





Northern Corridor Research Program: Phase 2 Final Report

G. Kent Fellows, Katharina Koch, Emily Galley, and Robert Mansell

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FOREWORD

THE CANADIAN NORTHERN CORRIDOR RESEARCH PROGRAM PAPER SERIES

This paper is the last in a special series of studies conducted by the School of Public Policy's Canadian Northern Corridor Research Program. This special series started with the publication of *Planning for Infrastructure to Realize Canada's Potential: The Corridor Concept* which I co-authored with Mr. Andrei Sulzenko in 2016.

The ultimate goal of this research program and paper series has been the investigation of a concept that would connect the nation's southern infrastructure to a new series of corridors across middle and northern Canada. Over the past eight years, the Canadian Northern Corridor Research Program has been the leading platform for information and analysis on the feasibility, desirability, and acceptability of a connected series of infrastructure corridors throughout Canada.

Endorsed by the Senate of Canada of Canada, phase 2 of our program (which ran from 2019 to 2023) responded to the Council of the Federation's July 2019 call for informed discussion of pan-Canadian economic corridors as a key input to strengthening growth across Canada and "a strong, sustainable and environmentally responsible economy."

All the Canadian Northern Corridor publications can be found at: https://www.canadiancorridor.ca/research-publications/

or through the School of Public Policy Paper Series. DOI links to all papers in this special series are also included in the appendix of this paper.

On behalf of the Canadian Northern Corridor Program I want to thank you for engaging with our work. Whether you are reading this in the days, months, years or decades after it is published, I hope the information and analysis here, and in our prior work, is useful to you.

Dr. Kent Fellows Program Director, Canadian Northern Corridor Research Program

The Canadian Northern Corridor Research Program: Summary and Recommendations

G. Kent Fellows, Katharina Koch, Emily Galley, and Robert Mansell

ABSTRACT

The Canadian Northern Corridor is an idea that responds to Canada's need to increase interregional and international trade, provide services to northern communities and establish a broadly accepted approach to large-scale infrastructure development. Since 2015, the School of Public Policy at the University of Calgary has undertaken research and public engagement sessions to study the feasibility, acceptability and desirability of a coherent and unified approach to national and regional infrastructure development in Canada. This paper stands as a final abbreviated summary of the research and engagement program. The entire program comprises well over 40 individual studies conducted by over 50 contributing researchers and authors across eight research themes over the past eight years. This summary provides a high-level review of the research program. The research conducted under this program suggests that a large-scale corridor concept is challenging to conceive, in both theory and practice for midand northern Canada. For that reason, we recommend a segmented corridor approach focused on development initiatives which are already gaining public acceptance and which communities identify as key priorities, such as digital infrastructure. One immediate priority could be the digitization of highways and roads to enhance safety while travelling and to digitally connect communities. Regardless of the type of infrastructure, a corridor approach must reflect a holistic strategy addressing the shortcomings, such as unreliable transportation pathways, food insecurity and inadequate housing, which are related to the infrastructure gap in mid- and northern Canada.

INTRODUCTION

Phase 2 of the Canadian Northern Corridor (CNC) Research Program officially ended on March 31, 2023. In this communiqué, we provide an extremely abridged summary of the research.

The CNC Research Program produced well over 40 individual studies by over 50 contributing researchers and authors across eight research themes. Phase 2 of the research program also included a set of 18 community engagement activities and 17 stake- and rights-holder roundtables. Given this voluminous body of work, this report is a very high-level summary. We, as authors of this communiqué, have attempted to draw out the most prominent themes and policy recommendations from the CNC Research Program. However, we encourage all readers to consult constituent studies that may be of interest. These studies are grouped by research theme and are freely available at: www.canadiancorridor.ca or through The School of Public Policy.

The CNC Research Program was launched in 2015, followed by its first publication "Planning for Infrastructure to Realize Canada's Potential: The Corridor Concept" in 2016. That paper motivated a discussion on how the corridor concept could be applied to mid- and northern Canada, as well as an argument for the potential benefits to Canada. These include international and intranational trade expansion and diversification; improved regional development; northern and Indigenous economic and social development; enhanced Arctic security and sovereignty; and a potential for more effective mitigation of environmental risks.

Phase 1 of the program ran from 2015 to 2018 and focused mainly on the macroeconomic and trade implications of corridor development along with preliminary investigations on Indigenous engagement and the duty to consult on major linear infrastructure projects. This work generated significant interest. Following testimony given by CNC researchers Andrei Sulzenko and Kent Fellows, the federal Standing Senate Committee on Banking, Trade and Commerce recommended the CNC program receive \$5 million in funding to pursue additional research (Standing Senate Committee on Banking, Trade and Commerce 2017). While the federal government did not provide this funding, the program was able to procure funding from the Alberta government, which was augmented by matching funds from Western Economic Diversification (now Prairies Canada).² This funding supported the research program's second phase, initiated with an updated scoping paper introducing the potential economic, environmental, political and social benefits and implications of a Canadian Northern Corridor (Fellows et al. 2020).

Phase 2 of the program ran from 2019 to 2023 and took a much broader interdisciplinary approach to corridor research including the aforementioned community engagement and stake- and rights-holder roundtables.

All issues of *The School of Public Policy Publications* (including all Northern Corridor papers) are available at: www.policyschool.ca and https://journalhosting.ucalgary.ca/index.php/sppp

The combined sum of funding received from these sources was less than the \$5 million recommended in the Senate Committee report.

EVOLUTION OF THE CANADIAN NORTHERN CORRIDOR CONCEPT

Corridors have become a recognized solution to address transportation challenges in other jurisdictions.³ Pursuant to this, the School of Public Policy and its partner organization, CIRANO, launched the Canadian Northern Corridor (CNC) Research Program in 2015 (Marlow 2015). At a 2016 Senate hearing, former School of Public Policy director Jack Mintz proposed "that Canada should develop a national corridor system" to move Canadian products to tidewater (Standing Senate Committee on Banking Trade and Commerce 2016, 42). Sulzenko and Fellows (2016, 35) then presented the idea of a "Canadian Northern Corridor" to deliver "significant strategic benefits to Canada in terms of trade and investment objectives, Arctic security and sovereignty, and transportation system rationalization." Both Sulzenko and Fellows testified at a hearing of the Standing Senate Committee on Banking, Trade and Commerce in 2017 to present the idea of a northern corridor for Canada.

The initial CNC concept conceived by the School of Public Policy and CIRANO proposed establishing rights-of-way to facilitate the development of major transportation infrastructure in a timely manner. Recognizing that the notional route, or segments thereof, crosses or is adjacent to the traditional territories of many Indigenous communities, their participation in developing a northern corridor was emphasized early on.⁴ Given the diverse geographical regions and interests involved, establishing an appropriate and effective governance structure will be critical. The federal government's leadership role and collaboration with provincial, municipal and Indigenous governments is crucial to facilitate co-operation between relevant rights- and stakeholders and accommodate various interests and perspectives.

In its first phase (2016–2018) the CNC program focused on the potential macroeconomic impacts of corridor development and the fundamental topics of consultation and engagement of Indigenous Peoples (Sulzenko and Fellows 2016; Fellows and Tombe 2018; Boyd and Lorefice 2018). The early work on economic impacts demonstrated that more effective transportation infrastructure in the territories alone could result in a \$6.5 billion increase in Canada's GDP, with most of that gain resulting from a 50 per cent increase in regional productivity. The Phase 1 research also demonstrated the clear gaps in Indigenous consultation related to infrastructure projects and directions for improvement (including a need to generate more evidence and analysis about the benefits and impacts of development on remote and Indigenous communities).

The second phase of the CNC program (2019–2023) took a much broader approach to corridor research. Organized across eight themes,⁵ Phase 2 research was interdisciplinary, drawing on academics and subject matter experts from diverse fields including law, geography, engineering, business, sociology, political science and economics. Phase 2 also included an extensive set of stakeholder roundtable and community engagement events with the expressed goal of producing information and analysis to assess the feasibility, desirability and acceptability of corridor development by incorporating the priorities and concerns of potentially affected rights- and stakeholders across communities in mid- and northern Canada.

Examples include the Lamu Port-South Sudan-Ethiopia-Transport (LAPSSET) corridor in East Africa, the Belt and Road Initiative (BRI), Australia's Pilbara Corridor and transportation corridors in the European Union. Earlier Canadian examples include the transcontinental railway, the Trans-Canada Highway and the St. Lawrence Seaway.

⁴ Early engagement and dissemination of CNC research included a keynote presentation at the 2016 Pipeline Gridlock Conference organized by the Indian Resource Council and a presentation at the inaugural gathering of the National Coalition of Chiefs in 2018.

See the list provided in the Summary of Research Publications section below.

The concept evolved significantly throughout Phase 2 of the research program. The most notable change came from the program's engagement research. Through this work, CNC researchers identified important community-level concerns with the idea of a "pre-established rights-of-way" that might limit or remove individual communities' agency in decisions regarding large-scale development in their regions. As a result, the corridor concept (as originally described by the CNC program) has evolved to consider the need for a long-term, integrated, national strategy for connective infrastructure that involves collaboration among municipal, Indigenous, provincial, territorial and federal governments.

Canada is alone among its peers in not having a transportation infrastructure strategy (as defined by the European Court of Auditors).⁶ As our thinking on the corridor concept has evolved, the need for, and development of, an infrastructure strategy has become the defining component, replacing the idea of specific geographic rights-of-way embedded with predefined clearances.

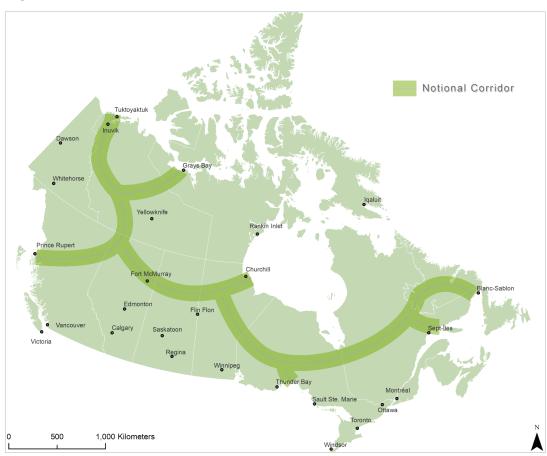


Figure 1: Notional Canadian Northern Corridor Route

In defining a peer group for Canada, we follow the European Union framework for large infrastructure projects which defines a comparator group including: The EU, Australia, Canada, the United States, Switzerland, France and Norway. See: European Court of Auditors (2021) Review No. 5/2021, https://www.eca.europa.eu/Lists/ECADocuments/RW21_05/RW_Transport_flagships_EN.pdf.

With our shift away from proposing a specific rights-of-way-based corridor in favour of developing an intergovernmental strategy, our focus on a specific, monolithic notional route has diminished. We have received considerable constructive criticism on the notional route as mapped in Figure 1.7 Further to this, taken as a body of work, the legal and regulatory area and community engagement research conducted as part of the Canadian Northern Corridor program clearly indicates that a research program cannot participate in the level of practical engagement required to inform specific route decisions. It is clear now that a more effective strategy involves government action to determine routes based on collaborations (involving Indigenous governments, municipal governments, provincial governments, territorial governments and the federal government) as well as community engagement and consultation. In this context, the approach would be to identify potential regional infrastructure priorities that would integrate into a long-term infrastructure development plan. This is in sharp contrast to the current approach of one-off connective infrastructure projects focused on shorter term priorities and without a longer term, larger and more integrated vision.

SUMMARY OF RESEARCH PUBLICATIONS

In addition to the extensive community and stakeholder engagement activities conducted by the CNC Research Program, in Phase 2 of the program, we have also completed over 40 individual studies (this is in addition to six foundational studies completed during Phase 1).

The research is grouped into the following eight themes:

- Strategic and Trade Dimensions
- Funding and Financing
- Legal and Regulatory
- Organization and Governance
- Geography and Engineering
- Economic Outcomes
- Social Benefits and Costs
- Environmental Impacts

The studies completed during Phase 2 cover all eight of these themes and each includes specific policy recommendations. These recommendations in many cases complement the outcomes of our community engagement and stakeholder roundtable research.

A listing of all Northern Corridor studies and links to each of them are provided in Appendix A below. An extremely condensed and abridged list of policy recommendations derived from the research conducted during Phase 2 of the program is provided in Appendix B.

In fact, the portion of the route leading to Grays Bay in Nunavut did not appear in the initial 2015 version of the map and was added following constructive criticism we received through conference presentations of our work in 2016 and 2017.

SUMMARY OF THE COMMUNITY AND STAKEHOLDER ENGAGEMENT ACTIVITIES

The Canadian Northern Corridor Engagement Program ran from January to November 2022 and consisted of 17 virtual stake- and rights-holder roundtables and 18 virtual and in-person community engagement events. The invitation-only roundtables brought together representatives from all levels of government (municipal, provincial, territorial, federal and Indigenous); key sectors like natural resources, energy, finance and tourism; and non-governmental social and environmental organizations. Community events were open to all members of a given community and the surrounding area. Due to COVID-19-related restrictions, the first four community sessions were conducted virtually; the two sessions with communities in Quebec were also conducted virtually to accommodate translation needs.

The goal of both the roundtable (Koch et al. 2023) and community engagement (Galley et al. 2023) programs was to discuss development-related priorities, interests and concerns, as well as relevant challenges (problems the community, government body or sector currently faces) and barriers (factors that are inhibiting or undermining efforts to address stated challenges). Sessions also involved conversations about how corridor development could support stated priorities or help address challenges and barriers. The development of both corridors and potentially associated infrastructure was discussed.

Support for the corridor concept varied significantly both across and within the roundtable and community sessions. Responses ranged from a high degree of enthusiasm and interest in the potential opportunities that could accompany corridor development to suspicion, distrust and outright rejection of the concept. The latter responses were largely based on past experiences with large-scale infrastructure and resource development as well as mistrust of both government and private corporations. This was particularly evident among Indigenous participants, representatives and communities, though it was not limited to these groups.

Several common topics and themes emerged from the engagement program:

- Inadequate digital infrastructure: Access to reliable and affordable high-speed broadband internet access remains a persistent issue for rural and remote communities across mid- and northern Canada. As more educational and employment opportunities, as well as government services, move online, residents in northern regions are missing out due to expensive, inconsistent and sometimes absent internet connectivity. This puts them at a disadvantage relative to Canadians in more southern regions. Poor cellular coverage, particularly on rural roads and highways, presents a serious safety risk for residents, tourists and commercial drivers alike.
- Deteriorating connective infrastructure: Issues include absent and deteriorating roads and highways, inadequate or absent safety infrastructure on existing roads, the loss of rail services and scheduled air routes, fragile energy distribution grids, antiquated water and sewage networks and a lack of redundancy in transportation and distribution networks. This lack of redundancy can leave remote communities unable to access basic goods and necessary services in wildfires, winter storms, floods and accidents, resulting in disruption of and damage to key routes.

- Political and social marginalization: Northern communities and regions feel that their interests and perspectives are routinely ignored, and that politicians, policy-makers and development proponents largely based in southern Canada don't understand northern Canada's unique cultural, economic and environmental contexts. Consequently, processes and policies appropriate to southern regions are applied to northern situations, resulting in inefficiencies and a failure to meaningfully address northern needs.
- Barriers to interjurisdictional collaboration: Where different communities, regions, governments and sectors seek to collaborate on shared priorities and goals, their efforts are routinely undermined by interjurisdictional barriers. For example, regional collaboration, e.g., between municipalities or counties, is challenging where regions cross provincial and territorial borders. Potential co-operation between First Nations and neighbouring municipalities or counties is often stymied by federal processes and priorities that do not address the interests of local communities.
- Lack of local or regional capacity: Many rural and northern jurisdictions lack the financial and logistical capacities, as well as the human resources, to address their social and infrastructure priorities. This affects their ability to address issues such as infrastructure maintenance and planning for future development. It can also prevent regions and communities from participating meaningfully in potential infrastructure and resource development as they lack the resources and capacity to effectively represent their interests and perspectives.

While many participants saw a role for a corridor, or network of corridors, in addressing their most pressing development issues, there were also significant concerns about the potential impacts of large-scale infrastructure development. Environmental impacts, particularly in the context of climate change and in consideration of traditional land use and key species populations, were of primary concern.

The social implications of large-scale development on small and remote communities could be significant, and concerns ranged from the impact on community coherence and local culture to increases in crime and violence. Indigenous communities and those with previous experience with resource development and the attendant influx of workers from outside the community (often in the form of man camps) were particularly anxious about this matter.

Finally, many communities were worried about the potential for a national-scale project to neglect or override local and regional concerns and interests; the idea of a pre-approved right-of-way was particularly concerning as it implied to many participants blanket assessments and approvals that could neglect local environmental, social and cultural considerations.

CONCLUSION AND BROAD RECOMMENDATIONS

We find that a large-scale corridor concept is challenging to conceive, in both theory and practice for mid- and northern Canada. We recommend a segmented corridor approach, focusing on those development initiatives which are already gaining public acceptance and which communities identify as key priorities, such as digital infrastructure. One early priority could be the digitization of highways and roads to enhance safety while travelling and to digitally connect communities. A corridor approach must reflect a holistic strategy addressing the shortcomings related to the infrastructure gap in mid- and northern Canada which contributes to unreliable transportation pathways, lack of digital connectivity, food insecurity, inadequate housing and lack of healthcare and education services.

- Canada needs a long-term strategic and integrated infrastructure vision for midand northern Canada that focuses on communities' long-term policy priorities. We recommend the federal government spearhead a region-based infrastructure assessment in mid- and northern Canada to integrate the views and perspectives of different rights- and stakeholders, including Indigenous, municipal, territorial and provincial governments, avoiding a top-down approach while recognizing the importance of federal support and co-ordination. This would result in a regionalized national strategy that considers place-based knowledge and context to adequately capture and respond to regional circumstances.
- Streamlining of regulatory frameworks is required to improve efficiency, integration and co-ordination in the planning and approval of hard and soft infrastructure development.

 Many policies and regulations typically constrain and determine the conditions for infrastructure development. Their purpose is generally to ensure viability, safety and sustainability and to maximize benefits and minimize any negative social and environmental impacts. However, in the case of linear infrastructure, these often involve multiple overlapping jurisdictions and mandates resulting in stalemates, procedural delays, uncertainty, high costs and excessive amounts of time for decisions. This has contributed to substantial declines in Canada's reputation in terms of the attractiveness of investments to address its growing infrastructure deficits, especially across mid- and northern regions. This streamlining should include approaches such as coordinated strategic regional infrastructure assessments at the planning and regulatory stages to provide for earlier and more fulsome evaluation of benefits, costs and concerns; address jurisdictional overlaps and conflicts; and avoid duplication of resources for environmental impact and other impact evaluation.
- Infrastructure policy development for mid- and northern Canada must focus on collaborative approaches that foster co-operation and co-ordination. Rights- and stakeholders who participated in our roundtables identified a lack of collaboration and co-operation between all governmental levels as a key obstacle to effective decision-making processes. Despite various mechanisms in place (such as the Federation of Canadian Municipalities), there is still a lack of co-ordination across provincial and territorial borders and sometimes even between communities in the same province or territory. Communities should at least have the opportunities for example, through adequate forums or platforms to better understand available resources and strategies to address shared challenges. This would require the preparation of joint databases and joint events in which community rights- and stakeholders can exchange knowledge and information.

- Recent challenges experienced with global and Canadian supply chains underline the need for strategic and targeted infrastructure optionality to ensure reliable transportation and access to goods and services. Climate change and geopolitical instability disrupt Canada's economy, which relies on stable supply chains. Carefully targeted redundancy, for example for transportation, energy and digital infrastructure, is necessary to mitigate negative outcomes for communities when critical infrastructure is affected by devastating natural disasters and to ensure the transport of essential supplies. Having transportation options as well as transmission lines across mid- and northern Canada can offer greater reliability which is needed for all urban and rural communities.
- Infrastructure development, focused on transportation and access to services such as health care, is essential to safeguard living standards for future generations. Pivoting the corridor's focus in the direction of connective infrastructure, and ultimately building connections between east and west, and north and south, shifts the focus towards soft infrastructure. Local and regional issues such as housing, health care and education require adequate solutions to capture regional circumstances across mid- and northern Canada.
- For all Canadians to benefit, infrastructure development must adhere to the principles of equity, diversity, inclusion and accessibility. We suggest integrating the principles of equity, diversity, inclusion and accessibility into future infrastructure strategies to ensure the inclusion of voices from vulnerable members of Canadian society and to incorporate diverse perspectives and ideas. The goal is to achieve equity across Canada by offering access to the resources that are necessary to achieve similar social and economic outcomes across all of Canada with the ultimate goal of reducing its persistent infrastructure deficit.

APPENDIX A: LIST AND LINKS TO ALL NORTHERN CORRIDOR PAPERS

Note: All papers are available and sorted by theme on the Canadian Northern Corridor website: https://www.canadiancorridor.ca/research-publications

Title	Authors	Link	Publication Year
Strategic and Trade Dimensions	Authors	Lilik	Tear
Global Rare Earth Elements Market	Alaz Munzur	https://journalhosting. ucalgary.ca/index.php/sppp/ article/view/74263	2022
Critical Mineral Mining in Canada	Alaz Munzur	https://doi.org/10.11575/sppp. v14i1.74020	2021
Mackenzie Valley Gas Pipeline in Retrospect	Alaz Munzur	https://doi.org/10.11575/sppp. v14i1.72326	2021
Northern and Arctic Security and Sovereignty: Challenges and Opportunities for a Northern Corridor	P. Whitney Lackenbauer and Katharina Koch	https://doi.org/10.11575/sppp. v14i1.72084	2021
Constraints in the Canadian Transport Infrastructure Grid	Jean-Paul Rodrigue	https://doi.org/10.11575/sppp. v14i.70156	2021
A Canary in Panda's Clothing?	G. Kent Fellows and Alaz Munzur	https://doi.org/10.11575/sppp. v13i0.70459	2020
Funding and Financing			
Canadian Competitiveness for Infrastructure Investment	Mukesh Khanal, Robert Mansell and G. Kent Fellows	https://doi.org/10.11575/sppp. v16i1.76465	2023
A Review of Funding and Financing Models for Infrastructure Corridor Megaprojects, and Implications for the Canadian Northern Corridor	David Large and Ahmad Teymouri	https://doi.org/10.11575/sppp. v16i1.75325	2023
Reducing Transaction Costs on Infrastructure Corridor Projects in Canada	André Le Dressay, Jason Calla and Jason Reeves	https://doi.org/10.11575/sppp. v15i1.73464	2022
Financing and Funding Approaches for Establishment, Governance and Regulatory Oversight of the Canadian Northern Corridor	Anthony E. Boardman, Mark A. Moore and Aidan R. Vining	https://doi.org/10.11575/sppp. v13i0.69445	2020
Legal and Regulatory			
The Usage of Indigenous Languages as a Tool for Meaningful Engagement with Northern Indigenous Governments and Communities	Jenanne Ferguson and Evgeniia (Jen) Sidorova	https://doi.org/10.11575/sppp. v16i1.75839	2023
Regulatory Alignment for Multi- Modal Infrastructure Corridors	Rowland J. Harrison	https://doi.org/10.11575/sppp. v16i1.75968	2023
Indigenous Land Ownership and Title in Canada: Implications for a Northern Corridor	Cherie Metcalf	https://doi.org/10.11575/sppp. v16i1.76089	2023
Indigenous Land Rights in Australia: Lessons for a Canadian Northern Corridor	Sharon Mascher	https://doi.org/10.11575/sppp. v15i1.75215	2022

Title	Authors	Link	Publication Year
An Overview and Assessment of Key Constitutional Issues Relevant to the Canadian Northern Corridor	Dwight Newman	https://doi.org/10.11575/sppp. v15i1.72946	2022
Cross-Canada Infrastructure Corridor, The Rights of Indigenous Peoples and 'Meaningful Consultation'	David Wright	https://doi.org/10.11575/sppp. v13i0.69222	2020
Understanding Consultation and Engagement with Indigenous Peoples in Resource Development	Brendan Boyd and Sophie Lorefice	https://doi.org/10.11575/sppp. v12i0.68159	2019
Understanding Consultation and Engagement of Indigenous Peoples in Resource Development: A Policy Framing Approach	Brendan Boyd and Sophie Lorefice	https://doi.org/10.1111/ capa.12301	2018
Organization and Governance			
Subarctic Corridors in Northern Quebec: Is the Canadian Northern Corridor Concept Aligned with Quebec's Historical Development?	Thomas Stringer and Marcelin Joanis	https://doi.org/10.14430/ arctic74657	2022
Existing and Pending Infrastructure Projects: Potential Compatibility with the Canadian Northern Corridor	Alaz Munzur	https://doi.org/10.11575/sppp. v15i1.72528	2022
Governance Options for a Canadian Northern Corridor	Andrei Sulzenko and Katharina Koch	https://doi.org/10.11575/sppp. v13i0.69291	2020
Geography and Engineering			
Air Connectivity and Airport Infrastructure in Northern Canada	Alexandre G. de Barros, Marcela Coelho Lopes and Iyad Sahnoon	https://doi.org/10.11575/sppp. v16i1.75914	2023
Fostering Resilience and Adapting to Climate Change in the Canadian North: Implications for Infrastructure in the Proposed Canadian Northern Corridor	S. Jeff Birchall, Sarah Kehler and Nicole Bonnett	https://doi.org/10.11575/sppp. v15i1.74463	2022
Optimal Routing of Wide Multi-Modal Energy and Infrastructure Corridors	Mehdi Salamati, Xin Wang, Jennifer Winter and Hamidreza Zareipour	https://doi.org/10.3390/ ijgi11080434	2022
Differentiating the Canadian North for Coherent Infrastructure Development	Katharina Koch	https://doi.org/10.11575/sppp. v15i1.74249	2022
An Overview of Major Engineering Challenges for Developing Transportation Infrastructure in Northern Canada	Eva Stephani, Julie Malenfant Lepage and Guy Doré	https://doi.org/10.11575/sppp. v15i1.73187	2022
Canadian Arctic Marine Transportation Issues, Opportunities and Challenges	Frédéric Lasserre	https://doi.org/10.11575/sppp. v16i1.75914	2022
Nordicity and its Relevance for Northern Canadian Infrastructure Development	Katharina Koch	https://www.tandfonline. com/doi/full/10.1080/108893 7X.2021.1995066	2021

Title	Authors	Link	Publication Year
Economic Outcomes			
The Australian Experience with Resources, Infrastructure Corridors and Supply Chains	lan Satchwell	https://doi.org/10.11575/sppp. v16i1.76012	2023
Implications of an Infrastructure Corridor for Alberta's Economy	Trevor Tombe, Alaz Munzur and G. Kent Fellows	https://doi.org/10.11575/sppp. v14i.70651	2021
Economic Loss Analysis to Prince Edward Island Resulting from a Prolonged Closure of the Confederation Bridge	G. Kent Fellows, Michelle Patterson, Amy MacFarlane, Lukas Marriott, Andrew Carrothers and Jurgen Krause	https://idjs.ca/images/rcsr/ archives/V41N1-FELLOWS- PATTERSON.pdf	2018
Social Benefits and Costs			
The Canadian Northern Corridor Community Engagement Program: Results and Lessons Learned	Emily Galley, Katharina Koch, G. Kent Fellows, Robert Mansell, Nicole Pinto and Jennifer Winter	http://dx.doi.org/10.11575/ sppp.v16i1.77585	2023
The Canadian Northern Corridor Roundtable Program: Results and Lessons Learned	Katharina Koch, Emily Galley, Evgeniia (Jen) Sidorova, G. Kent Fellows and Robert Mansell	http://dx.doi.org/10.11575/ sppp.v16i1.77066	2023
Implications of a Northern Corridor on Soft Infrastructure in the North and Near North	Julia Christensen	https://doi.org/10.11575/sppp. v16i1.75178	2023
The Northern Corridor, Food Insecurity and the Resource Curse for Indigenous Communities in Canada	Shirley Thompson, Stewart Hill, Annette Salles, Tanzim Ahmed, Ajarat Adegun and Uche Nwankwo	https://doi.org/10.11575/sppp. v16i1.76032	2023
A Socio-Economic Review of the Impacts of Northwest Territories' Inuvik to Tuktoyaktuk Highway 10	G. Kent Fellows, Alaz Munzur and Jennifer Winter	https://doi. org/10.7202/1094686ar	2022
The Territorial and Socio-Economic Characteristics of the Digital Divide in Canada	Katharina Koch	https://doi. org/10.7202/1092248ar	2022
The Digital Divide and the Lack of Broadband Access During COVID-19	Katharina Koch	https://doi.org/10.11575/sppp. v13i0.70382	2020
Environmental Impacts			
Species and Areas Under Protection: Challenges and Opportunities for the Canadian Northern Corridor	Steven M. Vamosi	https://doi.org/10.11575/sppp. v16i1.75311	2023
Estimating Future Costs for Infrastructure in the Proposed Canadian Northern Corridor at Risk from Climate Change	Nathan S. Debortoli, Tristan D. Pearce and James D. Ford	https://doi.org/10.11575/sppp. v16i1.74925	2023
Community-based Environmental Monitoring (CBEM) for Meaningful Incorporation of Indigenous and Local Knowledge	Evgeniia (Jen) Sidorova and Luis D. Virla	https://doi.org/10.11575/sppp. v15i1.73981	2022
Climate Change and Implications for the Proposed Canadian Northern Corridor	Tristan Pearce, James D. Ford and David Fawcett	https://doi.org/10.11575/sppp. v13i0.69570	2020

Title	Authors	Link	Publication Year
Foundational Studies			
The Canadian Northern Corridor: Planning for National Prosperity	G. Kent Fellows, Katharine Koch, Alaz Munzur, Robert Mansell and Pierre-Gerlier Forest	https://doi.org/10.11575/sppp. v13i0.71388	2020
Opening Canada's North: A Study of Trade Costs in the Territories	G. Kent Fellows and Trevor Tombe	https://doi.org/10.11575/sppp. v11i0.43290	2018
Gains from Trade for Canada's North: The Case for a Northern Infrastructure Corridor	G. Kent Fellows and Trevor Tombe	https://doi.org/10.11575/sppp. v11i0.43342	2018
Planning for Infrastructure to Realize Canada's Potential: The Corridor Concept	Andrei Sulzenko and G. Kent Fellows	https://doi.org/10.11575/sppp. v9i0.42591	2016

APPENDIX B: STANDOUT KEY MESSAGES ACROSS THE EIGHT RESEARCH THEMES



STRATEGIC AND TRADE DIMENSIONS

https://www.canadiancorridor.ca/research-publications/category/strategic-and-trade-dimensions

- "Canada's investments in Arctic defence infrastructure are modest compared to those of
 its Russian and American neighbours. A CNC, potentially adding strategically important
 infrastructure in the Canadian North, will directly tie into the discourse of Arctic security
 and power relations" (Lackenbauer and Koch 2021).
- "Different levels of opposition and delays to infrastructure projects undermine the co-ordination
 potential of corridor development and the commercial viability of crucial infrastructure. Outside
 specific northern connectors to resources such as mining, energy and logging, the private
 sector has limited incentives to provide infrastructure or services to low-density areas. Sole
 private ownership and operation of infrastructure are unlikely unless supported by massive
 subsidies" (Rodrigue 2021).



FUNDING AND FINANCING

https://www.canadiancorridor.ca/research-publications/category/funding-and-financing

- Canada's reputation as a destination for investment in infrastructure projects has worsened relative to our peers (G7 Nations + Australia) in recent years. This declining reputation appears to be primarily driven by regulatory and bureaucratic delays. Federal infrastructure policies and funding programs are inconsistent and unreliable. Policies change and programs are cancelled and replaced frequently, based on short-term political cycles rather than longer term strategic priorities. Canada has some of the world's largest pension funds investing in infrastructure projects, but the projects are primarily non-Canadian. More must be done to encourage and entice Canadian pension funds to invest in domestic infrastructure projects (Khanal, Mansell and Fellows 2023, 2).
- "To commit to being a part of corridor development, private-sector stakeholders must perceive a compelling business case, including strategic alignment, a feasible investment amount, a clear and simple funding model (operational revenues), a compelling return on investment (i.e., profitability) and an acceptable level of risk" (Large and Teymouri 2023, 1).
- "There are significant and systemic barriers for greater Indigenous support of infrastructure corridor projects related to historic mistrust; poor fiscal, infrastructure and environmental jurisdictional clarity and co-ordination between governments; and an absence of standards, procedures, transparency and institutional support for interested Indigenous nations to participate in these projects" (Le Dressay, Calla and Reeves 2022, 1).
- "The federal government or a consortium of governments should constitute an 'assembler' that assembles the land rights and grants use rights to infrastructure providers. This assembler would be financed by government(s) through debt, taxes or by reducing other spending. The assembler could be funded by auctioning corridor access to infrastructure providers, if the latter can earn sufficient profits, or by value captured through property, sales, corporate or personal income taxes or resource royalties" (Boardman, Moore and Vining 2020, 1).



LEGAL AND REGULATORY

https://www.canadiancorridor.ca/research-publications/category/legal-and-regulatory

- "Government and industry should incorporate the usage of Indigenous languages into
 consultants' data-gathering process through Indigenous decision-making practices.
 Federal and provincial/territorial legislations and industry regulations on Indigenous
 engagement should explicitly recognize the connection between Indigenous languages and
 the land and should reflect this connection in their policies" (Ferguson and Sidorova 2023, 1).
- "There is no established model for regulatory oversight of multi-modal corridors that would accommodate the multi-jurisdictional framework in Canada and that could be applied to both establishing the corridor and to the approval of the placement of infrastructure within. Questions of establishing and overseeing the corridor and the subsequent approval of infrastructure within the corridor should be approached as separate from, although related to, each other" (Harrison 2023, 3).
- "The best case for successful infrastructure development that incorporates Indigenous rights is full consent and participation by all relevant Indigenous peoples. There is some legal uncertainty around government's ability to support a project like the Northern Corridor by justifiably infringing Indigenous land rights in the absence of consent" (Metcalf 2023, 1).
- "Australia's legislative response to Indigenous land rights is not transferable to Canada. However, the renewed focus on agreement-making is a high-level lesson that is transferable. As a nation-building exercise, the CNC concept should be built on a presumption that it will proceed in a manner that recognizes the importance of agreement with Indigenous communities whose rights and interests may be affected along the corridor" (Mascher 2022, 2).
- "The Constitution provides significant jurisdictional authority to the federal government on matters of interprovincial and international transportation and communications that could be deployed in support of a project like the Northern Corridor. The key challenge would not be a constitutional bar but that of attaining sufficient agreement among the necessary constitutional actors" (Newman 2022, 1).
- "Pursuit of the corridor project, to the extent that it involves Crown action that may adversely affect established or asserted Aboriginal rights or title, would trigger the Crown's duty to consult, as would review and approval of specific infrastructure projects that may eventually fall within the corridor. While it is conceivable that a corridor consultation process employs some kind of envelope approach and attempts to consult on the most likely uses of the corridor, significant additional consultation will almost certainly be required as each specific project is pursued" (Wright 2020, 1).



ORGANIZATION AND GOVERNANCE

https://www.canadiancorridor.ca/research-publications/category/organization-and-governance

- "Determining the regions, cities and communities to be served by the corridor requires a comprehensive investigation of the existing and pending infrastructure projects serving an area in addition to determining the needs and priorities of the stakeholders and the area's economic potential" (Munzur 2022, 1).
- "At the project proposal stage there is a choice to be made on governance structures
 and processes: deploy existing institutions and regulatory processes or establish a
 special corridor agency that reviews all projects within the designated right-of-way.
 Approval of proposals and their subsequent oversight would similarly be vested in
 the special agency or existing bodies. In order to make corridor routing negotiations
 manageable, they could be divided into segments, concentrating on relevant key stakeholders
 within a dedicated geographic area. This would also divide CNC implementation into segments"
 (Sulzenko and Koch 2020, 2).



GEOGRAPHY AND ENGINEERING

https://www.canadiancorridor.ca/research-publications/category/geography-and-engineering

"After reviewing the existing policies and legislation related to air transportation and to northern communities, we found no relevant policies or legislation relating the two. Provision of airport infrastructure and services is generally the responsibility of the provinces and territories. Air services are completely deregulated in terms of routes, fares and capacity. There are no essential air services policies in place in Canada. We recommend developing clearer, specific policies to address this shortcoming" (De Barros, Lopes and Sahnoon 2023).

"Northern Canada is warming at double the global rate, which is already causing significant challenges for northern infrastructure. The feasibility of expanding northern infrastructure is drastically reduced without capitalizing on the ability of adaptation and resilience planning to mitigate increased risks due to climate change. Hard infrastructure adaptation measures are capital-intensive, costly to maintain and carry a high risk of failure. The costs and effectiveness of adaptation measures have limits in the face of unrestricted climate change and are constrained by sociopolitical factors that define a community's capacity to adapt. Effective adaptation is integral to the sustainability of any proposed northern expansion. Smart adaptation measures focused on reducing vulnerability through a place-based approach can be identified through public consultation and fostered through the respectful integration of non-Western knowledge systems. Intergovernmental co-operation is critical to facilitate the implementation of low-risk, high-benefit policy" (Birchall, Kehler and Bonnett 2022).

"Infrastructure Canada has noted that the current southern-based 'one size fits all' northern infrastructure approach is inefficient because northern conditions and challenges often do not respond to policies that are conceived in the south. Currently, infrastructure projects are often conducted on a one-off basis without establishing broader connections in the northern region. The CNC could offer a coherent northern infrastructure framework that addresses the shortcomings of made-in-Ottawa policies for the Canadian North and Arctic" (Koch 2022a, 1)

"The main concern for sustainably developing infrastructure in permafrost terrain arises from melting the ground ice contained in the frozen soils. Impacts of permafrost degradation on infrastructure are widespread in the Arctic and expected to increase as permafrost continues thawing with climate change" (Stephani, Malenfant Lepage and Doré 2022, 3).

"Corridors can act both as a regulatory tool and as a way to concentrate development assets to promote more effective transportation. Low impact shipping corridors are a tool to regulate ship movements to reduce navigation hazards, and concentrating navigational aids along these corridors is a way to improve safety and efficiency. Land infrastructure may be developed in co-ordination with shipping patterns and economic projects such as mining ventures. The geographic concentration of community resupply and mining logistics may both sustain and further develop transportation activities that could support the profitability and viability of corridors in the Canadian Arctic" (Lasserre 2022, 1).



ECONOMIC OUTCOMES

https://www.canadiancorridor.ca/research-publications/category/economic-outcomes

"Governments, through their control of land, have critical roles to play in identifying, planning and creating infrastructure corridors and development precincts for private-sector investment, and to conclude strategic land access agreements and environmental approvals to facilitate development of individual projects. Infrastructure to support communities is essential for them to be able to attract and retain workers needed for resources projects and supply chains, to achieve scale for livability and business capability and to enable resources regions and their people to derive sustained benefits from development" (Satchwell 2023, 2).

"The benefits of increased pipeline access for Alberta's economy are well known. The benefits of infrastructure corridors, however, go far beyond pipelines. By reducing interprovincial and international trade costs, multi-modal infrastructure corridors of road, rail, utilities and communications can potentially create large economic benefits" (Tombe, Munzur and Fellows 2021, 1).



SOCIAL BENEFITS AND COSTS

https://www.canadiancorridor.ca/research-publications/category/social-benefits-and-costs

- "Community infrastructure priorities fall into three areas: physical and digital connectivity, local infrastructure to support community well-being and energy security and environmental protection. All three should be included in a long-term strategic and integrated infrastructure approach for mid- and northern Canada. The Government of Canada, in co-operation with provincial, territorial, municipal and Indigenous partners, should invest in region-based assessments to determine specific local infrastructure priorities across mid- and northern Canada. The Government of Canada, in line with its consultations on the implementation of the United Nations Declaration on the Rights of Indigenous Peoples, should identify ways to incorporate the principles of free, prior and informed consent in legal and regulatory frameworks related to infrastructure and natural resource development. Resources including but not limited to financial, legal and logistical should be provided to Indigenous communities and rights-holder organizations to enhance their advocacy capacity for local and regional priorities" (Galley et al. 2023, 1).
- "It is essential for infrastructure policy development in mid- and northern Canada to prioritize
 collaborative approaches that engage diverse rights- and stakeholders and foster meaningful
 partnerships, with a focus on respecting community rights, interests and aspirations while
 promoting sustainable and inclusive development through the co-ordination of actors. Managing
 co-operation between communities, governments and industries can be complex. Effective
 governance mechanisms, such as collaborative planning, stakeholder engagement and dispute

resolution processes, are crucial to ensure that infrastructure development is equitable, inclusive and sustainable. Streamlining of regulatory frameworks is required to improve efficiency, integration and co-ordination in the planning and approval of hard and soft infrastructure development" (Koch et al. 2023).

- "Policies prioritizing northern and Indigenous businesses in order to benefit from hard infrastructural development are necessary in order to limit leakage of economic benefits from northern communities. Strong policy around extractive industry to ensure the distribution of mining revenues and benefits is key to ensuring relative economic well-being and to avoid potential political conflicts between individual communities and the governments and organizations that represent them" (Christensen 2023, 1).
- "Utility or resource corridors lead to worse food insecurity outcomes for impacted Indigenous communities in Canada. To prevent a health and human rights emergency due to high food insecurity elevating further, an Indigenous-led food strategy, rather than a resource corridor, must be the priority so that Indigenous food insecurity can be brought to functional zero" (Thompson et al. 2023).



ENVIRONMENTAL IMPACTS

https://www.canadiancorridor.ca/research-publications/category/environmental-impacts

- "Climate change could adversely impact and even halt the continuous operation of the corridor. Central regions of the corridor are projected to be more likely to receive concomitant impacts on several chokepoints, including combined threats from increasing frequency of wildfires, freezing rain and permafrost thaw" (Debortoli, Pearce and Ford 2023, 1).
- "Community-based environmental monitoring (CBEM) could serve as a powerful strategy to incorporate ILK within the CNC concept because CBEM provides an opportunity for communities to meaningfully engage in identifying existing and potential environmental impacts of infrastructure development" (Sidorova and Virla 2022, 1).
- "Climate change impacts are likely to affect the construction of transportation infrastructure in the corridor. Future climate change projections must be integrated into regulations, codes and standards, design and route planning. Maintenance of infrastructure in the corridor would need to be more robust to mitigate expected climate change impacts. This will likely increase the costs of maintenance, and maintenance procedures will need to be responsive to dynamic conditions over time" (Pearce, Ford and Fawcett 2020, 1).
- "There is a global biodiversity crisis, and many of the threats to biodiversity are present in northern Canada. A multi-modal transportation corridor will likely exacerbate many of these threats. For example, roads, pipelines and railways physically fragment ecosystems and habitats, lead to significant mortality in diverse animal groups (road and railways), indirectly contribute to climate change through the transport of non-renewable resources, increase salt, heavy metal and/or sediment loads on nearby habitats and facilitate the arrival and spread of exotic species. Some species, such as the boreal caribou, will require special consideration by CNC proponents" (Vamosi 2023).

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ISSN

ISSN 2560-8312 The School of Public Policy Publications (Print) ISSN 2560-8320 The School of Public Policy Publications (Online)

DATE OF ISSUE

April 2025

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