] Ibid, p.GL-10.

INTRODUCTION

Climate change is changing the design of globalized economic networks. It is impacting the fast-expanding accessibility to the Arctic region, and having a ripple effect into business and industry across the world. With this emerging accessibility cutting down significant shipping distances by using the Northern Sea Route (NSR) or Northwest Passage through the Arctic, as opposed to the southern route through the Suez Canal, businesses will continue to look to pad their profit margins by considering the NSR and Northwest Passage in their business' future. Amidst the foreseeable increased accessibility of the Arctic waterways will be an increased presence, of both civilian and government/military vessels, conducting anything from distribution activities for businesses, to Arctic academic research, to sovereignty patrols. Due to the inevitable increase in traffic in the Arctic, the Government of Canada must consider what impacts this will have on Canada at large. As the Canadian Defence Policy looks for Canada to be "Strong at home […], Secure in North America […], and Engaged in the World"[3], the Canadian Armed Forces (CAF) will also continue to increase its interest, knowledge-base and footprint in the Canadian Arctic in order to meet this mandate.

This paper will address the research question: how does the changing arctic environment impact support to the defence of the Canadian Arctic? The research question addresses the arctic environment from the perspective of not only climate change, but also the subsequent secondary and tertiary effects where accessibility to navigable waterways and economic prosperity are concerned. Also, the research question examines the current support mechanisms and infrastructure that are in place to sustain CAF operations in the Arctic, and determines their feasibility over longer term (i.e., 6 month+) operations with increased amount of CAF personnel.

[3] Government of Canada, *Strong, Secure, Engaged: Canada's Defence Policy* (Ottawa: Department of National Defence), 2017, p 14.

Chapter 1 will detail what is currently known of the essential background information required to properly analyze the research question as it is applied to the Canadian Arctic/north. Following that, chapter 2 will detail what infrastructure (to include military, civilian and other governmental departments) is currently available in northern Canada in order to assess its feasibility for longer term, sustained CAF or whole of government operations. Chapter 3 will dive deeper into current CAF sustainment practices which are currently in place and how this might be further developed with existing local industry. Chapter 4 will highlight some potential gaps in current plans where already strained, existing support operations would be exacerbated by an increase in CAF personnel and longer durations. Chapter 5 will make recommendations to address these gaps over the near (1-5 years) and long (5+ years) term. Lastly, chapter 6 will summarize and conclude the findings and recommendations made throughout the paper.

CHAPTER 1 - BACKGROUND

Though climate change remains a contested topic in some forums, there is a significant amount of scientific evidence and academic literature indicating that the globe is warming quicker than what was predicted years ago[4]. In fact, the Council of Canadian Academies (CCA), using a panel of eight experts and an additional 17 workshop participants, produced a document

[4] Literature on the Arctic submits or acknowledges that climate change is warming the globe faster than scientists had predicted, such as: M. Bennett, "The Arctic Shipping Route No One's Talking About", *The Maritime Executive* (Fort Lauderdale: The Maritime Executive, LLC), 5 Aug 2019. Accessed 9 Feb 2020 at: https://www.maritime-executive.com/editorials/the-arctic-shipping-route-no-one-s-talking-about. It is even recognized in China's Arctic Policy, "Global warming in recent years has accelerated the melting of ice and snow in the Arctic region. As economic globalization and regional integration further develops and deepens, the Arctic is gaining global significance […] The Arctic situation now goes beyond its original inter-Arctic States". People's Republic of China, *China's Arctic Policy – White Paper* (Beijing: Government Headquarters), Jan 2018. Accessed online 9 Feb 2020: http://english.www.gov.cn/archive/white_paper/2018/01/26/content_281476026660336.htm.

in 2019 regarding climate change risks and the potential to adapt to those changes.[5] Specifically, the CCA submits that:

> Recent reports point out that Canada is warming at a rate roughly double that of the rest of the world. For northern parts of the country the warming trend is nearly three times the world rate. Global greenhouse gas concentrations continue to increase spurred by global energy use which increased at a rate of 2.3% in 2018. The burning of fossil fuels provided the energy for most of this increase. Global emissions will continue to rise, and Canada's warming will continue its upward trend.[6]

With these factors in mind, there is a necessity to look at associated timelines, in particular as it relates to the Arctic waterways, as this will be the driving factor behind an increase in shipping traffic in areas such as the NSR and the Northwest Passage. Current predictions, based on the literature (and as seen in Figure 1), assess that the waterways in the Arctic will be completely ice-free for multiple months of navigable season anywhere from 2035 to mid-21st century.[7,8,9] A deduction from this trend is that, over the next 15+ years, all eight Arctic states are set to expect a drastic increase in maritime traffic through Arctic waters and this could potentially cause concern for sovereignty.

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[5] Council of Canadian Academies, *Canada's Top Climate Change Risks* (Ottawa: Council of Canadian Academies), 2019. Accessed 6 Feb 2020 at: https://cca-reports.ca/wp-content/uploads/2019/07/Report-Canada-top-climate-change-risks.pdf.

[6] Ibid, p. v.

[7] M. Bennett, "The Arctic Shipping Route No One's Talking About", *The Maritime Executive* (Fort Lauderdale: The Maritime Executive, LLC), 5 Aug 2019.

[8] L. Pizzolato, S.E.L. Howell, J. Dawson, F. Laliberté, and L. Copeland, "The influence of declining sea ice on shipping activity in the Canadian Arctic", *Geophysical Research Letters*, Vol 43, Issue 23, (Washington: American Geophysical Union), 16 Dec 2016. Accessed 9 Feb 2020: https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2016GL071489#grl55272-fig-0001.

[9] N. Melia, K. Haines, and E. Hawkins, "Sea ice decline and 21st century trans-Arctic shipping routes", *Geophysical Research Letters*, Vol 43, Issue 18, (Washington: American Geophysical Union), 28 Sep 2016. Accessed 9 Feb 2020: https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1002/2016GL069315.

Open waterways in the Arctic have garnered the attention of *China* in the their *Arctic Policy*[10], of Russia in their *Foreign Policy Concept*[11], and many others who see economic opportunity in this evolving environment. So long as the waterways remain free from threat and maintain acceptable environmental impacts, there is increasing potential for economic prosperity worldwide through the Arctic. And with this prosperity, economic power is a key consideration in any state becoming a global hegemon.

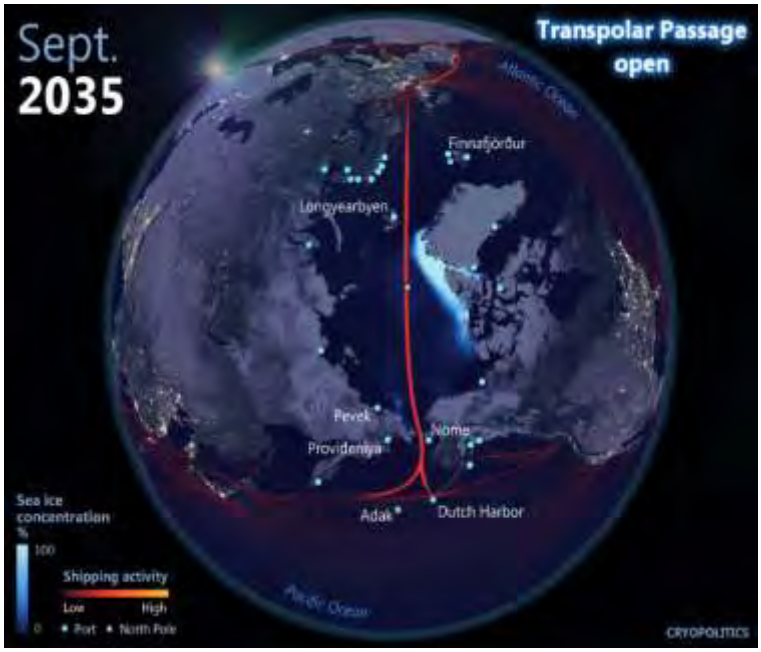

Figure 1.1 – Transpolar passage Arctic waterways prediction for 2035
Source: Bennett, "The Arctic Shipping Route No One's Talking About"

Lyman Miller defines "a "superpower" [as] a country that has the capacity to project dominating power and influence anywhere in the world, and sometimes, in more than one region

[10] People's Republic of China, *China's Arctic Policy – White Paper* (Beijing: Government Headquarters), Jan 2018. Accessed online 9 Feb 2020: http://english.www.gov.cn/archive/white_paper/2018/01/26/content_281476026660336.htm

[11] The Russian Federation, *Foreign Policy Concept of the Russian Federation,* (Moscow: Ministry of Foreign Affairs of the Russian Federation), 1 Dec 2016. Accessed 6 Dec 2019: https://www.mid.ru/en/foreign_policy/official_documents/-/asset_publisher/CptICkB6BZ29/content/id/2542248.

of the globe at a time, and so may plausibly attain the status of global hegemon".[12] Miller also states that there are four measurements of global hegemons, and they are: "military, economic, political, and cultural".[13] Those who look to become a world superpower, such as Russia and China, will look to increase their military, economic, political and cultural capacities as nations, in conjunction with having influence throughout the world. The Arctic presents such an opportunity to those looking to become great.

Climate change, has had secondary and tertiary effects with the foreseeable navigable waterways in the Arctic, producing great economic potential and opportunity. Where states are looking to bolster support to their national economies, political leaders can influence others to use the Arctic as a sound business choice. Au complet, the Arctic then provides potential for economic growth and stability, entices others via political influence, and demonstrates a desire for a cultural shift toward accepting the Arctic as a land of opportunity. With politicians rallying for the use of the Arctic for economic gains, there is a continued responsibility to protect national homelands for those who maintain Arctic landmass. Thus, both environmental and sovereignty concerns should be top of mind for the eight Arctic states. It is therefore important to explore the competition that currently exists amongst specific Arctic states, or what some states have dubbed themselves, *near-Arctic states*: Russia, China and the US.

Section 1.1 - Arctic Competitor - Russia

For example, Russia has indicated very strong tone in its *Foreign Policy Concept* in stating, "Russia will be firm in countering any attempts to introduce elements of political or military

[12] Lyman Miller, "China an emerging superpower?", *Standford Journal of International Relations* (Standford, CA: Standford University), 5 Apr 2006. Accessed 10 Feb 2020: https://web.stanford.edu/group/sjir/6.1.03_miller.html.

[13] Ibid.

confrontation in the Arctic, and, in general, politicize international cooperation in the region."[14] It is offered in this paper that such strong tone and language, along with Russia's military build-up along the Arctic coastline and increase in Arctic training over the past decade[15], appears as Russia posturing as a hard power in the Arctic region. Russian explorer, Arthur Chilingarov, also made a bold move by planting a Russian flag at the North Pole in 2007, and this came at a time when Russia reinvigorated its Arctic military infrastructure plans and resumed its Arctic bomber flights.[16] Other state actors in the Arctic region (Denmark, Sweden, Iceland, Finland, Norway, the United Stated of America, and Canada) may see this either as a potential threat to their sovereignty from a geographic perspective, or generally see an increased and substantive reasoning to increase their own sovereignty postures in the Arctic/north.

Also of significant note, regarding Russia, is the prevailing sentiment surrounding President Vladimir Putin's speech from the 43rd Munich Security Conference in 2007 where he made clear the divide between Russia and the U.S (though he also made mention of the North Atlantic Treaty Organization (NATO) and the European Union (EU)).[17] Putin elaborated on the fact that he and Russia at large was regularly *educated* on democracy, in heated acrimony.[18] He also stated how Russia was consistently told it should do things such as reducing the amount of nuclear warheads that it had, increase its role in world affairs, and that Russia should play by the rules (more specifically the rules set out on the international stage, such as those under the

[14] The Russian Federation, *Foreign Policy Concept of the Russian Federation,* (Moscow: Ministry of Foreign Affairs of the Russian Federation), 1 Dec 2016.

[15] Robbie Gramer, "Here's What Russia's Military Build-Up in the Arctic Looks Like", *The Cable* (Washington: Foreign Policy), 25 Jan 2017. Accessed 10 Feb 2020: https://foreignpolicy.com/2017/01/25/heres-what-russias-military-build-up-in-the-arctic-looks-like-trump-oil-military-high-north-infographic-map/.

[16] W.P. Lackenbauer, A. Lajeunesse, J. Manicom, and F. Lasserre, *China's Arctic ambitions and what they mean for Canada* (Calgary: University of Calgary), 2018. Accessed 11 Feb 2020: https://press.ucalgary.ca/books/9781552389010/.

[17] Vladimir Putin, "Speech at the 43rd Munich Security Conference", (Munich: International Security Conference), 10 Feb 2007. Accessed 24 Feb 2020: https://www.youtube.com/watch?v=hQ58Yv6kP44.

[18] Ibid.

United Nations).[19] The frustration from the Russian President was obvious in the tone of his speech and arguably carries through to the future. Now present day, the US encourages others to follow democratic governance, but conversely acts in such a way that supports the US being a world hegemon on the international stage. Imposing such sanctions on other states, as previously mentioned, but acting contrary to international law and the charter of the United Nations[20,21], makes the US appear as though it may be democratically motivated internally, but not on the international stage. This ongoing sentiment could easily evolve into larger competition between Russia and the US, specifically in the Arctic region. A topic for future research and analysis is whether Russia's stance as a hard power in the Arctic will help or hinder their desire to foster economic relationships with anyone wanting to use the NSR in the future.

A study completed by the Centre for Defence and Security Studies at the University of Manitoba highlighted an ongoing potential physical threat from Russia, toward North America, that warrants planning considerations for possible contingency plans at the very least:

> Today, the air breathing [i.e., a type of missile that requires air intake to combust its fuel] threat to North America has returned because of the deterioration in relations of the West with Russia, the resumption of Russian bomber flights over and around the North American Arctic, and the emergence of a new generation of long range, advanced Russian air and sea launched cruise missiles (A/SLCMs).[22]

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[19] Ibid.

[20] Multiple sources confirm or agree that the US invaded Iraq in 2003, though some states may still debate this fact. The United Nations (UN) Secretary General even stated so in a 2004 interview: "I have indicated it was not in conformity with the UN charter. From our point of view and the UN Charter point of view, it [the war] was illegal". Interview conducted with Kofi Annan, "Iraq War Illegal, says Annan", (London: British Broadcasting Corporation (BBC)), 16 Sep 2004. Accessed 28 Feb 2020: http://news.bbc.co.uk/2/hi/middle_east/3661134.stm.

[21] Ryan T. Williams, a law graduate from Yale University and Georgetown Law, wrote a piece regarding the illegal invasion of the US into Afghanistan following the terrorist attacks against the US on 11 September 2001. R.T. Williams, "Dangerous Precedent: America's Illegal War in Afghanistan", *University of Pennsylvania Journal of International Law*, Vol 33, No. 2, pp. 563-614, (Pennsylvania: University of Pennsylvania), winter 2011. Accessed 28 Feb 2020: https://heinonline.org/HOL/Page?handle=hein.journals/upjiel33&id=575&collection=journals&index=.

[22] A. Charron and J. Fergusson, *NORAD: Beyond Modernization*, (Winnipeg: University of Manitoba), 31 Jan 2019. Accessed 23 Mar 2020: https://umanitoba.ca/centres/cdss/media/NORAD_beyond_modernization_2019.pdf.

The public appetite for defence and security in Canada is not always strong, outsize of peace support and disaster relief/humanitarian aid operations, and this may be due to the perceived lack of physical threat to the country at large. The CAF and those organizations responsible for the defence and security of Canada (i.e., Public Safety Canada - the Royal Canadian Mounted Police, Canadian Border Services Agency, the Canadian Coast Guard), must remain vigilant and plan for all possibilities. Whether Russia commits any acts of aggression that involve the aforementioned missiles is yet to be seen, but what can be certain is that if those missiles are launched, it will be far too late for North America to react, unless they are prepared.

Regarding the aforementioned A/SLCMs, a recent 2019 RAND Corporation Report stated that Russia now has a variety of cruise missiles which vary in their ranges anywhere from 300kms to 3,500kms.[23] Though Russia may not have as many long range missiles as other munitions, it takes very few long ranges missiles to have potentially strategic and catastrophic effects. Russia could impact many areas of North American significance, such as national capitals, military bases and power generation infrastructure, without even entering into Canada-US national waterways or airspace (distances depicted in Figure 1.2 below).

[23] K. Crane, O. Oliker, and B. Nichiporuk, *Trends in Russia's Armed Forces – An Overview of Budgets and Capabilities*, (Santa Monica: RAND Corporation Headquarters), 2019. Accessed 3 Apr 2020: https://www.rand.org/content/dam/rand/pubs/research_reports/RR2500/RR2573/RAND_RR2573.pdf.

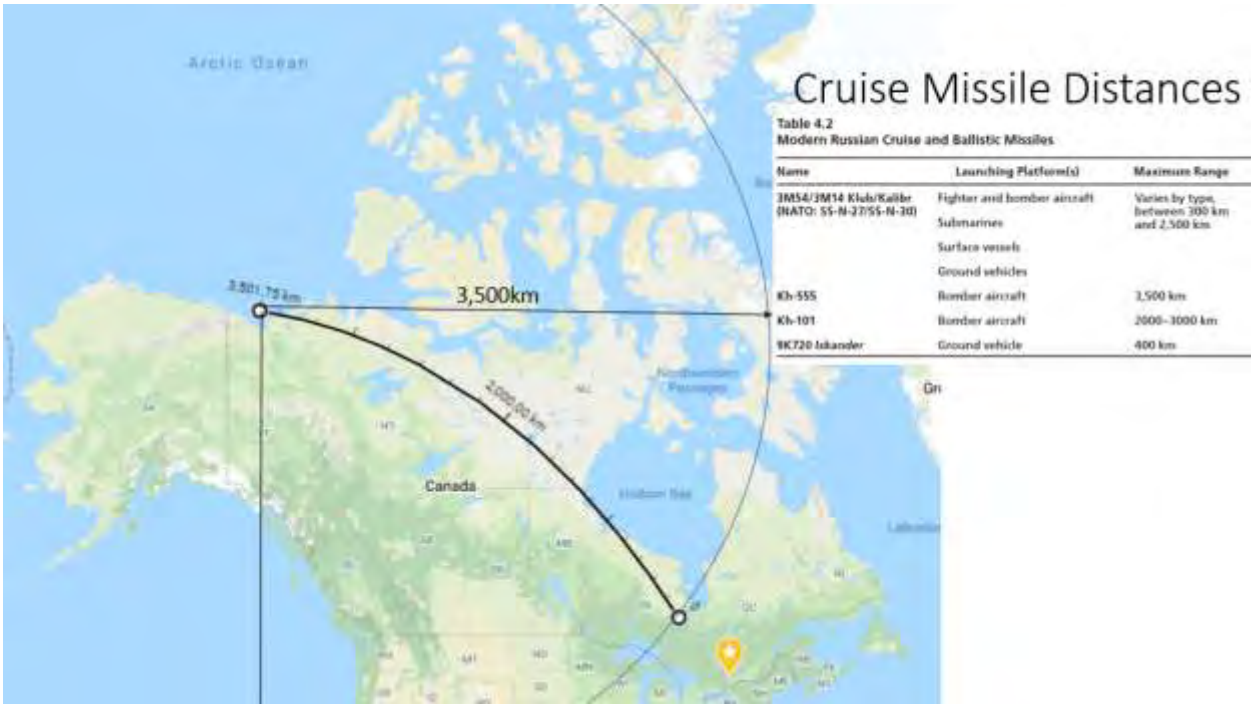

Figure 1.2 – Pictorial Representation of Aerial Distances Within Canada
Source: Combination of information drawn from Google Maps and a RAND Corporation report of Russian Armed Forces trends[24]

Due to the potential for Russian (as well as other country) aggression, organizations such as North American Aerospace Defence (NORAD) work diligently 24/7/365 to monitor for such potentialities. NORAD is a binational organization, of which 1 Canadian Air Division, headquartered in Winnipeg, leads the 1 Canadian NORAD Region (CANR) effort with four forward operating locations (FOLs) in northern Canada. If Russia uses cruise missiles to eliminate any of those FOLs, NORAD would have a reduced ability to project air assets North, in defence of North America. This would significantly complicate Canadian security and defence measures, as well as enable Russia to infringe on Canadian sovereignty. It should be considered paramount for Canada to be prepared to defend itself against such potential aggression. Though there may be no legitimate reason for Russia to encroach on Canadian

[24] Ibid, p. 64.

landmass to make sovereignty claims (as was witnessed in their 2014 annexation of Crimea), the Kremlin could target Canada to both do significant damage (i.e., economic, political, infrastructure, public security) nationally, and against allied partners such as the US.

Section 1.2 – Arctic Competitor - China

China has also declared, in its *Arctic Policy* that "the Arctic situation now goes beyond its original inter-Arctic States", and that "China is an active participant, builder and contributor in Arctic affairs who has spared no efforts to contribute its wisdom to the development of the Arctic region".[25] Though the wording is not as rigid as that seen in Russia's foreign policy, China is demonstrating intent and providing contributions toward the development of the Arctic for a number of reasons, but one in particular, is related to the economic potential in China's Belt & Road (B&R) initiative[26]. The B&R initiative includes marine passage through Arctic waters, better connecting China globally, and extending China's influence. Several countries, to include the United States, are concerned over this endeavor, and China's potential for growing influence globally.[27]

China has also stated its desire (within its white paper on *China's Arctic Policy*) to tap into resources, such as different fuel types, which are available in abundant supply in both the Arctic and Antarctic regions. It is well documented that China struggles to meet internal national

[25] People's Republic of China, *China's Arctic Policy – White Paper* (Beijing: Government Headquarters), Jan 2018.

[26] China's Belt & Road initiative, also referred to as the One Belt One Road (OBOR) initiative, came into place after the Chinese President visited Kazakhstan and Indonesia in 2013. The official policy was written in 2015 and suggests that the initiative will allow for mutual benefit from all those who participate in the initiative, and is aligned with the UN Charter. Specifically, the initiative states that it "is open for cooperation […] is harmonious and inclusive […] follows market operation [and …] seeks mutual benefit". People's Republic of China, *Vision and Actions on Jointly Building Silk Road Economic Belt and 21st-Century Maritime Silk Road*, (Beijing: National Development and Reform Commission), March 2015. Accessed 28 Feb 2020: https://en.ndrc.gov.cn/newsrelease_8232/201503/t20150330_1193900.html.

[27] A. Chatzky and J. McBride, "China's Massive Belt and Road Initiative", (New York: Council on Foreign Relations), 28 Jan 2020. Accessed on 11 Feb 2020: https://www.cfr.org/backgrounder/chinas-massive-belt-and-road-initiative.

fuel demands, such as liquefied natural gas (LNG) and gas,[28,29,30,31,32] and it would be a natural response for China to seek more fuel elsewhere in the world in order to meet its national demand. In this instance, China's attraction to the Arctic and the natural resources which are said to exist there, is both very necessary and will be enduring. In fact, a 2008 US Geological Survey estimated that "the total mean undiscovered conventional oil and gas resources of the Arctic are estimated to be approximately 90 billion barrels of oil, 1,669 trillion cubic feet of natural gas, and 44 billion barrels of natural gas liquids."[33] This is estimated to be approximately 13% of remaining oil reserves, and more than 30% of natural gas reserves worldwide.[34] The abundance and type of resources available in the Arctic therefore aggrandize China's interest in the Arctic.

China has established scientific research stations in both Norway and Iceland, and also demonstrates great interest in establishing infrastructure and a permanent presence in Greenland.[35] China has completed nine Arctic maritime expeditions with the *Xuelong*

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[28] Tsvetana Paraskova, "Is China Facing a Gas Shortage?", (College Station: OilPrice.com), 22 Oct 2019. Accessed 27 Feb 2020: https://oilprice.com/Latest-Energy-News/World-News/Is-China-Facing-A-Gas-Shortage.html#.

[29] OilPrice.com, "Is China Facing a Natural Gas Shortage?", (College Station: OilPrice.com), 1 Nov 2019. Accessed 27 Feb 2020: https://oilprice.com/Energy/Energy-General/Is-China-Facing-A-Natural-Gas-Crisis.html.

[30] Huileng Tan, "China's drive for cleaner energy is causing a gas shortage for winter", (New Jersey: Consumer News and Business Channel (CNBC)), 6 Dec 2017. Accessed 27 Feb 2020: https://www.cnbc.com/2017/12/06/chinas-drive-for-cleaner-energy-is-causing-a-gas-shortage-for-winter.html.

[31] Ruby Lian, Muyu Xu, and Josephine Mason, "As China gas crisis deepens, factories, homes lose supply", (Toronto: Thompson Reuters Corp.), 13 Dec 2017. Accessed 27 Feb 2020: https://www.reuters.com/article/us-china-pollution-gas/as-china-gas-crisis-deepens-factories-homes-lose-supply-idUSKBN1E714C.

[32] David Sandalow, Akos Losz and Sheng Yan, *A Natural Gas Giant Awakens: China's Quest for Blue Skies Shapes Global Markets*, (New York: Columbia School of International and Public Affairs), June 2018. Accessed 27 Feb 2020: https://energypolicy.columbia.edu/sites/default/files/pictures/China_A%20Natural%20Gas%20Giant%20Awakens_CGEP_June%202018_0.pdf.

[33] Kenneth J. Bird, Ronald R. Charpentier, Donald L. Gautier, David W. Houseknecht, Timothy R. Klett, Janet K. Pitman, Thomas E. Moore, Christopher J. Schenk, Marilyn E. Tennyson, and Craig J. Wandrey, "Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle", (Reston: United States Geological Survey Headquarters), 2008. Accessed 27 Feb 2020: https://pubs.usgs.gov/fs/2008/3049/fs2008-3049.pdf.

[34] Hobart M. King, PhD, RPG, "Oil and Natural Gas Resources of the Arctic", (Geology.com). Accessed 27 Feb 2020: https://geology.com/articles/arctic-oil-and-gas/.

[35] Government of the Unites States of America, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2019*, (Washington: Department of Defense), 2 May 2019.

(Ukranian-built ice-breaking research vessel), and on the eighth expedition crossed the Canadian Northwest Passage in 2017.[36] From China's outermost borders, the People's Liberation Army (PLA) currently possesses munitions and weapons systems that could theoretically touch the very north-western tip of Alaska (see Figure 1.2). If China establishes a weaponized security presence in areas such as Norway, Iceland and Greenland, it could greatly extend its reach.

Figure 1.3 – Conventional Strike Capabilities of China
Source: US Department of Defense, Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2019

A significant concern regarding China is not only its influence internationally, but its inability to follow, or allow others to follow, rules-based order and international laws. For instance, Canada has recently arrested Meng Wanzhou (a Chinese business executive who is the

Accessed 28 Feb 2020: https://media.defense.gov/2019/May/02/2002127082/-1/-1/1/2019_CHINA_MILITARY_POWER_REPORT.pdf.

[36] Ibid.

deputy chairwoman and chief financial officer of the telecommunication company Huawei), based on the US indictments related to Huawei's violation of the Racketeer Influenced and Corrupt Organizations Act (RICO) and conspiracy to steal trade secrets, whereby the US has requested Wanzhou's extradition to the United States.[37] Wanzhou was arrested in early December 2018, and not long after two Canadians (Michael Spavor and Michael Kovrig) were detained in China on suspicion of illegally spying, as well as stealing and sharing state secrets.[38] Many have denounced China's knee-jerk reaction and commented on the arbitrary arrests of the two Canadians, such as the Canadian Prime Minister and Foreign Affairs Minister, as well as senior political officials from other countries (for example, the Netherlands[39]). The primary concern with this is that if the Arctic states were to come to a consensus on rules and regulations governing the use of the Arctic for things such as shipping for trade, there is no guarantee, and in fact evidence to support the contrary, that states such as China would allow for peaceful and uncontested trade through the Arctic ocean.

Another area in which China has disregarded rules-based international order is in their denial of the findings made by the Permanent Court of Arbitration (PCA) where China was found to have no increased sovereign claims with the creation of its artificial islands in the South China Sea.[40] The PCA was created in order to facilitate arbitration between states over one-

[37] Government of the Unites States of America, "Chinese Telecommunications Conglomerate Huawei and Subsidiaries Charged in Racketeering Conspiracy and Conspiracy to Steal Trade Secrets", (Washington: Department of Justice), 13 Feb 2020. Accessed 24 Feb 2020: https://www.justice.gov/opa/pr/chinese-telecommunications-conglomerate-huawei-and-subsidiaries-charged-racketeering.

[38] Thomson Reuters, "China formally arrest Spavor and Kovrig, accuses them of spying", (Toronto: CBC News), 16 May 2019. Accessed 24 Feb 2020: https://www.cbc.ca/news/politics/canadians-arrested-china-state-secret-1.5138103.

[39] Government of the Netherlands, "Statement on the detained Canadians Michael Kovrig and Michael Spavor", (Hague: Ministry of Foreign Affairs), 12 Dec 2019. Accessed 24 Feb 2020: https://www.government.nl/documents/diplomatic-statements/2019/10/10/statement-on-the-detained-canadians-michael-kovrig-and-michael-spavor.

[40] Permanent Court of Arbitration, "Press Release – The South China Sea Arbitration", (Hague: The Permanent Court of Arbitration), 12 Jul 2016. Accessed 26 Apr 2020: https://www.nytimes.com/interactive/2016/07/12/world/asia/hague-south-china-sea.html

hundred years ago. It was specifically designed to assist in cases such as that brought forward by the Philippines v. China regarding China's newly fabricated artificial islands. The fact that China does not recognize the final decision of this arbitration is an attempt to delegitimize the PCA, and perhaps overstates China's sense of entitlement, or self-proclamation of immunity from laws that other sovereign states follow.

Section 1.3 – Arctic Competitor – United States of America

The US has been very vocal about its claim over a portion of the Arctic region due to its coastline, or more specifically the Alaskan coast, in the Arctic. Alaskan Senator Dan Sullivan, in a speaking engagement with the Centre for Strategic and International Studies, stated that historically, the US purchased Alaska from Russia with great visions for "new trade routes, new riches, new resources, [and] new alliances" in the mid-19th century.[41] However now, with the Russian President claiming that Russia would control the NSR, Sen. Sullivan countered with "but I think we don't want Russia to control that".[42] He states later, in the same speaking engagement, that Russia is in fact the most significant strategic threat.[43]

US Secretary of State, Mike Pompeo, also stated in a speech prior to an Arctic Council meeting in 2019, "there are only Arctic states, and non-Arctic States. No third category exists, and claiming otherwise entitles China to exactly nothing".[44] With US government officials openly voicing their concerns and opposition to both China and Russia in the Arctic, insofar as

[41] Dan Sullivan, "A Conversation with US Senator Dan Sullivan on Defending the Arctic", (Washington: Centre for Strategic and International Studies), 26 Jun 2019. Accessed 28 Feb 2020: https://www.csis.org/analysis/conversation-us-senator-dan-sullivan-defending-arctic.

[42] Ibid.

[43] Ibid.

[44] Mike R. Pompeo, "Looking North: Sharpening America's Arctic Focus", (Rovaniemi: Press conference), 6 May 2019. Accessed 28 Feb 2020: https://youtu.be/6Bk8PeRBYcg.

hard power or not following international rules-based order is concerned, it confirms the stiff competition that exists between the tri-polar states: China – Russia – US.

Another concern vocalized by Pompeo was the infrastructure that China has been establishing throughout its B&R initiative, specifically those which enable Arctic shipping vessels to maneouvre through Arctic waters. He stated that there is, and will continue to be, significant concern from the Pentagon about China not only establishing infrastructure for Arctic research in other countries, but also then establishing a permanent security presence where those pieces of infrastructure are located.[45] This is cause for concern because China has a significant and growing nuclear and conventional attack submarine capability.

The *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2019* states that "the PLAN [People's Liberation Army Navy] currently operates four nuclear-powered ballistic missile submarines (SSBN), six nuclear-powered attack submarines (SSN), and 50 conventionally powered attack submarines (SS)."[46] This number is expected to grow by 5-10 more submarines by 2020.[47] China may attempt to find justification for moving between these infrastructure locations (i.e., Norway – Iceland - China), as well as along the B&R, indicating to some Arctic states the potential for military escalation of force. Of course, this would be significant cause for concern to any sovereign Arctic state, as well as to any cargo vessels that choose to use the Arctic ocean for business as opposed to the southern maritime routes.

The US has also recently stated a relatively confusing opinion stating that the Canadian Northwest Passage should be considered international waters. Contradictory to this opinion, the

[45] Ibid.

[46] Government of the Unites States of America, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2019*, (Washington: Department of Defense), 2 May 2019.

[47] Ibid.

US and Canada under the Reagan and Mulroney administrations, back in 1988, signed an *Agreement on Arctic cooperation*. This agreement specifically stated "the Government of the United States pledges that all navigation by US icebreakers within waters claimed by Canada to be internal will be undertaken with the consent of the Government of Canada", stated with regards to the Canadian Northwest Passage.[48] The current opinion stated by high level US government officials is confusing because the US currently sees Russia and China as a competitor on the verge of escalation (i.e., due to their recent and large scale military Arctic capability advancements and the growing accessibility of the Arctic), and claiming the Northwest Passage as international waters would then give Russia and China (to include their attack submarines) freedom of navigation therein. The US has already stated that Russia is a strategic threat, and there is a growing level of discomfort with China's push to influence Arctic activities in their recent *Arctic Policy* white paper, therefore the desire to make the Northwest Passage into international waters seems illogical. This confusion was also echoed by Canadian Political Science Professor, and arguably lead Canadian academic, Robert Huebert, who has researched and written extensively on the Arctic over the past 30 years.[49,50]

The question thus remains about what Arctic states truly believe about different states' intentions in the Arctic region, especially when the waterways open up for longer durations in the coming years and decades. There is obviously competition to be had, from an economic perspective in the Arctic, however, political will is the driving force behind whether there is or is not a perceived military/political threat. At this moment in time, and as highlighted in Robert

[48] Governments of Canada and the United States of America, *Agreement on Arctic cooperation*, (Ottawa: Parliament), 11 Jan 1988. Accessed 29 Feb 2020: http://www.assidmer.net/doc/1988_Canada_-_USA_Treaty.pdf.

[49] More works regarding the Arctic from Professor Robert Huebert can be found at this link: https://scholar.google.com/citations?user=0ZV7hzAAAAAJ&hl=en.

[50] Andrey Bondarev, Heather Exner-Pirot, Robert Huebert, and Rebecca Pincus, "Great Power Competition in the Arctic", (Washington: Woodrow Wilson Centre), 25 Jul 2019. Accessed 24 Feb 2020: https://www.youtube.com/watch?v=FwI-XUFhjyI.

Huebert's speech at the *Great Power Competition in the Arctic* panel discussion in July 2019, there is a tri-polar security challenge or concern which has developed between China, Russia and the US.[51] It was stated that Russia's gross domestic product (GDP) relies heavily on the Arctic as 15-20% of Russia's GDP is produced from means existing in the Arctic region.[52] Between Russia questioning the US government's intentions (as it believes the US is internally using democratic rule but outwardly demonstrating a different image), Russia's reliance on the Arctic from an economic perspective, and their build-up of military forces along the Russian Arctic coastline, Russia is a strong competitor in the Arctic. Whether or not this competition evolves into hostile intent, and subsequently military actions, is yet to be seen.

Regarding China's influence in the Arctic and participation as a 'near-Arctic' state, China has voiced its intent to use the Arctic as part of their B&R initiative, for economic reasons, and to close the gap for China's fuel shortages, but has also demonstrated its desire to follow international law only insofar as the law suits China's purposes. Furthermore, the US has demonstrated concern toward their defence, security and sovereignty in the Arctic based on recent actions taken by both China and Russia in the region, thus underlining US participation and actions in the Arctic.[53,54]

The US also claims to have the highest environmental standards relative to other Arctic states, specifically regarding resource development[55], and therefore demonstrates some desire to maintain the pristine environment through research and environmentally friendly practices. With

[51] Ibid.
[52] Ibid.
[53] Robbie Gramer, "Here's What Russia's Military Build-Up in the Arctic Looks Like", *The Cable* (Washington: Foreign Policy), 25 Jan 2017.
[54] Andrey Bondarev, et. al., "Great Power Competition in the Arctic", (Washington: Woodrow Wilson Centre), 25 Jul 2019.
[55] Dan Sullivan, "A Conversation with US Senator Dan Sullivan on Defending the Arctic", (Washington: Centre for Strategic and International Studies), 26 Jun 2019.

Russia, China and the US demonstrating the potential for more hard power in the Arctic than any other Arctic or near-Arctic state, it is necessary for Canada to pay close attention to what its allies and potential adversaries do in the Arctic, but also to remain vigilant and prepared to react as necessary.

In this chapter, key background information was provided in terms of the environmental considerations linked not only to climate change, but also linked to the secondary and tertiary effects the changing environment has on the Arctic. These subsequent effects are related to open waterways and the economic opportunity that they present for nations to take advantage of, but also to increase a state's potential to become a global hegemon. Those looking to exploit the Arctic from an economic perspective, thus potentially increasing a state's claim to becoming a global hegemon, should be considered competition in present day and could potentially become threats in the near future. If for no other reason, these global hegemon-hopefuls are already demonstrating their knack for competition and relatively aggressive political actions. The following chapter will speak to the infrastructure which is presently in place in northern Canada to support a potential increase of CAF personnel during Arctic operations, whether those operations are related to a threat or maintaining national sovereignty.

CHAPTER 2 - CURRENT INFRASTRUCTURE IN SUPPORT OF ARCTIC OPERATIONS IN NORTHERN CANADA

Section 2.1 - Canadian Armed Forces Infrastructure in the Arctic

The Canadian Arctic is a vast geographic footprint of over three million square kilometers (incorporating Yukon, North West Territories and Nunavut), but contains only 0.3% of the Canadian population.[56] The Canadian defence infrastructure is dispersed throughout the

[56] Government of Canada, *Energy Use in Canada's North: An Overview of Yukon, North West Territories, and Nunavut – Energy Facts* (Calgary: Canada Energy Regulator), 28 Aug 2019. Accessed online 19 Feb 2020: https://www.cer-rec.gc.ca/nrg/ntgrtd/mrkt/archive/2011nrgsncndnrthfct/nrgsncndnrthfct-eng.html.

aforementioned territory and other small transportation hubs are used to link into the northern sites (such as Canadian Forces Bases (CFB) Cold Lake, Bagotville and Goose Bay). The multitude of sites are found in Figures 2.1 and 2.2 (below) as a visual reference.

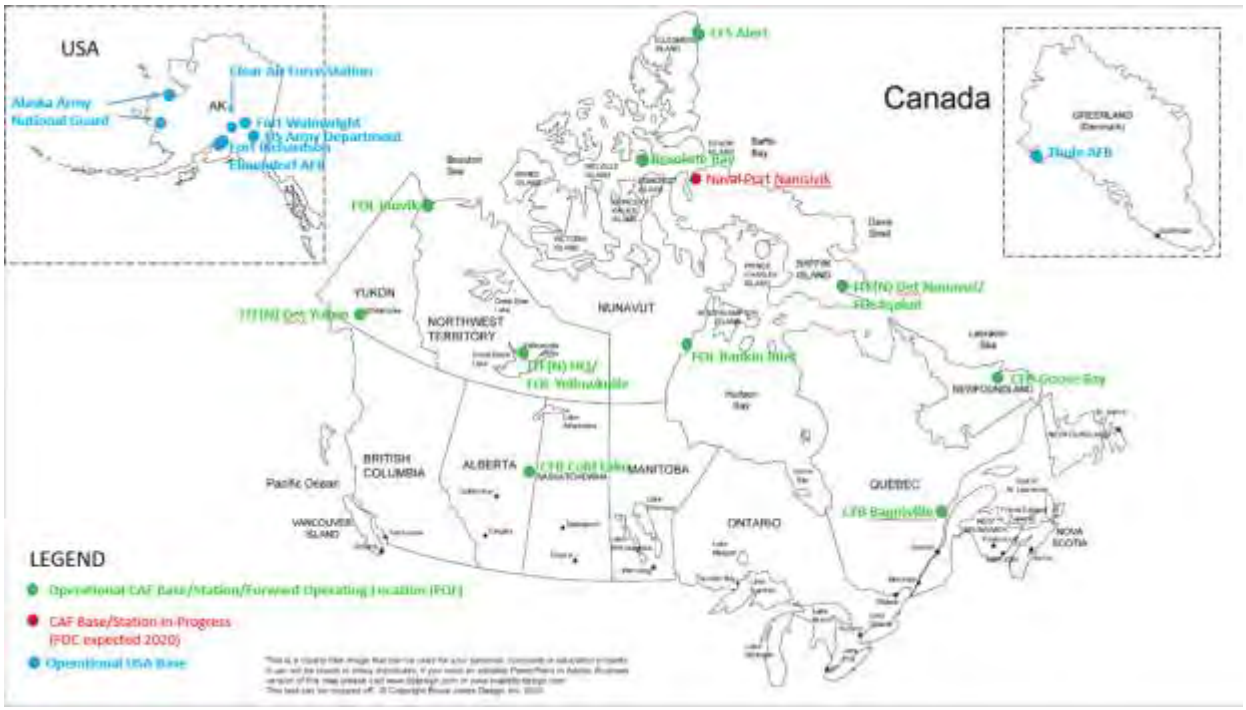

Figure 2.1 – Canadian Defence Infrastructure in Northern Canada
Source: Major R.A. Richard, Open Source Information on North American Defence Infrastructure[57]

[57] A series of open source information was used by the author to amalgamate the information found in Figure 2.1. Those sources are: the map was retrieved from https://www.freeusandworldmaps.com/html/USAandCanada/CanadaPrintable.html on 23 Jan 2020; the information pertaining to Joint Task Force North's dispersion across the Canada Arctic was retrieved from https://www.canada.ca/en/department-national-defence/services/operations/military-operations/conduct/regional-task-force/north/detachments.html on 23 Jan 2020; the information pertaining to the Resolute Bay Training Facility was retrieved from https://www.cbc.ca/news/canada/north/military-s-arctic-training-facility-opens-in-resolute-1.1411838 on 23 Jan 2020; and the information pertaining to the Nanisivik Naval Port was retrieved from http://www.navy-marine.forces.gc.ca/en/news-operations/news-view.page?doc=operation-nanook-2018-canadian-armed-forces-strengthen-joint-arctic-capabilities/jl8edjzj on 23 Jan 2020.

Figure 2.2 – Joint Task Force (North) Infrastructure
Source: LCol Ray Chiasson, Environmental Change and Security Implications for Canada

It is important to note that this infrastructure is all found in relatively remote locations across the Canadian Arctic and is subject to extreme weather conditions depending on the time of year. Most of this infrastructure is manned and operated by Canadian Armed Forces personnel, however the North Warning System (NWS) found in Figure 2.2 is currently operated and maintained by Raytheon.[58] Of particular focus in this paper will be the installations found in Figure 2.1, concerning the support to military operations in defence of North America.

With a specific focus on the research question, the infrastructure in Figure 2.1 will be further explored: how does the changing arctic environment impact *support to the defence* of the Canadian Arctic? The current CAF command element found in northern Canada is Joint Task Force North (JTF(N)). JTF(N) is headquartered (HQ) in Yellowknife, NWT but has several

[58] Raytheon, *North Warning System*, (Waltham: Raytheon Company), 2020. Accessed on 19 Feb 2020: https://www.raytheon.com/ourcompany/global/americas/canada/nws.

outposts across the Arctic such as the JTF(N) Detachment (Det) Yukon located in Whitehorse, and JTFN(N) Det Nunavut in Iqaluit. There are also four Forward Operating Locations (FOLs) located in Inuvik and Yellowknife, NWT, as well as Rankin Inlet and Iqaluit, NU that fall under the purview of the North American Aerospace Defence (NORAD), but more specifically, Commander of 1 Canadian NORAD Region (1 CANR) (double-hatted as Commander 1 Canadian Air Division). There is also a naval port facility being opened (expected to be at full operational capability by the summer of 2020) in Nanisivik, NU, a CAF Arctic Training Centre (ATC) (co-operated with National Resource Canada[59]) in Resolute Bay, NU, and the Canadian Forces Station Alert in Alert, NU. Outside of the installations found across the northern Canadian territories are also three Air Force *feeder* bases whereby activities in northern Canada can be supported from, or mounted from, as necessary. Those feeder bases are CFBs Cold Lake, Bagotville and Goose Bay.

The JTF(N) HQ houses over 300 military and civilian Department of National Defence (DND) personnel, as well as 1 Canadian Ranger Patrol Group HQ, consisting of approximately 50 personnel. The infrastructure itself is meant for office-related work, and there are minimal outbuildings or training grounds for the current CAF contingent located in Yellowknife, NWT. The JTF(N) Det Yukon houses considerably fewer personnel (three total) and operates in a similar environment where the infrastructure is related to office work and there are no dedicated training grounds. However, the four FOLs have been established to be more tactical and designed to be purposefully similar (see basic representation of different FOLs in Figures 2.3 and 2.4, below). These buildings house mostly aircraft, crew and their support requirements. What

[59] Government of Canada, *Canadian Armed Forces Arctic Training Centre*, (Ottawa: Department of National Defence), 15 Aug 2013. Accessed on 19 Feb 2020: http://www.forces.gc.ca/en/news/article.page?doc=canadian-armed-forces-arctic-training-centre/hkdons6l.

would be missing from current infrastructure at the FOLs, should additional CAF personnel deploy to those locations, depending on the military mission and operations being conducted, are accommodations related to a larger contingent of ground (i.e., Army) forces (to include personnel, equipment and vehicles). Those ground forces would also require the associated sustainment requirements which would be required to support any such forces (i.e., food services, personnel administration, maintenance, health services, communications and information services requirements, etc.). This will be discussed further in chapter 4.

Figure 2.3 – Basic CAF Aircraft Hanger and Maintenance Facility in Canadian Arctic Forward Operating Locations (FOL)
Source: Google Maps, Inuvik Mike Zubko Airport Grounds

Figure 2.4 – Basic CAF Personnel Accommodations Building (PAB) in Canadian Arctic Forward Operating Locations (FOL)
Source: Google Maps, Inuvik Mike Zubko Airport Grounds

Section 2.2 – Significant Civilian and Other Governmental Department Infrastructure in the Arctic

By assessing the distances between CAF installations across the Canadian Arctic (highlighted in Figure 2.1), one can develop an idea for the sheer distance between all of those installations that span across more than three million square kilometers. As the general transportation networks (seen at a macro-level in Figure 2.2) highlight the disparate challenges facing support to sustained operations in northern Canada, it is prudent to look at what networks

are currently being used in industry to support industrial activities in northern Canada as well. In particular, the mining industry would have similar challenges as the CAF regarding the movement of larger equipment, as well as sustaining that equipment and employees for extended periods, in northern Canada. The mining industry has pockets of activity happening across northern Canada, as seen in Figures 2.5, 2.6 and 2.7 (below). With comparable support challenges, it would be conceivable that the CAF could use piggy-back logistics, and possibly other means as it relates to the last-mile in the supply distribution chain, where existing commercial transportation nodes do not fully extend or are cut-off from main transportation hubs. This would also bring employment and economic opportunity to local Canadians and indigenous communities, resident in northern Canada, who are knowledgeable of the lands and non-commercial shipping routes to move goods as necessary.

Of note: *piggy-back logistics* is a term which is not used in CAF doctrine, but has existed for many years in industry, and across those geographic areas which are not blessed with great transportation infrastructure. The term means "a type of transportation in which a transportation unit is transported on the back of another type of transport specially made for such transportation".[60] Where the CAF may currently have distribution issues in northern Canada, with a potential increase in CAF operations in the relatively near future, there may be a possibility of using the mining industry to conduct piggy-back logistics until more purpose-built infrastructure is made. Chapter 4 will highlight the lengthy timelines associated with building infrastructure, or real property, in the CAF.

[60] MBASkool.com, "Piggy Back", *Concepts – Operations and Supply Chain*, (Framingham: MBASkool.com Headquarters), 2008. Accessed 20 Feb 2020: https://www.mbaskool.com/business-concepts/operations-logistics-supply-chain-terms/2091-piggy-back.html.

Figure 2.5 – Planned Mining Activity in Nunavut – 2015
Source: Canada-Nunavut Geoscience Office, Summary of Activities 2015

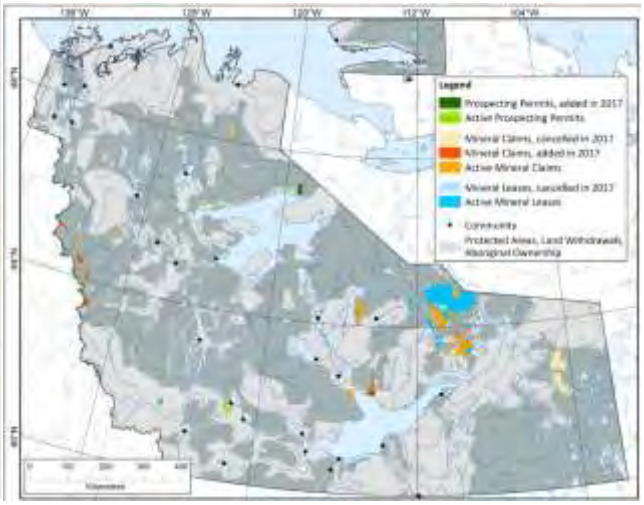

Figure 2.6 – Planned Mining Activity in the Northwest Territories – 2017
Source: Cairns, Elliott, Falck and Powell, Northwest Territories Mineral Exploration Overview

When considering the current locations of CAF installations in northern Canada and overlaying those locations with some known mining sites across the same geographic regions, one could begin to develop a sense for which areas could support piggy-back logistics operations. For instance, there are active mineral claims and leases in Yellowknife, NWT (such as Ekati, Gahcho Kué, and Diavik mines[61] which are relatively near JTF(N) Headquarters), the Baffinland Mine Site Complex and Mary River iron mine are on the northern part of Baffin Island (within close proximity to Nanisivik, NU by maritime network), there are off-shore oil drilling operations within close proximity to Inuvik, NWT (multiple sites and planned future

[61] UKDiss.com, "Diavik Diamond Mine Evaluation", (Nottingham: All Answers Ltd.), 2020. Accessed 1 May 2020: https://ukdiss.com/examples/diavik-diamond-mine-evaluation.php.

sites used by ExxonMobil[62], near the Inuvik FOL), there are several active mines near Whitehorse, Yukon (near JTF(N) Det Yukon), and there are a few mines near Rankin Inlet, NU (such as Meliadin gold mine, near the FOL). There are currently no known mines on Ellesmere Island (near CFS Alert), nor on Cornwallis Island (near the Resolute Bay Arctic Training Centre).

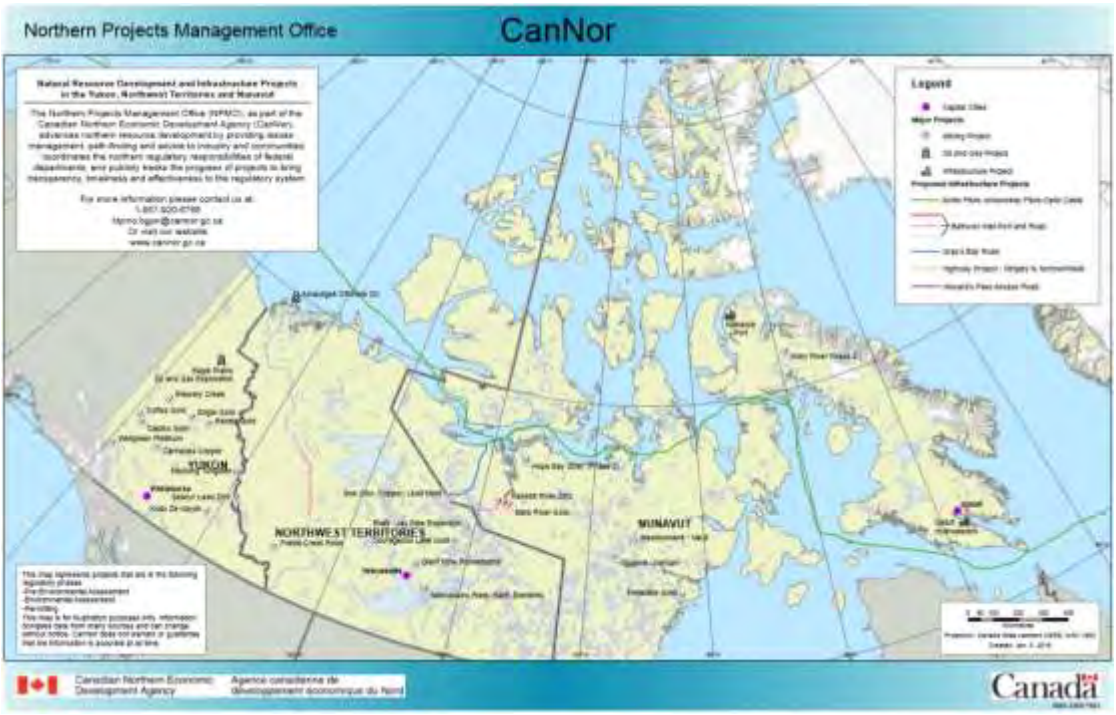

Figure 2.7 – Natural Resource Development and Infrastructure Projects in the Yukon, Northwest Territories and Nunavut
Source: Canadian Northern Economic Development Agency, Northern Projects Management Office

There is also a Canadian National (CN) railway which extends as far North as Hay River, NWT, which is South of JTF(N) HQ across Great Slave Lake (see Figures 2.8 and 2.9 below). The CN rail line from Edmonton, AB to Hay River, NWT is approximately 820kms in distance

[62] ExxonMobil, *Arctic Leadership*, (Irving: ExxonMobil Corp.), 2008. Accessed 1 May 2020: https://www.imperialoil.ca/-/media/Imperial/Files/Arctic-leadership.pdf?la=en-CA&hash=C8FDC74F37E0890D4B11BF552FB1C2E8BE743545.

and it can hold up to 268,000lbs of total weight (including cargo).[63] At this time, it would be feasible to use the existing infrastructure in order to create a logistical support hub from which the hub and spoke system could be based out of (further elaborated upon in chapter 5). JTF(N) HQ, in Yellowknife, is also connected to the major road network which extends from Hay River, South-West to Enterprise, west of Great Slave Lake, and North-East to the city of Yellowknife. The road network also extends all the way from Hay River to Inuvik, as seen in figure 2.2.

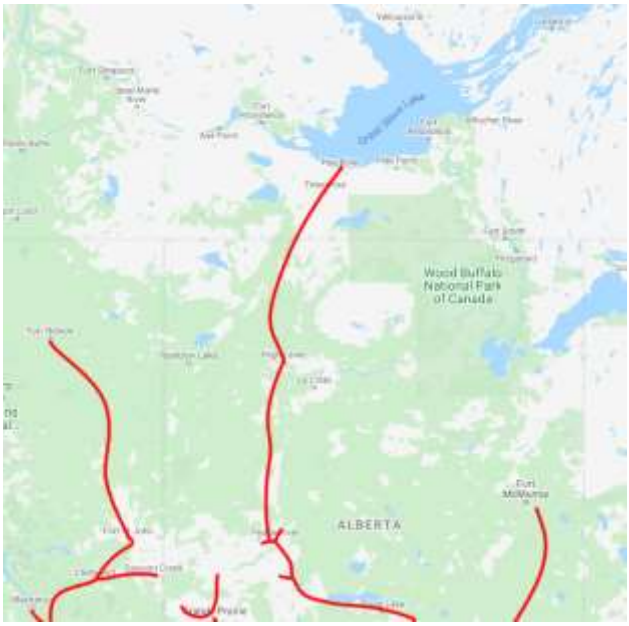

Figure 2.8 – CN Rail Line in Northern Alberta To Hay River, NWT
Source: Canadian National Rail Website, Rail Stations and Terminal Maps

Figure 2.9 – Hay River, NWT - CN Rail End of Line to Northern Canada
Source: Canadian National Rail Website, Rail Stations and Terminal Maps

Also of note, a number of academics from the University of Calgary are working on a substantial project (see Figure 2.10) called the Northern Corridor Project which is for "the establishment of permissible corridors: defined multi-modal rights-of-way through Canada's north and near-north with an accompanying regulatory and governance structure to facilitate

[63] Canadian National (CN) Rail Company, "Rail Stations and Terminal Maps", *Maps and Networks*, (Montreal: CN Rail Company Headquarters), 2020. Accessed 29 Feb 2020: https://www.cn.ca/en/our-services/maps-and-network/.

private and public sector infrastructure investments".[64] The objectives of this project are "to provide […] solutions to geographic, political and economic challenges, providing growth and diversification through access to rapidly expanding international markets, reducing interregional trade barriers, enhancing Indigenous and northern development opportunities and supporting northern security objectives."[65] Should industry and the Government of Canada support this initiative, it holds great potential to assist CAF defence objectives (not to mention Royal Canadian Mounted Police (RCMP) security objectives), specifically support to operations in the Arctic.

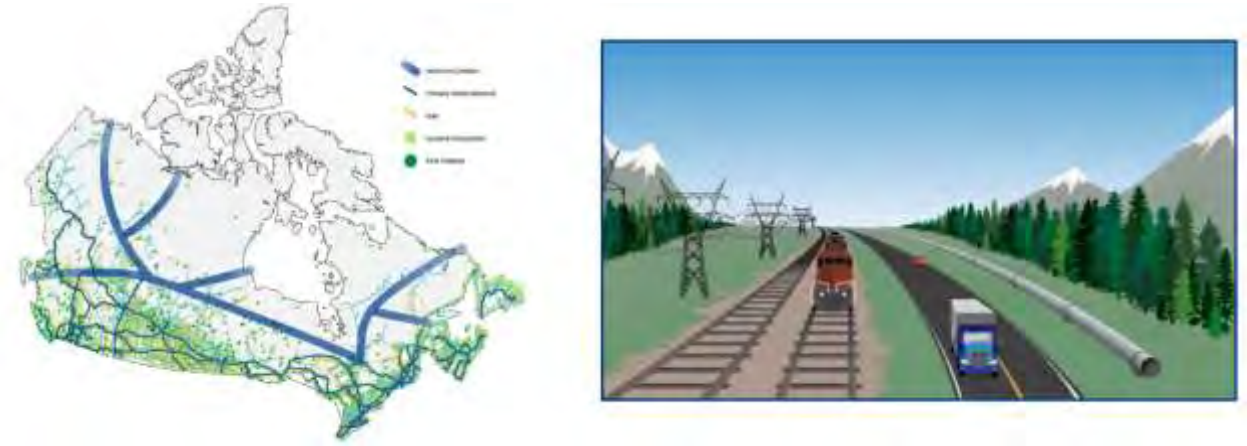

Figure 2.10 - Northern Corridor Project from the School of Public Policy at the University of Calgary

Source: "The Canadian Northern Corridor Concept: Building Canada's Future" presented by Robert Mansell, 18 June 2018, at The Canadian Academy of Engineering AGM and Symposium

It should be noted that there are also a significant amount of projects which have received Government of Canada approval and funding in northern Canada, and some of these projects could be mutually beneficial to the CAF and other government departments (OGDs) that may be trying to enhance their capabilities in the North. *Canada's Arctic and Northern Policy*

[64] Dr. Robert Mansell, "The Canadian Northern Corridor Concept: Building Canada's Future", *The Canadian Academy of Engineering AGM and Symposium*, (Calgary: University of Calgary), 18 Jun 2018. Accessed 29 Feb 2020: http://www.cae-acg.ca/wp-content/uploads/private/2018/Mansell_CAE_2018.pdf.

[65] Ibid.

Framework published 18 November 2019 supports projects such as the Northern Abandoned Mine Reclamation Program, which aims to remediate debris and toxic materials from old mine sites in the North West Territories, as well as the Taltson hydroelectricity expansion project, South-East of Great Slave Lake with the North West Territories Chapter.[66]

There is also the Nunavut Chapter which has received approval of a $71.7M project to invest in the "National Trade Corridors Fund for four Nunavut transportation projects, including preparatory work on the Grays Bay Road and Port Project and an expansion of the Rankin Inlet airport terminal building capacity".[67] Other projects have also been approved and funded, which are to be delivered across northern Canada, such as the provision of universal high-speed internet in remote and northern communities, as well as a project with a specific focus on the High Arctic with $190M being dedicated to "build multi-use buildings, food processing units and harbours".[68]

All of the aforementioned projects present an opportunity for OGDs and federal partners to synchronize efforts should there be a requirement to move goods from southern Canada to the North, especially any larger equipment, machinery, seacans and vehicles. By contracting with the local economy, and using cargo shipping space which may not already be filled by civilian requirements (i.e., piggy-back logistics) going to the Canadian Arctic, the CAF would be infusing more money and stimulating more growth within the local economy, as well as capitalizing on shipping loads, thus reducing additional costs and harm to the environment. This will be discussed in greater detail in chapter 5.

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[66] Government of Canada, *Canada's Arctic and Northern Policy Framework*, (Ottawa: Minister of Northern Affairs), 18 Nov 2019. Accessed 27 Mar 2020: https://www.rcaanc-cirnac.gc.ca/eng/1560523306861/1560523330587.

[67] Ibid.

[68] Ibid.

The aforementioned framework also included an *Arctic and Northern Policy Framework: Safety, security and defence chapter* whereby elements specific to safety, security and defence in northern Canada, and its waterways, was elaborated upon.[69] This framework chapter indicates that the objectives articulated within the document will be pursued until 2030. It also speaks to many of the points previously mentioned within this paper, specifically concerning climate change, resource competition, and threats to defence and security, but it further highlights challenges pertaining to critical infrastructure (CI) and emergency management (EM) in northern Canada.

Regarding Arctic and near-Arctic states' (some may infer Russia and China) interests in the Arctic, the chapter states that they are "using a broad range of military capabilities and other state-controlled assets as they work to collect intelligence and position themselves to access or control sensitive sites, infrastructure, and strategic resources – potentially under the appearance of productive activities". [70] In this context the Government of Canada is emphasizing the real security and defence threat in the Arctic, underscoring the need to act sooner rather than later. In order to address these defence and security concerns, the framework chapter reiterates that there is a need for a *greater presence* and that requires *collaboration*.[71] Specifically, the chapter states that "robust CI is required in order to support communications, EM and military capabilities, and safe transportation within the region."[72] However, in consulting the framework chapter and the defence strategy *Strong Secure Engaged*, there are no specific mentions of an increase to personnel or infrastructure in northern Canada.

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[69] Government of Canada, *Canada's Arctic and Northern Policy Framework: Safety, Security, and Defence Chapter*, (Ottawa: Minister of Northern Affairs), 10 Sep 2019. Accessed 19 Apr 2020: https://www.rcaanc-cirnac.gc.ca/eng/1562939617400/1562939658000.

[70] Ibid, p5.

[71] Ibid.

[72] Ibid.

In reviewing the Government of Canada website on *Defence Infrastructure Projects* dating from 2012-2019, it does mention airfield infrastructure improvements in Goose Bay, Labrador ($17.3 million total), infrastructure upgrading in Alert, NU ($10.2 million), and airport runway extension and modernization in Inuvik, NWT ($150 million).[73] If there is in fact a desire to increase the collective Government of Canada footprint in northern Canada, it does not currently seem to be documented or well-advertised. Projections over the longer term, past 2030, need to be formulated and details specified in order to create major projects and to request funding.

To conclude this chapter, information was presented regarding the macro distribution of CAF facilities across the Canadian Arctic, as well as a more detailed overview of some of the more primary, permanent locations which fall under the purview of JTF(N) and 1 CANR. Other government departments and civilian infrastructure was also highlighted for potential collaborative work in establishing sustained support nodes across northern Canada. Depending on the mission that the Government of Canada may task the CAF with in the future, one must be very cognizant of timeframes allocated to such tasks, and how easily some of those timeframes may become extended due to unforeseen circumstances (i.e., weather conditions). Having insufficient infrastructure for an increased CAF presence, for which additional infrastructure still needs to be envisioned with associated timelines, is indicative of the necessity for the CAF to begin planning and preparing immediately. At this juncture, it is essential to consider what can be accomplished in the interim, potentially using methods which already exist in industry, to bridge the gap. This segues into the following chapter regarding what current CAF sustainment

[73] Government of Canada, "Defence Infrastructure Projects", (Ottawa: Department of Defence), 11 Oct 2019. Accessed 2 May 2020: https://www.canada.ca/en/department-national-defence/services/infrastructure-projects.html.

to the Arctic looks like, based on existing infrastructure, and what action could potentially be taken in the meantime as more permanent infrastructure is planned and built.

CHAPTER 3 – OVERVIEW OF CURRENT CAF SUSTAINMENT TO ARCTIC OPERATIONS AND ITS POTENTIAL DEVELOPMENT

The distinction of those aspects which are considered *support to defence*, within the context of the research question, are specifically those activities which sustain operations within the CAF. Sustainment is considered "the ability of a nation or a force to maintain effective military power to achieve desired effects".[74] The activities which makeup support elements that execute sustainment activities in the CAF are those related to logistics, contracting, vehicle and equipment maintenance, military engineering, communication and information, military police, health, and personnel services.[75] Each of these sustainment or support functions need to be considered collectively across the northern Canadian territories to determine whether the CAF, or more generally the Canadian government, is prepared to conduct sustained (6 month+) operations (or have a sustained presence) in the Arctic. The detailed, individual sustainment activities surpass the purview of this paper however, they should be planned for individually and at length to determine specific details of both short and long term support operations in the Canadian Arctic. Those *support* details which specifically pertain to the survivability of the force, essential basic life necessities, will be the focal point of this paper as per the research question.

A key factor in supporting additional, sustained operations in the Canadian Arctic is the ability to store necessary supplies (i.e., food, water, fuel, medical supplies, mechanical equipment, etc.) on-site to avoid lengthy turnaround times when re-supply is needed. It is also

[74] Government of Canada, *Canadian Forces Joint Publication 4-0 – Support, 1st Edition*, (Ottawa: Canadian Joint Operations Command), 6 Oct 2016.
[75] Ibid.

necessary, given the scarcity of certain resources in northern Canada (i.e., fresh food, petroleum products, etc.), to have minimal-to-no impact on the local communities which currently reside within close proximity to the CAF installations across northern Canada. With these factors in mind, this paper will focus on the following: (1) resupply of food, water, fuel, munitions, and medical supplies; (2) housing personnel and their personal kit; and, (3) housing large support equipment (such as *construction engineering vehicles* - forklifts, dump trucks, ploughs, backhoe/loader, *logistics vehicles* - flatbed trailer and truck, and *mechanical engineering vehicles* - transportable maintenance workshops for maintenance and vehicles for recovery operations). The latter point, regarding large equipment, should be a major deciding factor as to what mission the CAF is best suited to execute in northern Canada due to the complexity of having such equipment and associated support available in location.

Generally speaking, the northern CAF installations are *resupplied* in the same way as the local communities within which these installations are integrated. If *food* is produced locally, even for specific periods of the year, it can be purchased locally, otherwise CAF requirements are amalgamated with local requirements and shipped North from southern Canada as required. Food-holding locations are dependent on each locations ability to temperature control food supplies. *Water* can be sourced locally, however, there are strict guidelines to preserve and environmentally protect all water sources. *Fuel* is a very limited commodity, especially in places such as CFS Alert where aircraft are restricted from refueling on-site (for emergency purposes only) and expected to refuel in Thule, Greenland prior to and after transiting to Alert, NU. Local movement is limited in such isolated communities, therefore minimal fuel increases should be required (i.e., there are not many, if any at all, larger vehicle platforms required to sustain operations at northern CAF installations), aside from heat production for accommodations and

work spaces. *Ammunition* is not frequently used for training or operational purposes in the Canadian Arctic at present, aside from CAF members protecting themselves and their resources from local wildlife, or for Auxiliary Security Force requirements. *Medical supplies* are resupplied either through local pharmacy, if available, or CAF resupply operations such as Operation BOXTOP.[76] Any *other supplies*, especially those considered non-essential, are resupplied either through the local community if the supplies are available, constructed by CAF personnel where appropriate, or requested through southern CAF bases to be resupplied on missions such as Operation BOXTOP. The current somewhat complex re-supply methods are indicative of the potential major impact that increased CAF operations in the Canadian Arctic, due to increased supply demand, could have on local and indigenous communities.

The *housing of personnel and their personal kit* is limited with existing infrastructure. As per Figure 2.4 (above), the personnel accommodation buildings (PABs) located at each forward operating location (FOL) can house approximately 200-250 personnel, in addition to those who currently operate and maintain the facilities. Those accommodations quickly fill-up with the staffing required to support fighter jets when they are in location. The Canadian Forces Arctic Training Centre, in Resolute Bay, NU, can house approximately 140 additional personnel. However, all other locations have minimal to no capacity to hold personnel in addition to the current staff on-site.

Personal kit (for example: an approximately 50lb ruck sack, additional similarly-sized bag and small carry-on-sized bag) can be accommodated in each location which is specifically

[76] "Operation BOXTOP is a Canadian Armed Forces (CAF) mission to bring supplies to Canadian Forces Station (CFS) Alert. CFS Alert is remote, located on the northeast tip of Ellesmere Island, Nunavut, just 817 km from the North Pole. As a result, the CAF concentrates on main supply periods for the station twice per year, once in the spring and once in the fall." Source: Government of Canada, "Operation BOXTOP", (Ottawa: Department of Defence), 10 Oct 2018. Accessed 18 Mar 2020: https://www.canada.ca/en/department-national-defence/services/operations/military-operations/current-operations/operation-boxtop.html.

designed to house additional personnel. With such limitations, the deployment of personnel in the near term would require heavy scrutiny as to each individual's necessity on the mission. Other potential options to house CAF personnel would be to use Arctic tentage (5-10 person tents), modular tentage (the tentage holding capacity is dependent on how many sections are strung together) with liners, or to engineer the use of the Relocatable Temporary Camps (RTCs) which house 250 or 500 personnel, depending on the variant used.

One factor which would prove very difficult in terms of a hasty deployment to the Canadian Arctic would be the *housing of large support equipment*, used by Engineers, Logisticians and Mechanics. If there was no need for such equipment, or even minimal requirement, this complex factor and its potential necessity may be most easily mitigated by using on-site, local resources if they exist – location dependent. The use of local resources would, of course, require consultation with the local communities to ensure that the use of such resources would not have a negative impact on the communities themselves.

There is minimal equipment housed and available at the FOL locations, as well as at the ATC, in order to maintain current operations related to, for example, runway clearance and maintenance. There is no further CAF or DND capacity to house such large equipment at current CAF installations in northern Canada. Any requirement to increase the footprint of large equipment would have significant logistical challenges in their movement from southern to northern Canada, as well as their supportability in location (i.e., increased fuel, maintenance, and recovery considerations and requirements over the long term). Also of importance, and increase of any personnel, equipment or infrastructure at any FOL location would also have to be planned and executed in close collaboration with NORAD as those sites fall under the purview/command

of 1 CANR. Ongoing NORAD operations must not be compromised in the execution of increasing the CAF presence in northern Canada.

All aforementioned sustainment activities are greatly reliant on *transportation networks*. Some of the major *road networks*, in northern Canada, are highlighted in Figure 2.2 (of note, not all installations are accessible directly by ground from southern Canada). In general, the existing road networks are very limited, disjointed and not necessarily designed for additional use beyond what they are currently being used for. There are minimal restrictions on *air transportation networks*, aside from inclement weather and runway supportability of particular types of aircraft. The *maritime networks* surrounding northern Canada are accessible for very short durations during the year (approximately three months) presently, however, they will continue to be modified drastically as climate change adjusts the landscape in the Arctic region.

The House of Commons Standing Committee on Foreign Affairs and International Development completed a report in April of 2019 confirming that "overall vessel traffic in the Arctic has more than doubled over the last 40 years".[77] This highlights the magnitude of the change in accessible Arctic waterways. These transportation networks are paramount in the supportability of sustained, long term CAF operations or presence in northern Canada. In the next chapter, alternate civilian infrastructure in northern Canada will be discussed as a possibility for the CAF to pair-up with industry, in order to demonstrate the potential for a relatively quick response, to potentially elongated operations in the Canadian Arctic.

[77] Government of Canada, *Nation-Building at Home, Vigilance Beyond: Preparing for the Coming Decades in the Arctic*, (Ottawa: House of Commons), April 2019. Accessed 3 May 2020: https://www.ourcommons.ca/Content/Committee/421/FAAE/Reports/RP10411277/faaerp24/faaerp24-e.pdf.

3.1 – Limitation on Support Infrastructure Pertaining to Health Services

Most all CAF facilities in northern Canada currently have inherent health services capabilities available within their current infrastructure and facilities, or draw from health services within their local community. Some northern CAF installations are limited in their scope to support operations, for example, in the level of health services available in CFS Alert as compared to JTF(N) HQ in Yellowknife, NWT. The size of health services organization at each northern CAF site is due, in part, to the size of the military footprint which is currently at each location and the corresponding services which are thus mandated. The size of organization is also dependent on the equitable distribution of resources to achieve all Canadian defence policy (*Strong Secure Engaged*) objectives and to concurrently provide health care services to the CAF in southern Canada (as per domestic requirements).

Limited increases in the provision of health care services to the CAF in northern Canada may be achievable immediately, but would be highly dependent on the availability of health care professionals and the demands of concurrent tasks based on the ongoing operational tempo.[78] The determination of whether sufficient health services would be available to support any additional operations in northern Canada would have to be assessed based on more detailed task information, such as: exact location(s), amount of personnel increase, duration of stay, and currently available health services. For the purposes of this paper, the supportability of health services will not be assessed aside from the transportation networks available to provide support to pre-existing CAF installations in northern Canada.

[78] As per a 2018 audit of Canadian Armed Forces Health Care Services, by the Assistant Deputy Minister (ADM) Review Services (RS), the survey mentions a shortage of "medical officers, pharmacists and social workers". There are other CAF health care trades which are also demonstrating shortages, to the point where some, such as Medical Officer, would currently receive a signing bonus for joining the CAF. Source: Government of Canada, "Evaluation of Military Health Care 1258-3-010 (ADM(RS))", (Ottawa: Assistant Deputy Minister Review Services), November 2018. Accessed 18 Mar 2020, https://www.canada.ca/en/department-national-defence/corporate/reports-publications/audit-evaluation/evaluation-military-health-care.html.

3.2 – Limitation on Support Infrastructure Pertaining to Munitions Storage Facilities

There is also a limitation on munitions facilities or the ability to hold additional munitions safely and securely on-site at each FOL and northern CAF site, aside from what is loaded in aircraft and carried by personnel where deemed operationally required (whether training or live rounds). Munitions facilities require net explosive quantity stand-off distances and barriers; thus, additional facilities would be required for longer term operations where munitions may be used more frequently.[79] Munitions storage facilities, especially in the Canadian Arctic and with the requirement to go through Territorial governments for land claims and approval on new infrastructure builds, could potentially take additional time above and beyond what an average new CAF infrastructure project requires. This additional time is due, in large part, to the nature of the supply commodity (ammunition, explosives and related accessories such as detonation charges) which would be housed within. The determination of whether current munitions holding requirements are sufficient, as opposed to increasing the munitions holding quantities due to a potential addition of personnel, equipment and infrastructure at northern CAF sites, would be entirely dependent on the task assigned to the CAF.

Another potential option would be the establishment of hasty munitions storage facilities (i.e., seacans and other fortification requirements, as seen on other CAF expeditionary operations) which could be created relatively quickly and put into place with appropriate munitions specialist (i.e. Ammunition Technicians), Construction Engineers, air support, and supply provisions. Also required would be authorities and permissions granted through the CAF,

[79] Additional munitions storage facilities must only be established after consulting local authorities and once land is identified and permitted. Whether hasty or permanent, all munitions storage facilities must be made in accordance with the appropriate regulations, such as the Canadian *Explosives Act*, as well as any Department of National Defence internal regulations.

the Government of Canada, and the Territorial governments in the specific areas of operations. Munitions storage may not necessarily be required, as it would be entirely mission specific, therefore a needs assessment would be required for this particular project. During the interim, where decisions are being made, it may be of interest for the CAF to begin building hasty munition storage sites with a view to potentially permanently house munitions in the future. These needs assessments should be conducted at any northern CAF installation which is expected to receive additional personnel over a sustained period (i.e., in the vicinity of the FOLs), to lessen the burden of potential future facility requirements.

3.3 - Limitation on Food Supplies Temperature Controlled Storage

Proper nourishment is essential for the body's "metabolic response to cold and hypoxia" in an arctic climate.[80] As such, it is of critical importance for the survivability and sustainment of a CAF element in the Canadian Arctic to be able to provide, and thus properly store, food. In order to properly store food for personnel, in addition to those who currently work in the Canadian Arctic, there would be a requirement for a temperature controlled containment unit(s) (depending on the size of the force deployed North), a generator or ability to provide power to the containment unit, fuel for the generator (if used), and additional shelter support (to keep the refrigeration unit and/or the generator away from the elements) as required. There is also a requirement for space to house dried and canned goods, as well as any cooking instruments and tools that would be required above and beyond what is currently in location. Health and safety, in terms of the storing, processing and disposal of food and food products would remain paramount in order to protect the health of the force.

[80] Eldon W. Askew, *Division of Foods and Nutrition*, (Salt Lake City: University of Utah), 1994.

If the need should arise for additional temperature controlled sea container units, along with generators and the additional requirements for storage, processing, and health and safety concerns, these supplies and equipment could all be shipped North, from southern Canada. This could be accomplished by using either pre-existing supplies, rentals, or purchased equipment as necessary and on relatively short notice. These are items which could be acquired and held in Arctic-specific operational stock, or as part of an *Arctic pack-up kit*, at 25 Canadian Forces Supply Depot in Montreal, Qc, where other operational stock for expeditionary operations (and some domestic operations where necessary) is also located.

There will also be a requirement for food services personnel, either CAF Cooks, caterers, or contracted food services professionals to prepare and manage food services operations at northern CAF installations, especially where significant increases in the quantity of personnel is concerned. In order to employ CAF Cooks at any northern CAF installations, much like health services personnel, a needs assessment would be required and the CAF would have to confirm whether they have sufficient personnel to fulfill the defence policy requirements both at home and abroad.

3.4 – Limitation on Communication and Information Systems in the Canadian Arctic

Communication and information systems (CIS) must be in place for the survivability of a CAF force anywhere around the globe. This is no different than the requirements in northern Canada, however, the harsh conditions further complicate CIS infrastructure. Should any northern CAF installations experience an increase in personnel, over a sustained duration, CIS infrastructure would have to be assessed to see whether the current infrastructure could withstand such an increase. As each of the CAF sites in northern Canada currently possess CIS infrastructure, minimal CIS should be required immediately for minimal increases in personnel,

however a needs assessment would be required to determine the feasibility of longer term stay or larger increases. Future major communications corridors, such as that which was mentioned in the *Northern Corridor Project* previously, would greatly benefit connecting northern Canada with other CAF, industry and civilian networks worldwide.

This chapter looked at how the CAF currently supports itself across the northern CAF installations. It also discussed what it would mean, in a general sense, to sustain a CAF force in addition to what is currently positioned in northern Canada. It highlighted the importance for the Government of Canada to decide exactly what is required of the CAF in terms of the types of tasks to be completed, and more specifically, whether any large equipment would be required as the logistics of using such equipment in northern Canada is difficult. The focus (above) was on logistics (i.e., essential supply commodities for the survivability of the force, distribution, and storage of those supplies), as well as the transportation networks which are used to support the supply chain and some of their nuances. Health services support (i.e., the health of the force to be maintained in order to perform effectively in a harsh environment) and communication and information systems (i.e., the essential ability to communicate amongst each other and to connect into essential services as required – search and rescue, coast guard, etc.) were also discussed, but are outside of the purview of this paper and should be assessed in detail for their supportability. The inclusion of all other support trades necessary for an increased CAF presence in northern Canada would be dependent on the task assigned by the Government of Canada to the Department of National Defence.

The *size and distribution of the force* required across northern Canada are the pertinent details which would be considered essential support planning factors. This information is so critical because many planning factors spill out from it, such as: the amount of basic life

necessity provisions to plan for in each specific location, the amount of infrastructure required, the type of equipment to be shipped from southern Canada North, and so on. This detail is currently not provided in the Government of Canada *Arctic and Northern Policy Framework*, nor in the framework's *Safety, Security and Defence Chapter*, though they do mention the need for an increased presence. An equally important detail pertaining to an increased presence in the Canadian Arctic, as it relates to the type of supplies and equipment required to be transported North, is whether the Government of Canada wants to posture the CAF as a *presence force*[81] or a *security force*[82]. The differentiation means a great deal of difference in terms of the associated support requirements.

CHAPTER 4 - GAPS IN PLANNING FOR SUPPORT TO OPERATIONS IN THE ARCTIC OVER THE LONGER TERM (6 MTH+)

Chapter 3 discussed support operations insofar as they pertain to the provision of basic life necessities, for CAF personnel and resources which are currently employed in CAF defence installations across northern Canada, as well as the subsequent effects of a possible increase of personnel and resources. Some issues were highlighted regarding an increase to the CAF presence in northern Canada, based on current support plans, however there are still some gaps to be addressed outside of the provision of basic life necessities. In order to properly address the concerns regarding any gaps in support plans for an increased CAF presence, it is important to have a more in-depth understanding of what those gaps are. This chapter will emphasize some of the most critical areas of failure, or simply where inefficiencies may be detrimental to longer term CAF support operations in northern Canada.

[81] What is meant by a *presence force* is essentially that the military would be postured in such a way that they are visible but not necessarily visibly armed or in defended positions.

[82] What is meant by a *security force* is that the military force is armed, in defensible positions and prepared to conduct military defence and security-related operations. This would be in-line with the 'hard power' assumed when speaking of military forces, and military forces used in a more 'traditional' sense.

4.1 – Time Required to Achieve Effective Support Operations

A significant concern, should the Government of Canada decide that it wants to increase the CAF presence across northern Canada, is the considerable amount of *time* required to plan, engineer and build additional infrastructure (or what is called *real property*). Depending on the size, location, available materials on-site (or within reasonable distances), complexity and cost of any necessary infrastructure (i.e., real property), it could take more than 13 years[83,84] to have purpose-built infrastructure made in northern Canada. This is also dependent on the approval and funding for specific projects. If project identification began immediately (in the 13-year real property cycle) for any CAF infrastructure which might be required in northern Canada, and knowing that some estimates see the Arctic waterways being completely ice-free by as early as 2035, that would leave a small gap of two years for the necessary resources and personnel to move into the aforementioned infrastructure and begin operations.

Due to time constraints and the fact that the Canadian government may want to react sooner, it is wise to consider what measures could potentially be taken while awaiting more specific direction from the government pertaining to what is required of the CAF in the Arctic and northern Canada. To this end, chapter 5 will address how the CAF may be able to take advantage of what is already available in the CAF or through Canadian industry presently, as well as another possible option being used in Iqaluit, NU which could help to bridge the time gap.

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[83] As per an internal audit which was conducted in 2013, it highlighted the time it could take from the identification phase (4 years), through the project approval definition and implementation phases (9 years), for one Department of National Defence real property piece of infrastructure to come to fruition. It should be noted that this 13-year cycle to produce one building could be further exacerbated in time and resources depending on the financial budgeting, and prioritization, available to such a resource at any given time.

[84] Government of Canada, *Internal Audit of Capital Project Cost Estimation*, (Ottawa: Department of National Defence), May 2013. Accessed 27 Feb 2020: https://www.canada.ca/content/dam/dnd-mdn/migration/assets/FORCES_Internet/docs/en/about-reports-pubs-audit-eval/p0972-eng.pdf.

4.2 – Lack of Policies to Enable Interdepartmental Hasty Operations in Northern Canada

One of the issues presented when using current, in-place organizations and infrastructure in order to achieve synchronous effects in support of operations in northern Canada is the lack of policies and regulations which permit, for example, federal government organizations to work together, or even to work with industry. For instance, the RCMP have rotary wing air assets available in the North and, on occasion, they would be more timely of use than similar CAF assets (which may be a further distance away) during an emergency scenario. However, the RCMP cannot immediately authorize the co-use or general transport of CAF personnel without a request being pushed up the chain of command to the Minister of National Defence and across to the Minister of Public Safety and Emergency Management for approval. Such a lengthy approval process may actually mean life and death dependent on the emergency scenario. In order to mitigate this issue, there should be administrative means created to allow federal government organizations to work together in northern Canada in order to achieve common goals (i.e., the safety and security of Canadians, indigenous populations, and visitors to Canada). This could be achieved by a memorandum of understanding (MOU) or letter of agreement (LOA), but is important in achieving a true whole of society approach to operations in the North as resources and infrastructure are limited, and it is important to be enabled to work with what is available.

The same could be said for federal government agencies attempting to work with local, on-site industries which are currently operating in northern Canada. Federal government organizations do not want to portray bias or favouritism when working with industry, therefore it is difficult for such organizations to pre-commit to any particular industry or civilian company via official means (i.e., MOU, LOA, or other legally binding contracts), where assistance may

only be required sporadically or intermittently. A key consideration, aside from the scarcity of resources in northern Canada, is the fact that some (for example) mining companies have internal air lift and medical services available on-site for internal emergencies. As this capacity is already integrated into a local system, it may be feasible that another federal government agency could request the use of such an asset in an emergency situation. In order to do this, it would be prudent to participate in table top exercises, and the like, where emergency scenarios are run with all potential actors and their respective assets involved. Of course, all involved would be acting with the confidence that remuneration or repayment would be completed post-event.

Though there is often talk about a whole of government approach to achieve goals in (and outside of) Canada, or an interdepartmental approach to achieve efficiencies, this is not necessarily a concept which is easily executed, especially without the requisite policies. There is also a whole of society approach to national goals which could achieve similar efficiencies with national or privately owned resources, but there is seemingly no whole of society policy which permits such collaborative work outside of the more forceful Defence Production Act.[85] There would be merit in exploring more permissive policies which enables Canadians, industry and governmental departments to work together, both within and outside the context of emergencies.

4.3 – Supply Chain Disconnect Between Southern and Northern Canada

Something which may be considered outside of the purview of the CAF is the fact that Canadian infrastructure, specifically transit corridors (i.e., road, rail, communications links, etc.), do not extend into northern Canada to the same extent they do in southern Canada. This makes the movement of supplies, materiel and equipment, as well as the connection of communication

[85] Information pertaining to Canad'a Defence Production Act can be located at the following link. Government of Canada, *Defence Production Act*, (Ottawa: Justice Laws Website), 5 Mar 2020. Accessed 3 Apr 2020: https://laws-lois.justice.gc.ca/eng/acts/d-1/.

and information systems, incredibly difficult. Depending on how the Government of Canada decides to task the CAF in northern Canada in the future, this disconnected supply chain could be one of the biggest limiting factors. It could be said that the disconnected supply chain, combined with the time required to achieve specific effects by the CAF in northern Canada, will be the most important support plan gap to overcome. Why, one might ask?

Basic survival requirements of anyone in an arctic environment are food, water, shelter and a heat source. If additional CAF members were tasked to operate in northern Canada, these basic survival requirements would be necessities to provide to each and every member. If the disconnected supply chain limited, for instance, food or shelter requirements, the CAF would not be able to achieve its mandate in northern Canada. As the lack of supply chain is recognized at this time, even though it may be addressed and improved in the future, there is an obvious requirement to build a plan to ensure the CAF could in fact operate within the current restrictions of the supply chain to northern Canada. A few options will be addressed in the recommendations section found in chapter 5.

4.4 – Missing Details Regarding the Direction from the Government of Canada Pertaining to a Long Term Plan to Maintain Sovereignty and Security in Northern Canada

Though this specific topic is not a direct gap in support plans to CAF operations in northern Canada, it does have significant secondary and tertiary impacts. Without specific and detailed political, strategic and operational-level direction for the CAF to carry out a task or mission in the North, there will inherently be a lack of associated funding and prioritization of CAF operations in northern Canada. Indirectly, the lack of detailed direction means: that the CAF does not know which resources need to be allocated to the North (i.e., division of assets between expeditionary and domestic requirements, as well as a division between assets required in southern and northern Canada); which of the current but limited CAF resources to prioritize

per location based on the multitude of northern CAF locations; and, which northern CAF installations to potentially increase current support requirements at (i.e., to include acquiring/ contracting and shipping large equipment, securing a reliable supply chain for increased long term support requirements, making local and territorial agreements for the increase of CAF presence, etc.), and so on. As each of these requirements take time, resources and funding, it is important to begin addressing them as soon as possible, however, they cannot be addressed without critical and sufficient detailed direction from the highest levels of government.

One of the critical details of the direction which is required from the Government of Canada, regarding the CAF presence in the Arctic or northern Canada, is pertaining to which posture it would like to see the CAF adopt. As previously discussed, the CAF could adopt a *presence* force posture, or a *security* force posture. These postures have different support plan requirements, at a minimum it is the difference between weapons, weapon platforms and munitions (i.e., having them or not having them), and therefore requires direction prior to being shipped North. A presence force posture would be much easier achieved in the near term, and it could be the foundation for either the presence force posture, or a future security force posture - if, for example, a presence force posture was to eventually lead to a security force posture at a later date.

In order for the government to provide such direction, one of the more complicated issues to be addressed is whether it is believed that there is a credible threat in the Arctic, or even from the near-Arctic, to warrant escalating the defence posture in northern Canada. As mentioned in chapter 1, Russia's arsenal consists of air and sea launched cruise missiles which have a range of up to 3,500kms. China also has long range missiles such as the land-based DF-26 multi-role Intermediate Range Ballistic Missile (IRBM), and the air-based H-6 with Land Attack Cruise

Missile (LACM), with ranges of 4,000kms and 3,300kms respectively. Depending on where China may launch such a missile from, for instance if such missiles were based in its research centre locations in Norway, Iceland, and potentially Greenland in the future, their long range missiles would have significant global reach.

Also, with the globe currently fighting a viral pandemic (Coronavirus, or COVID-19), and global medical supply shortages being announced, it should not be inconceivable that some countries will go to extreme measures to ensure their safety and longevity.[86] This may give some indication as to what the Government of Canada will want to impose as a military posture to be implemented in northern Canada in the future. The Government of Canada's *Arctic and Northern Policy Framework: Safety, Security, and Defence Chapter* also stipulates that the Government of Canada "require[s] a greater presence" in northern Canada, therefore already stating the importance of some improvement required based on the current defence and security posture.[87] Regardless, it is better to have the requisite defence posture and not need it, than need it but not have it in place.

This chapter emphasized: the importance of time to enable an increased presence across CAF defence installations in northern Canada; the lack of policies, MOUs, or LOAs between federal government agencies (as well as possibly with industry) to enable interdepartmental hasty operations as a whole of society approach to operations in northern Canada; the significant disconnect in the supply chain between southern and northern Canada; and, the missing details

[86] In a media statement on April 2, 2020, Philippine President Rodrigo Duterte announced to his police and military forces, who were helping to contain the spread of the Coronavirus pandemic by enforcing isolation policies, to "shoot them dead" if anyone was endangering the lives of the Philippine police and military members executing their duties. Global News, "Shoot them dead" Philippine leader Duterte warns coronavirus lockdown violators", (Toronto: Global News Headquarters), 2 Apr 2020. Accessed 3 Apr 2020: https://www.youtube.com/watch?v=Y3k5uPyHB9M.

[87] Government of Canada, *Canada's Arctic and Northern Policy Framework: Safety, Security, and Defence Chapter*, (Ottawa: Minister of Northern Affairs), 10 Sep 2019.

from the Government of Canada framework for the Canadian Arctic and North. Each of these topics are recognized gaps in planning for support to operations in northern Canada for longer durations (6+ months). The next chapter will make recommendations as to how to address these gaps over the short and long term.

CHAPTER 5 – RECOMMENDATIONS TO ADDRESS THE GAPS IN SUPPORT OF LONGER TERM ARCTIC OPERATIONS

One of the greatest challenges regarding CAF operations in northern Canada, aside from the extreme weather conditions, is the fact that such operations truly require a *whole of society approach*. Based on this, a variety of *important factors* should be considered, such as:

1. it is important to have specific and clear direction from the Government of Canada to guide the detailed planning and preparations to be carried out (with the whole of society);

2. it is important for all people and organizations receiving such direction to understand who is responsible or in-charge of which aspects of a national plan for security, defence and sovereignty in northern Canada – for example: territorial government, federal government, law enforcement agencies, indigenous peoples, CAF, Canadian Coast Guard, Environment and Climate Change Canada, the Department of Fisheries and Oceans, or local business/industry/land owners;

3. it is important for the federal government and industry to recognize the value (i.e., not necessarily an immediate return on investment, but rather long term revenue potential), regardless of the potential risk, of connecting southern and northern Canada with appropriate infrastructure corridors to support the movement of supply chain goods and services;

4. it is important to consult with indigenous and local communities to help support such a whole of society plan in order to both provide opportunity to those communities and to use the essential skill sets which may be available locally;

5. and finally, it is important to recognize how major waterways free from ice will increase sea shipments in northern Canada, and how that increased movement may pose a risk to Canadians and Canadian sovereignty (see figure 5.1).

With all of these factors in mind, the following two sections discuss short and long term solutions to many of the problems identified throughout this paper which would impact CAF

support to operations over extended periods (6 months+) in northern Canada. A summary of the recommendations can also be found in Annex B.

Figure 5.1 – Requirements for a Whole of Society Approach to Defence, Security and Sovereignty in Northern Canada
Source: Major R.A. Richard, overarching requirements identified by research related to extend and increase Canadian Armed Forces support operations in northern Canada

Section 5.1 – Potential short term (1-5 years) solutions to support sustained CAF and Whole of Society operations in the Canadian Arctic

As both force postures (presence and security) could be enabled by the foundational requirements needed for a *presence* force posture, it is recommended that the CAF focus on the establishment of a presence force posture in the short term. In order to support an increase in the CAF presence in northern Canada, as discussed in chapter 2, this will require additional storage capacity (i.e., food, water, fuel, ammunition[88], medical supplies, varying sizes of equipment),

[88] Hasty munitions storage facilities should be made early in order to enable possible security force posture operations in the future. The idea of having munitions storage established during the short term does not mean that ammunition necessarily needs to be stored on-site during the short term, however, it will enable possible future operations by being planned for and addressed early.

and housing (for CAF personnel and their personal kit), as well as reliable supply chains which could support tasks or operations in excess of six months across northern Canada. A presence posture would see an increase of mostly troops across northern Canada. The most likely northern CAF installations to see an increase in CAF presence, at least initially, would be Inuvik and Yellowknife, NWT, Nanisivik, NU, and potentially the Artic Training Centre in Resolute Bay, NU. The reasoning for this is each site's proximity to the Northwest Passage, as well as the location of a pre-established headquarters (HQ) with the Joint Task Force (North) being located in Yellowknife. As Russia should be considered a leader in northern/Arctic military operations, and has already pre-positioned its military installations along sites which are in close proximity to the Northern Shipping Route (NSR), it would only be logical for Canada to imitate this concept along the Northwest Passage.

With a focus on specific northern CAF installations (Inuvik, Yellowknife (HQ), Nanisivik and Resolute Bay), the focus will now be on more detailed requirements. There is no indication of what size of force would be deployed, or posted, to these northern CAF sites, and therefore this is where more detailed direction from the Government of Canada (as per the first step indicated in Figure 5.1 – direction - suggests) is essential. There is also no indication of what other organizations may be required to work with the CAF as a part of a whole of society approach. Using an estimate of approximately 100 (maximum) people[89] at each of these sites, which equates to a company-sized Army element, planning can begin. See Annex A for the details regarding support requirements to be considered for logistical support to any additional troops being placed at any of the four potential locations. Immediate concerns for the

[89] This number suggests that each site could surge anywhere from an additional 20-100 people, and this could potentially include other federal government agencies depending on the policy developed (as per Figure 5.1) to enable government agencies to work together in order to achieve a whole of nation approach in northern Canada.

deployment of either a presence or security force posture would be those support requirements related to the provision of basic life necessities (sustenance, accommodations and a heat source) and for proper hygiene and good health, to ensure the survivability of the force. This is crucial in the short term plan.

The importance of making use of what resources are already available in northern Canada, especially considering the austere environment and disconnected supply chain, was highlighted in chapter 4 concerning administrative measure which are of important consideration. MOUs, LOAs, and other legally binding agreements should be created, most especially related to isolated northern CAF installations, in order to best enable a whole of society approach to achieving Government of Canada aims in the Canadian Arctic. As a minimum, these agreements should be made amongst any co-located federal government organizations (i.e., CAF and RCMP), however, such agreements could also potentially be made with provincial-level governments and local industry. Within these agreements, two important components are that the authority to act should be resident with an authority that is locally-based, and that remuneration or payment will be discussed and agreed upon post-event.

As per the comments in chapter 2, there is a requirement to coordinate ongoing federal projects with potential new projects (such as an increased CAF force presence in northern Canada), especially those that might have some overlap in resources or supply chain distribution. After a detailed plan of what the CAF requires for each specific location across northern Canada, there should be a coordination meeting held, across governmental bodies (as a minimum), to see whether there are efficiencies which can be made. It is recommended that this coordination meeting be chaired by the office of the Crown-Indigenous Relations and Northern Affairs Canada within the federal government of Canada. Any organization which may be identified

through Government of Canada clarification or subsequent direction regarding defence, security and sovereignty operations in northern Canada should be included as a part of the coordination meeting. This is a critical part of the short term plan so as to avoid spending additional time or resources working in planning/information silos. Upon conclusion of this coordination meeting, planning can begin for what goods need to be shipped north.

During the interim, once government direction is clarified and strategic planning has begun, initial operational support planning can also begin and Arctic Pack-Up Kits (APUKs) can begin to be created by 25 Canadian Forces Supply Depot (CFSD) in Montreal, Qc. Support planning should incorporate logisticians, mechanical and construction engineers, and communications specialists at a minimum, and this may best be done by the Canadian Forces Joint Operational Support Group (CF JOSG) of the Canadian Joint Operations Command (CJOC). There is also a requirement for someone knowledgeable of the command and control (C2) element that will be in-place during the increase to CAF operations in northern Canada, as well as someone knowledgeable of the function of the entire CAF contingent at large (in northern Canada), to participate or inform the support planning group. Some of the commodities which should be included in the APUKs are items required for camp set-up (dependent on location and quantity of personnel; specific accommodations options, to include tentage, was discussed in chapter 3), food, storage (for food [cold and dry], fuel, medicines, and small equipment as a minimum), communications, power generation, and troop movement (dependent on the size of the force at each location).

With APUKs planned for and acquired, efficient shipment and distribution methods can be coordinated to each of the northern CAF installations, as and where required. A multitude of shipment methods could be used: shipment by rail to Hay River, NWT and onward to

Yellowknife and/or Inuvik via ground transport; shipment by sea during navigable seasons to Inuvik, Resolute Bay and/or Nanisivik; and shipment by air to any of the four locations (Yellowknife, Inuvik, Resolute Bay or Nanisivik) would all be feasible. Any of the aforementioned methods could be contracted, or done by the CAF, or a combination of both. Also, depending on the amount of cargo being shipped north, it may or may not be logical to create an operational support hub (OSH) in the vicinity of Hay River, NWT, especially to enable the flow and distribution of the supply chain for prolonged operational support, as required. The requirement for an OSH should be assessed once the quantity of personnel at each location is confirmed and the flow of supply chain sustainment items is confirmed.

As the CAF seeks to modernize the force, it should be noted in this recommendations section, and acknowledged overall, that such a drastic increase of troops in northern Canada means that these troops will be taken from other operations, missions or domestic bases in order to enable such a plan (an increase of up to 400 CAF members would be deployed North if the planning figures of 1-100 in each or all of the four indicated CAF sites is confirmed). As this may be of significant concern to CAF leadership, acknowledging personnel shortages across some trades and ranks at present, this may also necessitate a drastic change to the training regime. As the CAF looks to continue its contributions for operations with coalitions and the United Nations, it would be imperative to scrutinize current training in the CAF and whether it meets the needs of the future force. It may be argued that, the CAF being a smaller military in comparison to other national militaries, that the CAF should begin providing more specialist roles to contribute internationally. If this comes to fruition, the CAF could easily specialize (as it does somewhat already) in Arctic military operations, or what is commonly known as winter warfare operations. The CAF would have the means (especially as it does now with the Arctic

Training Centre in Resolute Bay, NU), across multiple northern CAF installations, to foster good relations and work with international partners who also share an interest in Arctic military operations (such as Finland, Norway, the United Kingdom, the US, Japan, India, Iran, China and Russia – all of which already conduct Arctic training within their respective national militaries). This could all be achieved while concurrently having a presence along the Northwest Passage and maintaining the defence and security of Canada. With the Arctic demonstrating great potential for increased maritime shipping, it may become of increasing importance for these international players to concurrently increase their ability to operate in arctic conditions, therefore this adjustment in the CAF training regime could be fruitful over the long term. As the Arctic may become the next competitive frontier, Canada could establish itself as a major actor in its management and sovereignty early, much like Russia, and come out ahead of the game.

Upon conclusion of the planning, movement to, establishment (at minimum an initial operating capacity), and maintenance (primarily of sustainable supply chains and distribution methods) of CAF elements positioned across installations in northern Canada, the next recommended operational support item to be executed is the establishment of hasty munitions storage facilities in order to enable potential future operations. This task should also be achievable in the short term, and would require Ammunition Technical specialists and Construction Engineers to properly plan for and execute this task. As the collection of required construction supplies and potentially contracted services will take some time, as well as the time required to build in such challenging weather conditions, the creation of hasty munitions facilities should begin as early as practical during the short term plan.

This section summarized the requirements for more detailed direction to be provided by the Government of Canada, and tasks the CAF could complete in the short term, over an

approximate five-year period. To re-state those requirements items, they are: provision of detailed direction from the Government of Canada with a specific aim to select a *presence* or *security* force posture for an increased CAF presence in northern Canada; coordinate any efficiencies in achievable goals for northern Canada across federal organizations and any other select entities via a coordination meeting (or several); creation of MOUs, LOAs, or other agreements to better enable a whole of society approach in northern Canada; begin support planning and creation of APUKs with key support and operational specialists; plan and determine the means for shipment and distribution of specific supplies and goods identified for northern CAF sites; determine whether there is a requirement to establish an OSH in the vicinity of Hay River, NWT to enable the supply chain and distribution of goods North over the long term; achieve an initial operating capacity (which will be further detailed in planning for each specific CAF installation selected for increased CAF operations in northern Canada) and solidify a supply chain and distribution method which is sustainable over the long term; and finally, to begin planning and creation of hasty munitions sites at select northern CAF installations to enable potential future operations.

Section 5.2 – Potential long term (5+ years) solutions to support sustained CAF and Whole of Society operations in the Canadian Arctic

This section assumes that the recommendations provided in section 5.1 have all or mostly all been completed, or at the very least have been initiated. Without some of the necessary steps in the previous section, the items in this section would not be achievable, or would be impractical. This section will address some of the gaps to support operations for the CAF deployed to northern CAF installations from five years onward. Based on earlier statements in chapter 1, climate change will continue to have a significant impact on Canada over the long term, as Canada warms at twice the average global rate and northern Canada at nearly three

times the average global rate.[90] Based on this information, it is critical that the CAF takes into account the anticipated changing climate and landscape across northern Canada when making such long term plans. The following recommendations should heed such anticipated changes, and planners should incorporate this information into the details of their plans.

Permanent infrastructure should be established over the long term at each of the four recommended sites: Inuvik, Yellowknife (HQ), Resolute Bay and Nanisivik. The type of infrastructure will be dependent on the increased amount of personnel expected to be at each site. For longer term solutions, hard-shell infrastructure (i.e., actual buildings as opposed to tentage) should be erected for longer term stay. Actual buildings will indicate to the international community that Canada is taking defence, security and sovereignty to the next level, permitting not only a greater long term presence across northern Canada, but the ability to watch over the Northwest Passage and enforce any regulations that govern it. This more permanent presence will then be in place prior to the full warming and break-up of the ice across arctic waterways (estimated anywhere from 2035-2050[91]), and thus when maritime shipping traffic increases, Canada will be prepared in the sense of defence, security and law enforcement. To this end, it is imperative that the appropriate Canadian federal government agencies work together on these plans as it should reflect not only what might be required of the CAF, but also organizations such as the Royal Canadian Mounted Police (RCMP), the Canadian Coast Guard (CCG) and the Canada Border Services Agency (CBSA). Permanent infrastructure across these sites could potentially house the requirements of multiple federal agencies.

[90] M. Bennett, "The Arctic Shipping Route No One's Talking About", *The Maritime Executive* (Fort Lauderdale: The Maritime Executive, LLC), 5 Aug 2019.

[91] M. Bennett, "The Arctic Shipping Route No One's Talking About", *The Maritime Executive* (Fort Lauderdale: The Maritime Executive, LLC), 5 Aug 2019.

The recommended method of approach for permanent, hard-shell infrastructure across northern CAF sites is the use of pre-fabricated modules which can be created elsewhere in the world and shipped north for installation only. Iqaluit, NU is currently using this method for a hotel project where the pre-fabricated modules will be created in Shanghai, China and shipped to Iqaluit for installation.[92] This method will allow for the CAF to take advantage of the more permissive weather conditions in southern Canada (or elsewhere in the world), as well as to provide industry with the opportunity to begin making connections between southern and northern Canada. Indigenous and local populations from each site should be consulted for their expertise at all appropriate times throughout the building and installation process, to garner better support to the projects at large, and to continue necessary community connections.

As a whole of society approach is important to address the issue of connectivity between southern and northern Canada, to better enable these defence and security measures amongst other things, it would be important for the Government of Canada to address the issue of permanent infrastructure at the national level as well. This would be an ideal time (though it may be feasible to do so in the short term) to reconvene the coordination meeting representatives, mentioned in section 5.1, for another meeting chaired by the office of the Crown-Indigenous Relations and Northern Affairs Canada, to address this issue with industry. As discussed in chapter 2, the School of Public Policy at the University of Calgary has been working on the Northern Corridor Project for some time now and this project, (as well as any similar projects) must be seriously acknowledged and one or multiple projects should be approved to begin construction. It is of utmost importance to connect southern and northern Canada with 21st

[92] E. Tranter, "From Shanghai to Iqaluit: New hotel ships pre-assembled rooms across international waters", (Iqaluit: Nunatsiaq News), 23 Jul 2019. Accessed 18 Apr 2020: https://nunatsiaq.com/stories/article/from-shanghai-to-iqaluit-new-hotel-ships-pre-assembled-rooms-across-international-waters/.

century infrastructure. This should happen as early as practical as such projects will take significant amounts of time and money to complete. For instance, the Northern Corridor Project is estimated to take decades to build as well as approximately $100B to fund.[93] The Government of Canada and Canadians at large cannot afford to continue waiting on such matters of national importance. If such a project was to be selected, supply chains to each of the four selected CAF installations have the potential to be much better connected and more reliable than the status quo. This issue, however, is outside of the scope of the CAF and therefore needs to be addressed by the Government of Canada.

As per section 5.1, if the CAF does make adjustments to its training regime in order to accommodate a more specialist approach to Canada's contribution to international military operations, the establishment of hard shell infrastructure should also take into account the potential for working with other national militaries in the conduct of Arctic operations, or winter warfare training. Addressing this requirement early will set the CAF up for success over the long term. Having the appropriate facilities to accommodate training of other national military's Arctic contingents will demonstrate the importance of the Arctic to Canada, the professionalism Canada has in addressing this complex issue, and demonstrate the fact that Canada is an elite force in Arctic operations and should be considered a major player in all things related to the Arctic (i.e., survivability, economic ventures, sovereignty/defence and security, environmentally, etc.). As the Arctic becomes more accessible, and competition for resources and financial gains becomes more prominent, it is plausible that Arctic operations become of greater concern to the

[93] K. Provost, "Federal Transport Minister Calls Proposed $100B Northern Corridor an 'Appealing Concept'", (Toronto: Canadian Broadcast Corporation), 13 Oct 2018. Accessed 19 Apr 2020: https://www.cbc.ca/news/canada/saskatoon/canada-northern-corridor-infrastructure-1.4861272.

international community, and if Canada is best prepared, it could emerge a leader for others to emulate.

Federal policies and regulations should be reviewed and amended as necessary throughout the process of improving northern CAF sites and potential new or improved national infrastructure corridors, especially as the environment continues to change over the long term in northern Canada. With more accessibility, potentially more corridors to move goods across supply chains by ground, and generally more traffic between southern and northern Canada, not only federal but provincial-level policies and regulations need to be adjusted to reflect a more substantial flow of goods and thus potential economic revenue.

If other logistical distribution routes are more economically favourable, industry may use other routes, and therefore making the northern corridors less appealing. With easier movement of goods, the supply chain to northern CAF installations not only becomes more direct and reliable, but also less expensive to maintain over the long term. This may also lessen the cost for local communities to receive goods, and thus more goods may become available for the CAF to purchase directly from local communities, allowing the CAF (or the Department of National Defence and the Government of Canada at large) to invest locally and develop greater ties with local business. Enabling greater community ties and ties with industry across Canada should develop favourable support from Canadians, about the betterment of the nation at large, demonstrating solidarity across the whole of the nation.

Chapter 5 summarizes some recommendations to be made both to the leadership of the Government of Canada, in order to enable the overall short and long term plans detailed in this paper, as well as to the Department of National Defence, but more specifically to the Canadian Armed Forces, to carry out over the coming years. The short term plan recommendations

highlight the requirement for the Government of Canada to select what type of force posture it deems necessary in northern Canada, and thus many tasks would naturally ensue. All recommendations should be carried out in consultation with local and indigenous peoples, industry, and other government departments where practical, as part of a whole of society approach to operations in northern Canada.

CHAPTER 6 – CONCLUSION

The Government of Canada is poised to act on a potential world-leading initiative based on predicted economic increases, due to the Arctic becoming more accessible and subsequently, competition rising between states. As a clear option for the Canadian government in its aim to have a "greater presence" in northern Canada, based on their latest policy framework governing the Arctic and northern Canada, the CAF must be prepared to act. Based on threat evaluations, amongst other things, the Canadian government must make some important decisions. Specifically, the Government of Canada must decide on which type of force posture (presence or security), the exact locations to increase its presence, and the amount of resources (personnel and equipment) it deems necessary to achieve its collective desired effect across northern Canada. The CAF, and those encompassed within a whole of society approach, will then begin collaborating, planning and executing this new direction.

As was mentioned in chapter 1, regarding the background information which supports the paper, but more specifically the actual threats to be assessed regarding the Arctic at large, the competition or threat level which persists amongst the tri-polar states is significant. Though there is no immediate threat, the *Arctic and Northern Policy Framework: Safety, security and defence Chapter* indicates that there is "growing competition and increased access [which] brings

safety and security challenges to which Canada must be ready to respond".[94] The chapter also speaks to a desire for a "greater presence", though the details of which are not provided. Therefore, it is evident that the Canadian Government, and by association the CAF, must begin planning and preparing for changes in northern Canada.

Chapter 2 made some general observations about what current support operations are in place for existing CAF personnel and infrastructure in northern Canada. It specifically focused on those requirements to sustain basic life necessities, highlighting current practices and where issues may be identified if the CAF presence were to grow in any of the recommended locations listed in chapter 5 (Inuvik and Yellowknife (HQ), NWT, and Resolute Bay and Nanisivik, NU). By virtue of adopting a whole of society approach, this chapter mentions the potential use for piggy-back and last-mile logistics to achieve the critical supply chain connection between northern and southern Canada. It also demonstrates a reality of northern Canada, in that its remoteness necessitates that even government departments should appreciate what is available through local industry and communities, and seize the opportunity to work together for the safety and security of the country. The collaboration with industries such as the mining industry, which is also experienced in operating austere Arctic environments, is a great opportunity to make community connections.

Though current CAF support operations to existing CAF personnel and resources tasked to northern Canada are functional, there were obvious concerns mentioned in chapter 3 that would need to be addressed prior to increasing the CAF presence across northern Canada. These concerns are not insurmountable, but they would endanger CAF personnel and resources without proper attention. There were also other areas outside of the scope of this paper – health services

[94] Government of Canada, *Canada's Arctic and Northern Policy Framework: Safety, Security, and Defence Chapter*, (Ottawa: Minister of Northern Affairs), 10 Sep 2019, p.2.

support, munitions storage, temperature controlled storage for food supplies, and communications and information system connections – which would have to concurrently be addressed by the appropriate subject matter experts.

Aside from that which is required to provide for the basic life necessities, there are also other gaps which were identified in chapter 4 that highlight other limiting or restricting factors to support planning for CAF operations in northern Canada. Some of these factors were: the volatility of timelines based on geography, climate and resource availability; the lack of policy support to enable interdepartmental (and thus whole of society) hasty (or even more deliberate) operations; the disconnected supply chain between southern and northern Canada due to the lack of infrastructure corridors; and, the missing but pertinent details required from the Government of Canada in their national direction governing their approach to safety, security and defence in northern Canada. Though some of these issues or factors lie outside of the purview of the CAF, they do impact the way the CAF will proceed in its operations in northern Canada. This consequently impacts support to operations in northern Canada as many factors would substantially impact a support plan – for example, the amount of troops/equipment/infrastructure increased in each respective location, the type of posture sustained (presence or security), and the availability of a secure supply chain to ensure the survivability of the force. Such decisions thus are necessary prior to planning and preparing for a change to what currently exists.

Finally, chapter 5 makes numerous recommendations for reasonable ways to proceed, once the detailed government direction is provided. These recommendations are made quite generally, but could be further refined based on each location and their inherent complexities. It cannot be emphasized enough the importance of engaging with the local communities in order to better manage the integration of a "greater presence" of CAF across northern Canada. A true

whole of society approach will not only benefit the Government of Canada and the CAF, it will also garner the best possible relationships amongst the affected communities.

This paper was specifically written to address the research question: *how does the changing arctic environment impact support to the defence of the Canadian Arctic*? The reality of which is that the arctic environment impacts support to the defence of the Canadian Arctic a great deal. The impacts are seen in the non-permissive environment, in that many northern CAF defence installations are geographically cut-off from southern Canada, and the austere environment poses significant and sometimes unpredictable challenges, but also due to the capricious nature of the foreseeable competition and reactions by the tri-polar states. There are certain factors related to northern Canada, which will have significant future impacts, that also make it difficult to forecast *support to defence*. For example: climate change, level of competition in the Arctic, and major communication corridors between southern and northern Canada. Each of these factors, as well as whether they occur concurrently or in sequence, will require significant shifts in support operations (some making support easier – i.e., communication corridors – and some making support more difficult – i.e., climate change and competition). The changing situation will have to be constantly monitored and changes made where required.

Change in the Arctic is coming, and it is evident that many are now paying more attention to it, as put forth in this paper. As a collective whole of society, Canadians are responsible to protect the homeland and its people, and ensure that Canadians prosper from that which they protect. With extensive changes potentially being directed from the Government of Canada in the relatively near future, which will better shape the broader CAF mission in the Arctic and northern Canada, support planning hinges on the policy, funding and resources

assigned to the mission. With these necessary elements in place, support to the defence of the Canadian Arctic will be achievable. However, at present, and with the current CAF infrastructure which exists across northern Canada, an increased CAF presence would only be minimally supportable.

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