

Unsettling Ground

Studies on Building and Fluid Geology in Arviat,
Nunavut

by
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Author's Declaration

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

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

Abstract

Ground in the Canadian Arctic is continuously being shaped by the dramatic seasonal cycles of the environment, extreme weather and deep geological processes of glaciation and retreat. The stability of Northern ground is particularly difficult to define on frozen soils suffering the increasing warming trends of climate change.

Across the Inuit homeland of Nunavut, the remote communities have always lived with geological instability through traditional knowledge of climate and territory. However, as the North was aggressively transformed by systematic federal government interventions, including forced relocations of Inuit, housing programs and military monitoring, Canadian visions of modernism imposed new patterns of settlement and spaces on Arctic communities. Today, Inuit are re-centring and staking ownership over buildings and spaces constructed in the territory.

Unsettling ground – the research and design practice of this project – refers to the questioning of colonial structures in the form of buildings and the urban plan of Arviat in southwestern Nunavut. This thesis is a response to historic and projected urban plans for the community which erase all Indigenous readings of the ground. Following two trips to the community, a series of architectural research studies examine multiple understandings of the ground, challenging imposed western conventions of mapping, masterplanning and housing that historically have shaped and neutralized development in the North. Stories and geological observations shared by community members **on the ground** culminate in three design schemes re-imagining current planning and design practices of the Nunavut Housing Corporation.

At three scales of infrastructure, community spaces and housing types, each scheme resists the rigid structure of current community planning with strategies for flexibility and adaptability: encouraging collective construction, ownership and inhabitation of unstable ground. Each speculation is open-ended, the beginning of a community-driven plan to reclaim agency over the dynamic ground from the geological and economic strictures imposed by modern colonial architecture and planning. **Unsettling Ground** offers a deeper understanding of the perpetually shifting geology impacting one community, but more broadly questions the grounds of architectural practice in the North through new, respectful relationships built upon the land.

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First, I would like to acknowledge the voices on the ground in the community of Arviat who informed, assisted and discussed the work that follows. I am grateful for their welcome to this visitor to their land, and the kindness, time and conversations shared by the community. To begin, Shirley Tagalik, who introduced me to many people working on housing in Arviat, was an excellent guide for my first day on the ground. Shirley's experience as a researcher herself and knowledge of working with outside researchers was invaluable in framing the questions and goals of this project. A long-time resident of the community, Shirley lent her observations on the history of housing, and the entanglements of health, space and economics within northern housing.

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question for me.

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Throughout this work in Inuit Nunangat, I was considering my responsibility to the ground. However, the work in the studio was also conducted on traditional territory of the Neutral, Anishnabeg and Haudenosaunee peoples that I must also acknowledge. My office at the School of Architecture, as well as the University of Waterloo campus sits on the Haldimand Tract, land promised to the Six Nations of the Grand River including six miles on either side of the Grand River from its source to mouth.

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Unsettling Ground

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- 142 *f* 3.2 Infrastructure on trails and wetlands. The existing process of filling ground covers over the specific relationships of community space and the landscape. Author's drawing informed by: 'Surficial geology based on 2009 reconnaissance surveys and interpretation of 2006 satellite imagery,' Forbes et. al., 'Reconnaissance assessment of landscape hazards and potential impacts of future climate change in Arviat, southern Nunavut,' Summary of Activities: Canada-Nunavut Geoscience Office (2013), 187.
- 144 *f* 3.3 Generated topography of fire access, drainage and wind fields. Author's drawing.
- 144 *f* 3.4 Constructing the ground, negotiating the changing ground, infrastructure and drainage (right). Author's drawing.
- 146 *f* 3.5 Utilidor as urban armature. Author's drawing.
- 147 *f* 3.6 Inuvik, NWT utilidor plan, 2016. Author's drawing.
- 149 *f* 3.7 Collective landscapes and infrastructures of Arviat. Author's drawing.
- 151 *f* 3.8 Section detail of the utilidor, revised for the unique grounds of arviat (Author's photo)
- 151 *f* 3.9 Collective urban landscapes and infrastructures. (Author's photo)
- 153 *f* 3.10 Infrastructure as collective space. (Author's photo)
- 155 *f* 3.11 Infrastructure has engages in the collective landscape beyond the generation of energy. Large structures become markers for navigation, guiding hunters back to town. Drawing by author. Informed by: 'Surficial geology based on 2009 reconnaissance surveys and interpretation of 2006 satellite imagery,' Forbes et. al., 'Reconnaissance assessment of landscape hazards and potential impacts of future climate change in Arviat, southern Nunavut,' Summary of Activities: Canada-Nunavut Geoscience Office (2013), 187.
- 156 *f* 3.13 Bending the plex. Breaking apart building forms on the north is problematic for the integrity of building envelope. Author's drawing.

156	<i>f</i> 3.12	Housing on collective grounds (see foldout). Author's drawing.
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165	<i>f</i> 3.18	Both facade and party walls are collective armatures of space, framing different spaces and anchoring modifications. Author's drawing.
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169	<i>f</i> 3.22	Section detail of collective deck spaces. Author's drawing.
171	<i>f</i> 3.23	Section detail of Thermo-plex housing. Author's drawing.



f 0.1 Rankin Inlet (YRT) terminal and a Calm Air ATR 42 parked on the apron, August 2018. Nearly everybody and everything that arrives in remote communities does so by air from southern hubs such as Winnipeg.

Preface

Unsettling ground – the research and design practice of this project – refers to the questioning of colonial structures in the form of buildings and the urban plan of Arviat in southwestern Nunavut. The relationships these spaces share with land and community are a product of processes in the environment – climate, weather and geology – and the practices of design – mapping, planning and building. The constructed ground then, should be read as a negotiated surface in the North, between the rights and title of Inuit, the indigenous people who have lived four millennia on Arctic land and development of the landscape as a Canadian territory.

Disciplinary practices of planning and architecture across the North were instrumental in often-brutal relationships between projects of development and indigenous land. The modern Canadian environment on the Arctic frontier has been constructed from representational and material practices that shape spaces and landscapes of militarization, economic development and settlement. Within national narratives of progress and modernization, architecture has repeatedly sought to territorialize Inuit land in the resource exploration of Canada's 'Northern Vision.'¹

However, the dynamic Arctic land and water challenges how the discipline of architecture may see the ground as a stable foundation. The frozen soil and ice that makes up permafrost are continuously flowing. Now, impacted by climatic changes, the physical ground, thought to be stable, is becoming increasingly fluid. The unstable ground is complicating structural, economic and cultural negotiations between growing communities across Nunavut and the Canadian state. The new towns constructed by the federal government only two generations ago are being continuously retrofitted by communities to repair the fractured relationships between imposed structures and the land. The question in this thesis is how the design disciplines can respond to changing land within the negotiations of communities to reclaim their agency and authority over the ground.

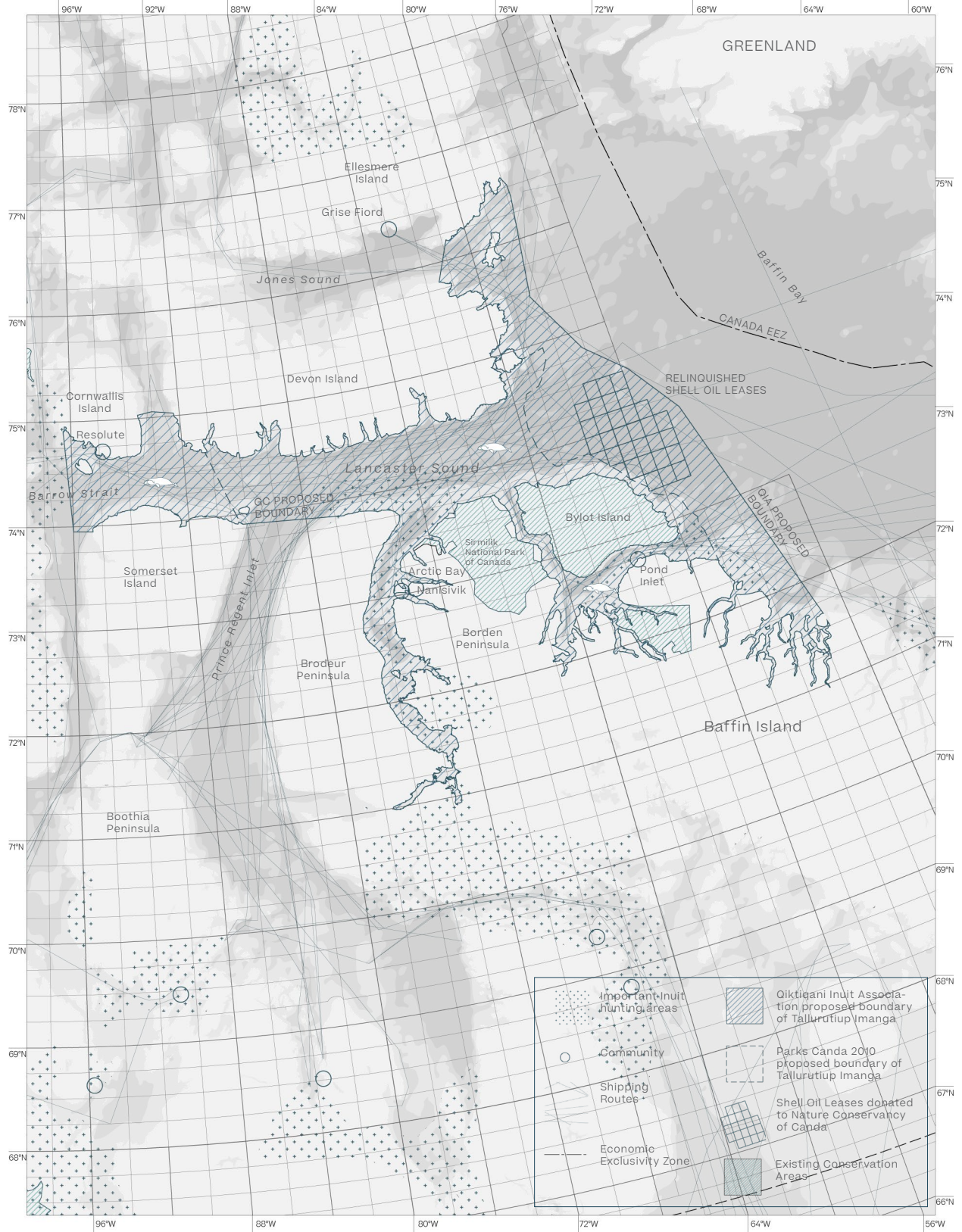
Two stories unfolding concurrently in the fall of 2016 opened the territorial questions that lead into the project that follows. First, sailing from August to September, the *Crystal Serenity* was the first large scale,

luxury cruise-ship to traverse the infamous Northwest Passage, from Alaska to the Atlantic Ocean through the now open waterways of the Canadian Arctic.² Following a record low year of sea ice in the Arctic, the incongruous image of cruise ships in the Arctic introduces a new spatial projection over Inuit land and water. Carrying some of the world's wealthiest people into Canada's most economically depressed territory, the voyage introduced mass tourism into the waterways of the Canadian North. New developments in tourism or mining in the north raise the often-conflicting priorities of conservation, economic development and reconciliation outside of the North with the concerns of affected communities.

Addressing the same geography, the negotiations for Tallurutiup Imanga (or Lancaster Sound) Marine Protected Area between the Qikiqtani Inuit Association and Parks Canada are seeking to reframe the value of the landscape against the pressures of economic speculation. The new Marine Protected Area (MPA) will protect both the unique marine ecology of Lancaster Sound and the food security of communities along the waterway. Not only are climatic changes over the land and water accelerating, but the representation of that same geography is simultaneously being re-negotiated. The mapped negotiation of Lancaster Sound (see *f 0.1*) tells a story of the contesting political, ecological and economic interests over the Canadian North. The initial boundary proposed by Parks Canada in 2010 skirted existing Shell Oil exploratory leases in Baffin Bay, but following intensive negotiations with Inuit communities, the MPA has been dramatically extended.³ The negotiations are an expression of the profound political changes in the North following the Nunavut Land Claims Agreement (NLCA) in 1993, and the partitioning of the new Nunavut territory in 1999.⁴ They were the first steps of Inuit establishing their millennia-long stewardship over Arctic land and water on the maps of the Canadian state, representing a call to action in support of Inuit self-determination on their land.

As Inuit appropriate and reclaim the buildings and infrastructures constructed in the North, they are also challenging the inherited maps, surveyed plans and building types that imposed assumptions of how communities relate to their land. This thesis focuses on the community of Arviat in southwestern Nunavut which embodies the challenges of housing the community on melting permafrost of the Canadian North. Through extensive consultation with housing officials and advocates in the community, the frictions between the shifting geological, political and economic grounds of the territory clearly manifested in the town of Arviat.

f 0.2 Tallurutiup
Imanga / Lancaster Sound
Marine Protected Area
negotiations.



For example, the conception and construction of housing continues to anonymously address the land through the conventions of the Community Plan which define spaces through surveyed boundaries and zoning by-laws. Foundation systems and building typologies literally separate the community from the land at a perfunctory technical level, addressing the ground through a geotechnical project of stabilization. The architectural details that structurally stabilize buildings within the rigorous grid of the masterplan have also imposed spatial strictures on kinships and cultural relationships within the town and on the land. Negotiations between design conventions and communities play out at multiple scales from the architectural details and domestic spaces of public housing units to the territorial negotiations by Inuit over vast landscapes impacted by development and climate change.

To “unsettle ground” means to address what decolonial theorist and feminist anthropologist Anna Tsing calls “gaps” between external assumptions and the richness and complexity of the Indigenous landscape.⁵ She writes of understanding discord in perspectives of land and territory through a study of the ground itself. *Gaps* between State territory and Indigenous landscapes are made tangible in the environment through architectural projects and material constructions. Following two trips to the community, conversations on the ground begin to reveal sites where, by projects of repair, construction and travel, the community reclaims the dynamic ground from the geological and economic strictures imposed by modern colonial architecture and planning across the territory.

The first part, ‘Notes on the Ground’, offers a series of observations on the traditional representational and material practices that have shaped the relationship between the dynamic, vibrant land and the buildings and spaces constructed in the North as instruments of colonization. The traditional architectures of Inuit were built on the ground within seasonal, ecological and ethical readings of the land. Conversely, modern mapping practices of the State have drawn sovereign control over the ground. The social-natural landscape of Inuit was fragmented into regional jurisdictions and classified by its material stabilities and economic value. The ancestral ties of indigenous land and building were fragmented between the lines and scales of State maps, transforming inhabited landscapes into unoccupied territory.

To question the separations of Inuit land and State territory, site research undertaken in the community of Arviat sought to build relationships



f 0.3 Arviat shoreline,
flying into the airstrip in
early May, 2018.

between the general tools and datasets employed by researchers and designers and the specific knowledge of the ground held by community members. Through interviews with community members and officials on the ground, photographic studies through the seasons and making maps constructed a reading of the complex geological, social and economic instability of the land. Then, remotely gathered geographic information, community research and material studies were triangulated through a series of model building exercises. In the representation of the ground, the annotating not only the duration seasonal cycles, but also climatic changes on a longer timescale reveals discord between the designed ground against the experiences of communities.

The second part, 'Arctic Urbanism on Unstable Ground,' examines the unstable geological, economic and political foundations that have directly shaped the ground in Arviat. For Inuit communities across the Canadian Arctic, disciplinary practices of planning and architecture were experienced as spatial agents of colonization on the land. Hudson's Bay Company Trading Posts and then Royal Canadian Mounted Police (RCMP) stations were architectural interventions of the economic and political systems that claimed authority over the territory and peoples of the Canadian Arctic. Federal administrators in Ottawa used housing as a form of welfare to assimilate Inuit into modern Canadian society, and the new houses that were constructed *en masse* imposed new economic and domestic relationships on traditional social structures.⁶ The rows of prefabricated houses in planned communities was an architectural project mask, insulate and build over the geological, social or economic instability of the ground.

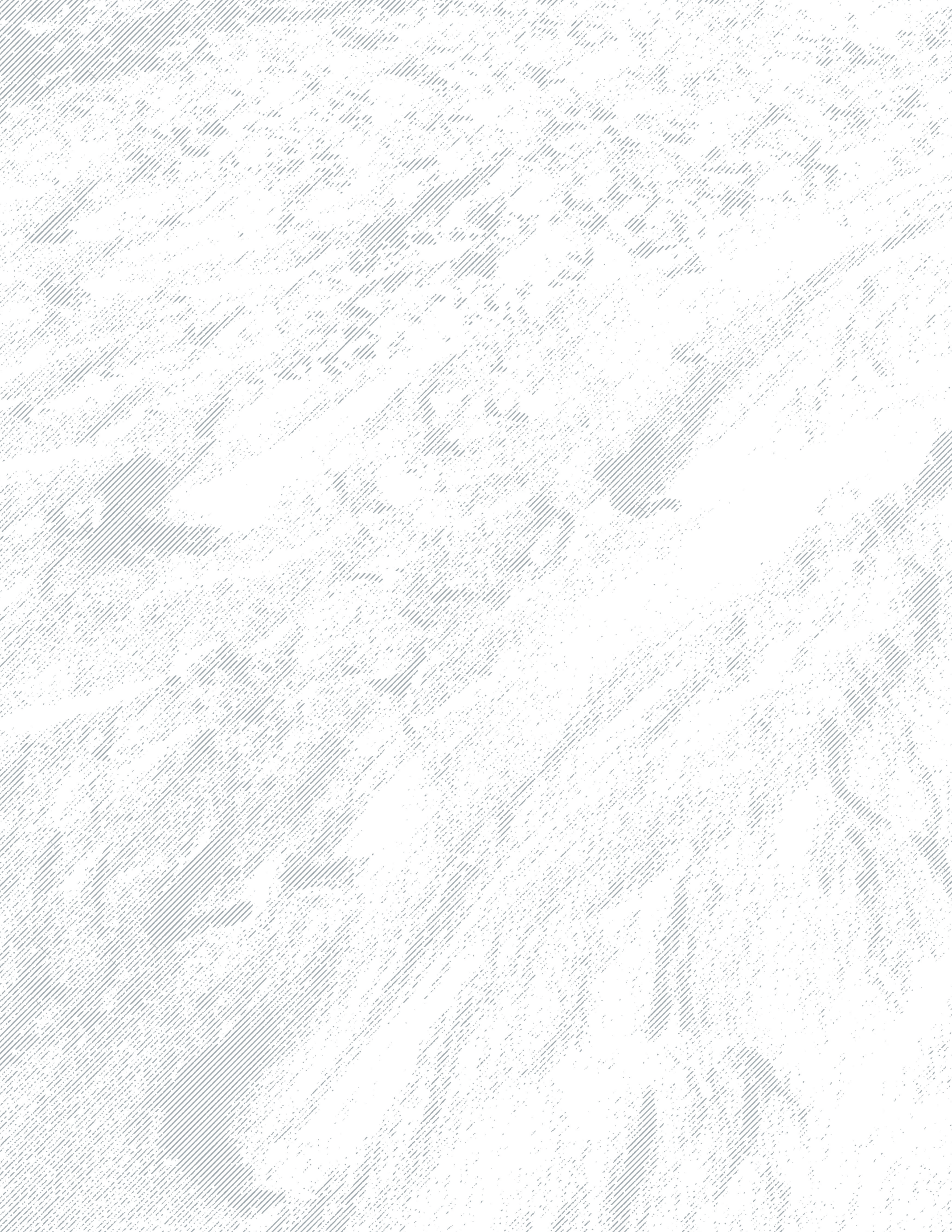
The third part, 'Unsettling Ground' is a series of three design speculations at the scale of town planning and housing design that study new relationships to unstable ground. Informed by the shared stories and geological histories of community members and the instabilities of the ground they questioned, the interventions speculate on established conventions of community planning, land development and design practices of the Territory, the Hamlet and the Nunavut Housing Corporation. Each seeks to explore new negotiations of the ground, resisting the rigid formality in current planning practices that seek to erase all readings of the land.

Endnotes - Preface

- ¹ The 'Northern Vision,' first introduced in by Prime Minister John Diefenbaker in 1958, and later revised under the Conservative government of Stephen Harper in 2007, has considered the North as a territory for economic development and the exertion of Canadian sovereignty. P. Whitney Lackenbauer, Ryan Dean, 'Canada's Northern Strategy under Prime Minister Stephen Harper: Key Speeches and Documents on Sovereignty, Security and Governance, 2006-15,' *DCASS Number 6*, 2016, 36.
- ² In the summer of 2016, the *Crystal Serenity*, a 1700-person cruise ship, made the first of what is planned to be an annual transit of the passage, marking the arrival of mass tourism into the North. The emergence of mass tourism is a likely sign of what is to come as Arctic waters are increasingly cleared of ice and better charted as navigable water-ways. While the ship offers an economic opportunity for the isolated communities across the Arctic Archipelago, it does so with added risks to the local environment.
- ³ Sabrina Doyle, 'Tallurutiup Imanga / Lancaster Sound to be Canada's Largest Protected Area,' *Canadian Geographic* (August 14, 2017), accessed: <https://www.canadiangeographic.ca/article/tallurutiup-imangalancaster-sound-be-canadas-largest-protected-area> (October 15, 2017).
- ⁴ *Agreement Between the Inuit of The Nunavut Settlement Area and Her Majesty the Queen in Right of Canada* (Nunavut Tunngavik Inc. and the Minister of Indian Affairs and Northern Development and Federal Interlocutor for Métis and Non-Status Indians, 2010)
- ⁵ Anna Lowenhaupt Tsing, *Friction: An Ethnography of Global Connection* (Princeton and Oxford: Princeton University Press, 2005), 175.
- ⁶ The architecture of the house, and its position within the community plan asserted a new cultural centre into life in the North. The new towns of the Arctic were material constructions of the federal policies of assimilation towards indigenous peoples across the country. Shelagh McCartney, 'Re-Thinking Housing: From Physical Manifestation of Colonial Planning Policy to Community-Focused Networks,' *Urban Planning*, 1 (4), 2016, 22-23.

“I am interested in the material as well as the representational practices of making and maintaining the landscape. The landscape is both ‘social’ (created within human projects) and ‘natural’ (outside of human control; populated by non-human species). My emphasis on social-natural landscapes differentiates my analysis from scholars who use “landscape” to refer either to aesthetic conventions...apart from a particular terrain, or to the sheer physical arrangement of things, studied without attention to social and cultural programs.”

Anna Tsing, *Friction: An Ethnography of Global Connection*, 175



Notes on the Ground

Ground: Between Land and Territory

Ground is the transition from the surface to the subsurface of the earth, mediating the rates of environmental change with the stability of geological time. The *ground (n.)* is the stable base of soils or rock, distinct from the changing natural or human environment above. To *ground (v.)* political, spiritual or structural foundations also requires stable responsibilities, knowledge or geography. On the other hand, *ground (adj.)* also describes the process of friction over time, eroding what appears to be stable and solid: ground can be gained contested and broken.¹

Ground in the Canadian Arctic has always been unstable, continuously being shaped by the material instability of frozen soils, the dramatic seasonal cycles of the environment and deep geological periods of glaciation and retreat. Moreover, increasing warming trends are impacting the Arctic with greater intensity than anywhere else on the planet, irreparably altering the millennia-old seasonal cycles of Inuit life while intensifying outside political and economic speculation in the North.² Rather than a stable foundation for construction, Northern ground should be seen as a thick, thawing terrain of emerging material, political and economic changes.

Colonial developers and Canadian politicians alike have understood the Canadian North as a resource hinterland for furs, minerals and oil, outside of the ecological and ethical relationships shared by Inuit to their land. The discipline of architecture has historically seen Northern ground as a set of geotechnical constraints or an aesthetic landscape upon which the built project is imposed. In her writing on the indigenous communities of the Meratus mountains in Indonesia, Anna Tsing suggests that the ground needs to be understood as a construction of 'material and representational practices.'³ She represents the landscape as an entirely constructed condition, first in long histories of settlements, trade and lives of indigenous peoples, and later of colonial and industrial projects in the 19th and 20th centuries. Construction practices can include research and mapping that interprets the ground, as well as mining and town planning that builds dominant cultural and political landscapes.⁴

In the North, Inuit and the recently arrived State understand the relationships between geology, communities and development in often

contesting ways. Indigenous stories from the *land* and State narratives over the *territory* were created from their respective cultural relationships to the ground in order to read the freezing and thawing landscape.

Identity 1 / Ground as Home

“As life is treasured, so must the land be treasured. Just as family units knew and protected each other well, the land they occupied was as familiar as members of a family unit.”

Mark Kalluak, *Inuit Quajimajatuqangit*, 56.

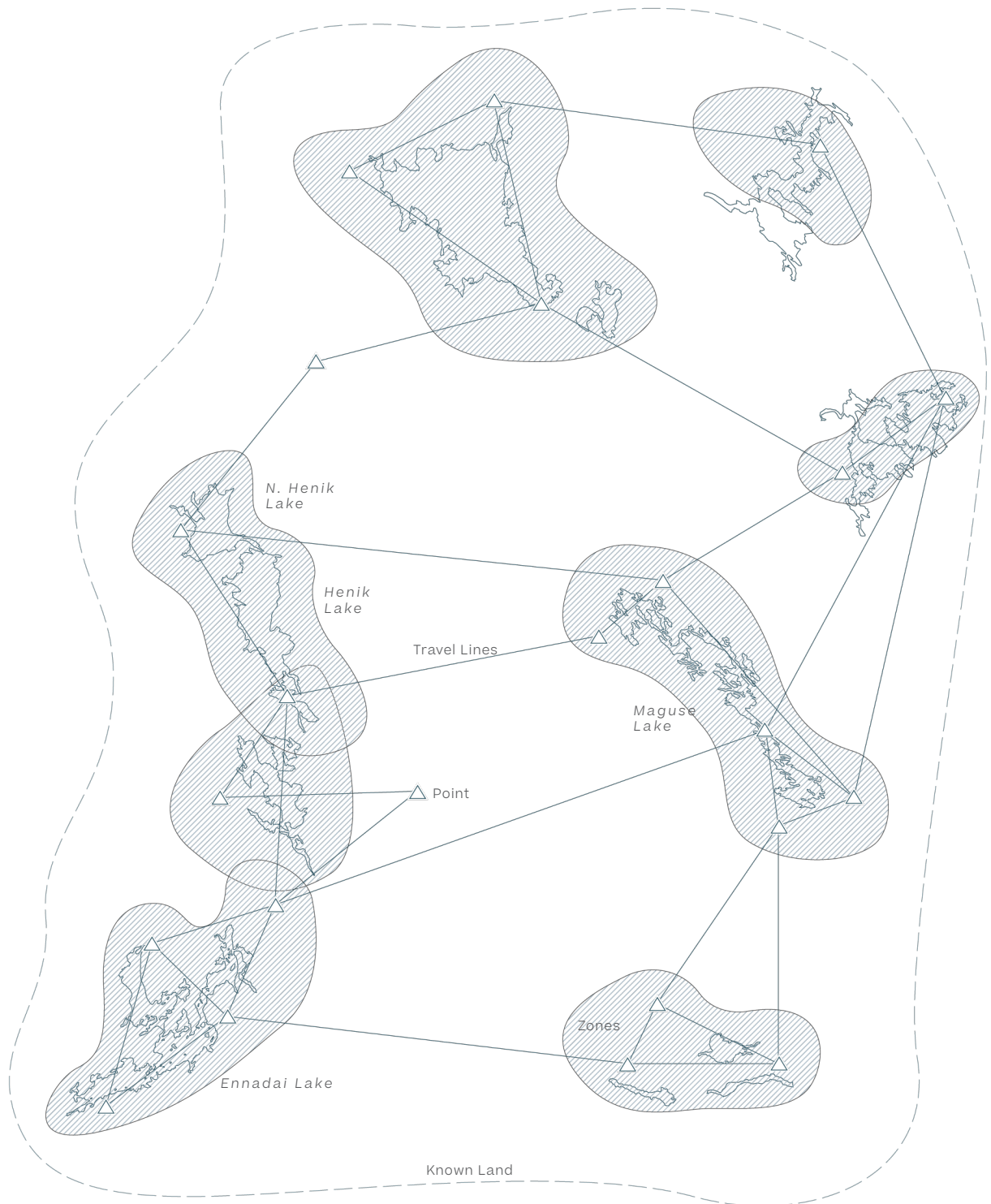
Inuit, who have inhabited the North for millennia, have a complex understanding of the land. *Nuna* is the Inuktitut word that describes the lively terrain upon which all things are related. *Nuna* is social, ecological and spiritual; rocks, muskeg, ice and other-species are understood as alive, and are thus accorded the respect due to all living things. This idea of land transcends scales, from that of the Inuk hunter and outpost camp, to multi-generational trails that extend hundreds of kilometres across the land. The subtle changes of the land through seasons and history are closely observed by individuals on the ground. The intimate knowledge of place is then collectively mapped into oral records of inhabited landscapes through complex toponyms and itineraries that describe camp sites, hunting grounds and kinships in the rhythm of seasonal changes.⁵ Knowledge of Inuit geographies is continuously renewed through lived experience of the landscape, adapting to environmental changes, kinships and technologies.

Inuit *Quajimajatuqangit*, or IQ, describes the deep body of ancestral knowledge passed through generations, rooted in understanding and respecting the uniqueness of the weather, climate and living with other species.⁶ IQ frames a world view around *Nuna* by four *maligarjuat* (translated literally as ‘big things that must be followed’): maintaining harmony in communities and the mind, working for the common good, being respectful of all living things, and continuously planning for the future in the changing environment.⁷ For Inuit, these ethical principles are the grounds for living together and collective adaptation.

While the principles of IQ have organized Inuit society for generations,



f 1.1 Hunters
returning from the caribou
herd back to town , May
2018.



the word itself emerged out of the Nunavut Land Claims Agreement and the more commonly used term of *traditional ecological knowledge*, which is often narrowly interpreted by researchers to only address the natural world.⁸ Rather Inuit knowledge of unstable weather and the land expresses the collective, ethical and legal responsibilities of living well in Inuit society. Edited by Joe Karetak, Shirley Tagalik of Arviat and anthropologist Frank Tester, *Inuit Quajimajatuqangit: What Inuit Have Always Known to be True* offers a series of translated stories by elders who have lived through the dramatic changes of the North. The stories told by elders share knowledge of Inuit adaptation on the land, through the violence of colonization, and its importance today.

Pre-contact, patterns of migration amongst family groups responded directly to the changing condition of the ground which also drove the migrations of other species such as the caribou across the land. The relationship between the lived extents of camps and the temporal changes in the environment shaped the settlement patterns and traditional Inuit architecture.⁹ Traditional buildings of the north emerged from the land itself, and simultaneously sat lightly on the permafrost, but produced a rich ground condition of camps, caches and trails that evolved over time. Camps across the Kivalliq region moved from the sea ice to familiar lakes in the interior every year. *Iglu* inhabited through the winters were renovated in response to familial changes and seasonal cycles. Added living spaces and storage niches were added following marriages or important hunts. In the spring, as the warming air destabilized snow structures, the large dome over the living area would be cut down into a low wall and replaced by a skin covering anchored by a ring of rocks.¹⁰ Extending the use of the snow-house into the spring allowed camps to transition to summer tents in order to follow the caribou herd and travel across the land.

The traditional architecture of Inuit responded specifically to the land and environment. Skin tents and snow houses were built, repaired and then disassembled as the harsh environment eroded materials. Foundations were embedded in these same material cycles. Winter camps would be constructed out of the snow in November or December by excavating and grading the snowpack to shelter structures from the wind and modulate interior environments. Each spring they would move away as family groups migrated to the caribou herd. Summer camps were constructed from the skins of the hunt and driftwood into tents on the land. Rings of rocks that anchored tents onto the land still dot the landscape around Arviat.

f 1.2 Schematic territory of IQ. Zones of the land are known by travel lines, zones and points of reference, building a landscape of relationships.

The knowledge shared by elders describes instability and uncertainty at the centre of collective adaptation and thriving on the land. Through observation over time, IQ is a living body of knowledge that records instability on the ground through direct experience, and how Inuit might respond to it. In the ongoing process of decolonization in the North, renewing traditional knowledge adaptation in response to hardship is helping communities navigate the political and economic changes in the Territory. The relationship of territories, spaces and technology through embedded material and environmental change was upended by the arrival of *qallunaat* into the North, who territorialized Northern ground in search of global sailing routes and resources reserves.

Identity 2 / Ground as Territory

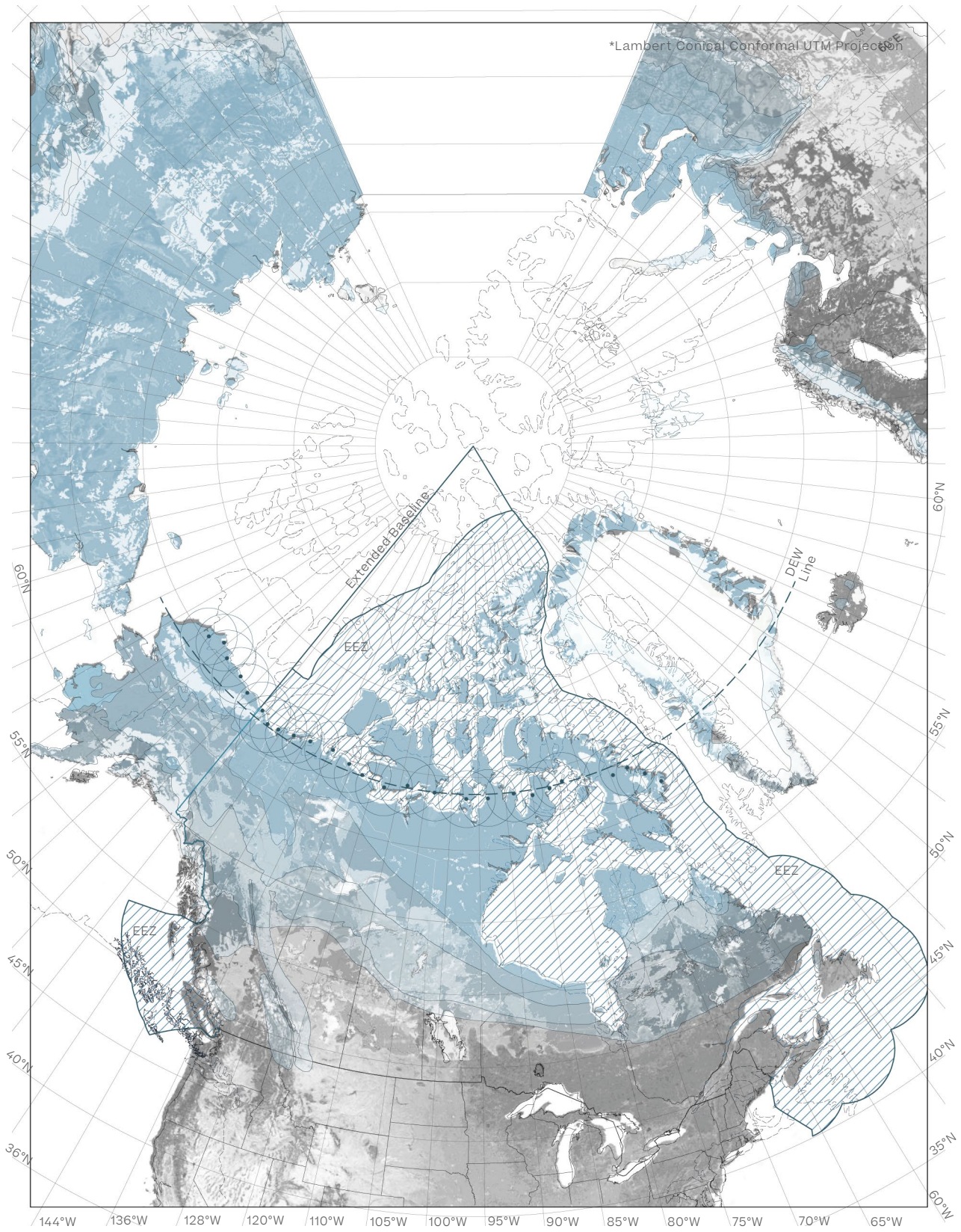
“The beauty of the UTM rectangular grid is that by using a brief code consisting of zone and grid-line numbers, it is possible to identify any point in Canada, even if that point is not otherwise marked or identified on any map.”

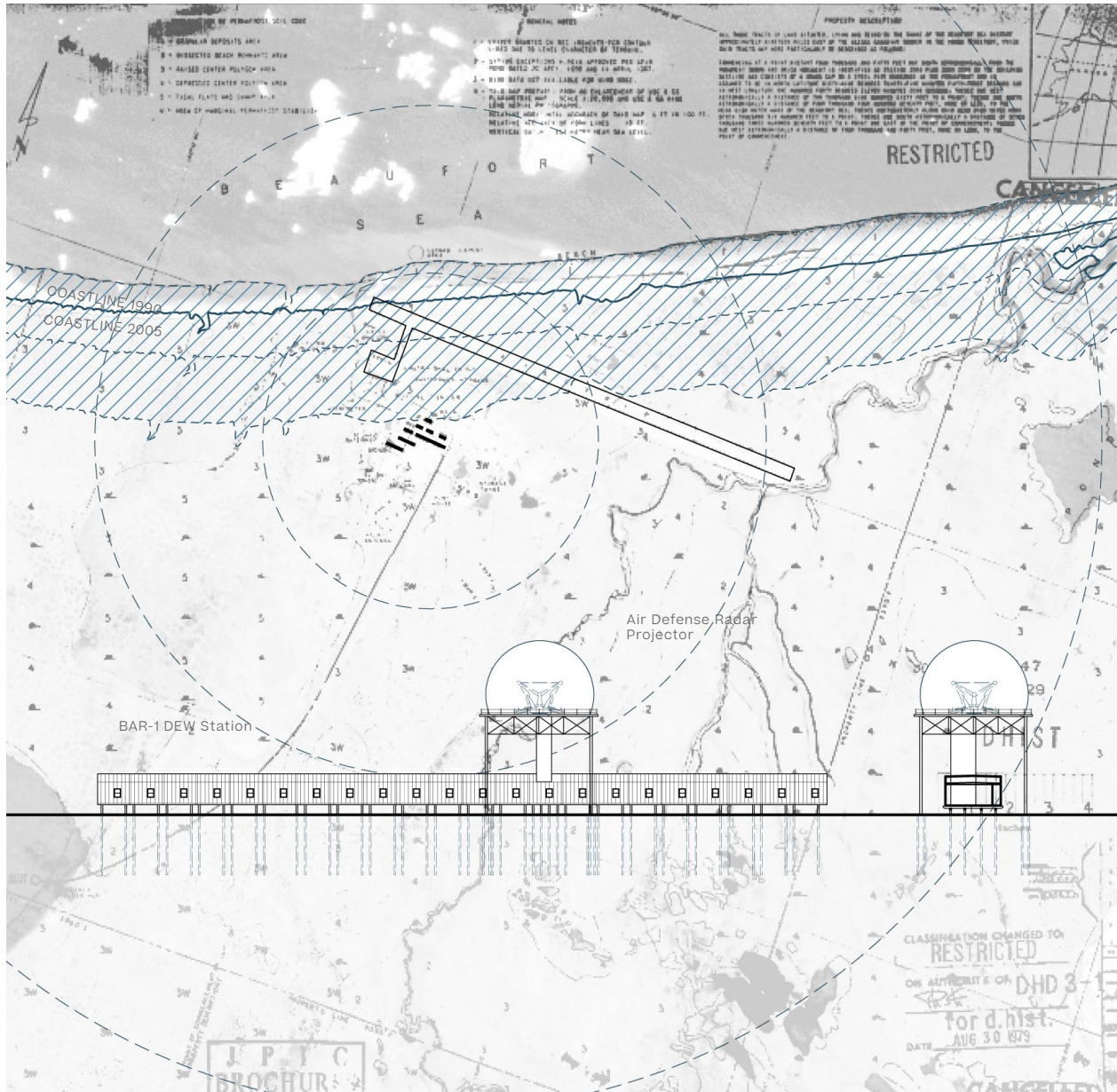
- Department of Energy, Mines and Resources, as quoted in *Inuit Land Use and Occupancy Project*, volume II, Milton Freeman Research Associates and Department of Indian and Northern Affairs (1976)

In the foundation of western geological sciences, early geologists such as James Hutton and Charles Lyell positioned humans within imperceptible histories of deep time. For Hutton and Lyell, the meaning of geology was the natural record of both organic and inorganic changes, and how those changes have altered the surface and structure of the earth.¹¹ The forces shaping the rock and soils were understood within epochs and eras, separated from social and cultural histories of communities.¹² The emerging scientific understanding of the ground was used to classify the value of materials by their chemical compositions or physical characteristics of size and colour. The identity of the ground was thus determined through fixed difference, rather than ecological or social relationships over time. *Territory* is constructed from this same reading, defining geographies through political opposition or generalized landscapes embedded in physical places, separating direct experience of the land into constituent parts.



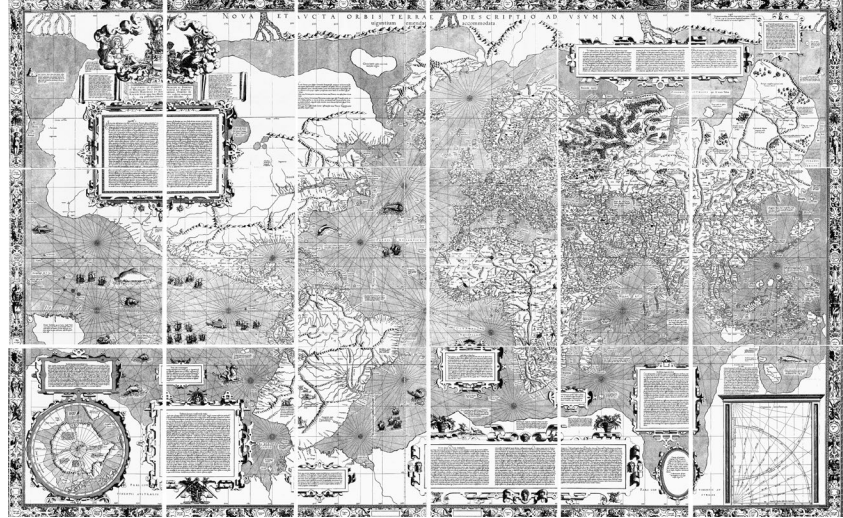
f 1.3 The projection of territory and economic sovereignty. Distortions in the projection reshape the reading of the ground. Mapped in UTM space, the territory is reshaped into a conical projection in order for Canada's Economic Exclusivity Zone to correctly meet at the North Pole.





f 1.4 The Distant Early Warning (DEW) Line stations were constructed across the arctic coastline along the 68 parallel. The prefabricated buildings and airstrips would in many cases become the modern towns of the north. However, as the arctic coastline erodes, these stations will soon disappear into the sea.

f 1.5 Gerardus
Mercator's 1569 World
Projection (on pages 12 and
13).



Through the 1960s, 1970s, and 1980s, the Canadian North was aggressively transformed by systematic and spatial interventions including forced relocations of Inuit, military monitoring, and building programs to ground the governing agenda of colonization, resource extraction, and militarization of the Arctic. Abstract spatial systems such as military Mercator mapping, but more importantly the National Topographic System, which structures how resource exploration leases are divided, operated at scales and by means that erased all readings of complex and dynamic land. In less than a generation, geographic and architectural projects at the scale of the territory erased the freezing and thawing of the land, representing it as stable ground to be settled.

The mapped territory fragments social-natural relationships on the land into separate frames of political and economic reference for the State.¹³ In the Canadian Arctic, control over territory has been constructed by large-scale military, sovereignty and resource extraction projects that have obscured the indigenous landscape. For instance, the construction of the DEW (Distant Early Warning) Line, a series of air defense radar stations funded by the United States during the Cold War, defined the north for decades by overlapping zones of monitored airspace along the 68th parallel. The DEW line established a geographically stable front line of monitoring stations separated by the range of each RADAR array, and isolated from the changing social and physical ground immediately underfoot. Both as an architectural and cartographic project, the physical structures of the DEW Line were placed accordingly to the Universal Transverse Mercator (UTM) map projection that referenced global space into a mathematically rationalized grid.

Developed by the United States Army Corps of Engineers in 1947 the UTM grid was the first system of mathematically rationalized global space.¹⁴ Prior to this, the first Mercator projection of global space was developed in 1569 by the Flemish cartographer Gerardus Mercator as a system of representation translating land claimed by European colonial powers from the observations of explorers into a two-dimensional geography, the contents of which could be navigated to without the sea or the stars.¹⁵ Planners, cartographers and nation-builders rationalize the ground through the abstract, mathematical perspective of the Mercator grid, which has become an *a priori*—a pre-existing construct to which physical ground can be spatially referenced.

First used to territorialize the North in the geopolitical battlefield of the Cold War, and then as a system of survey for resource development, both Canadian Forces and Natural Resources Canada maps operate in UTM space. The territorial perspective fundamentally shaped how the Canadian state saw northerners and their relationships to land, and thus how arctic settlement has unfolded in the territory.

Identity 3 / Ground as Friction

“Speaking of friction is a reminder of the importance of interaction in defining movement, cultural form and agency.”

- Anna Tsing, *Friction an Ethnography of Global Connection*, 6

“The formal mutations a building undergoes are processes of recording: *deformations* as matter *in formation* are also *information*... The built environment is not only a passive sensor of environmental and political change. It interacts with and affects the very processes it records

- Eyal Weizman, *Forensic Architecture*, 52-53

Friction is generated between objects or ideas that come into contact with each other, and both sides are transformed through the interaction. The friction between *territory* from *home* in the North can be understood in the subdivision and fragmentation of authority from the ecological relationships on the land into political boundaries on two dimensional maps.¹⁶ The early interactions of the federal government and territorial



f 1.6 As shifts and movement in the ground continues to intensify, buildings produced within readings of stability are beginning to fall apart. The ongoing project in the community to repair and retrofit these structures to respond to the shifting ground is an unending process of renovations and leveling.

administrators saw Inuit as political instruments within the mapped borders of a frozen territory. To stake Canadian sovereignty over the Arctic, a number of forced relocations of Inuit from Northern Quebec into the High Arctic. When the State began to take interest in the well-being of Inuit on the land, it was through the dualities of town and hinterland, public and domestic, traditional and modern that were cultural grounds of modern Canadian society in the 1950's.

Writing on care and public health crises in Nunavut, anthropologist and ethnographer Lisa Stevenson describes the problematic relationship between the statistical perspective of government institutions and sense of place in Inuit communities.¹⁷ Inuit societies had built resiliency through knowledge of their place, on the land, within larger social, climatic and ecological forces across generations. On the other hand, the statistical grounds of infant mortality and tuberculosis rates that health and housing programs are built on separate individual agency from larger scale concerns of state welfare. The classification of individuals and families as adequately housed or not serves Northern administrators either way. On one hand, housed people confirm the expected and positive result of housing programs, while on the other hand inadequately housed people become the grounds for more funding.¹⁸

The architecture of housing physically constructed policies of assimilation and cultural genocide for indigenous communities. In the North, territorial projects of development that preceded the early public housing projects had profoundly damaged the resiliency of Northern communities. Through the 1960's, houses designed in Ottawa were delivered across the North into the recently formed communities. In less than a generation, communities which had been living in dispersed and nomadic camps shifted from a life of hunting on the land to the suburban spaces of modern Arctic towns.¹⁹

Architectural theorist Eyal Weizman studies the material ground as a constructed surface that tells the stories of political and cultural of violence.²⁰ Weizman closely studies how cultural projects engage the environment and architecture power dynamics to shape space. Through his research practice, *Forensic Architecture*, Weizman studies the built environment as a geological and historical record, a stratigraphy of evidence that has a story to tell. In the Canadian North, the construction of settlements has been defined by brutal political projects and the disciplinary boundaries of design, building, property and land-use that neither recognized the culture of communities nor the environment in



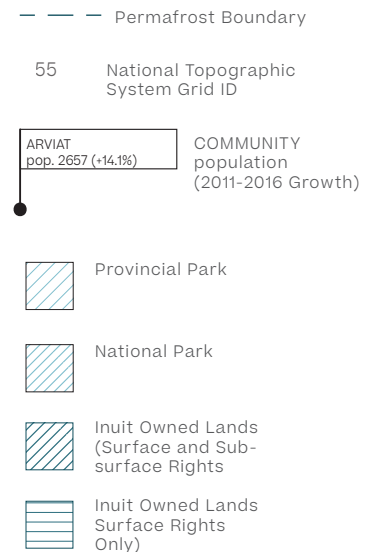
f 1.7 Petroleum contaminated soils being shipped to Montreal for remediation after the sea-lift arrives.

which they live.

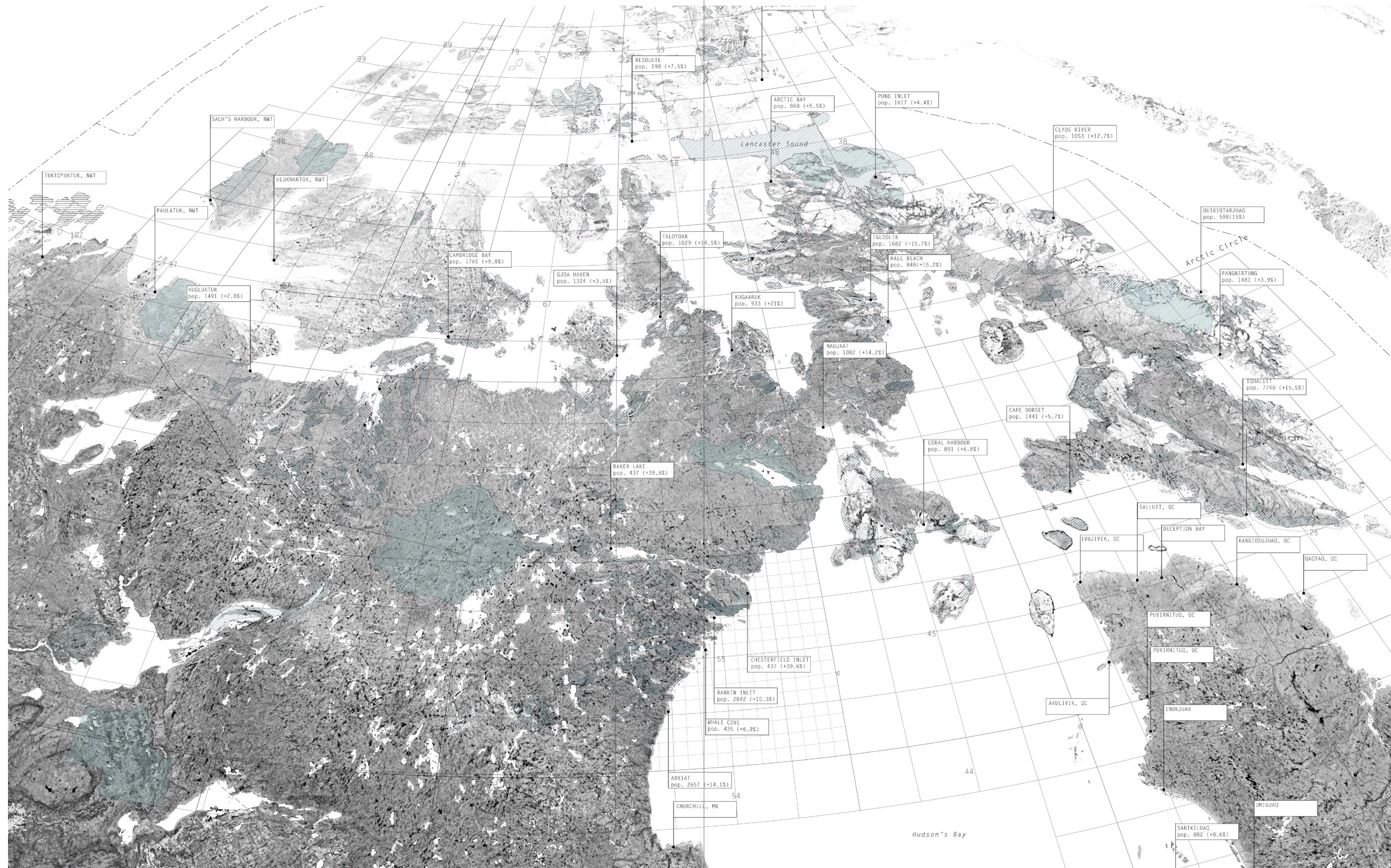
The zoning by-laws and building codes, within the frontier of territory, are spatial assumptions that impose ideas of domesticity, ownership and stability on Indigenous land. They are written from deep cultural concepts that shape identity and place of Canadian narratives over the land: the house as the seat of social stability, private property as economic prosperity and the town separated from the surrounding hinterlands.

In the marginal spaces left between the fire setbacks, lot lines and walls of Arctic towns, the friction between design conventions of housing initiatives and broken relationships to the land can be traced through the material interventions made by community members. On top of the traditional building materials of the land, industrial building materials imported into communities take on lives of their own on the ground. Off-cuts, waste and demolished structures, which would otherwise be buried in the town dump, are reconfigured into a new layer of architecture on the ground. For example, existing buildings are enhanced with porches, shacks, tent frames, sea-cans, and windbreaks that are local responses to improving the performance of built spaces as per community needs and wants.

As the North continues to be developed, infrastructures, buildings and administrative boundaries overlaid in the project of colonizing the territory have become the foundations of contemporary Nunavut. As Inuit continue to assert their right and title over the land following the NLCA, architecture is an instrument being reclaimed for community agency.²¹ Northerners are questioning the canon of Canadian architecture and indigenous designers are actively re-centring this canon by work done in communities. Architecture conceived and constructed in the North, by Northern designers is producing an emerging vernacular in the territory.²² The project of design and construction in the Canadian Arctic then needs to reframe its perspective and approach to closely engage with the agency of communities and their right to self-determine how to live on the land.



f 1.8 The Canadian North. The idea of north is constructed from political negotiations, conventions of mapping and climatic changes above and below the ground.



Environmental Negotiations and Reconciling the Ground

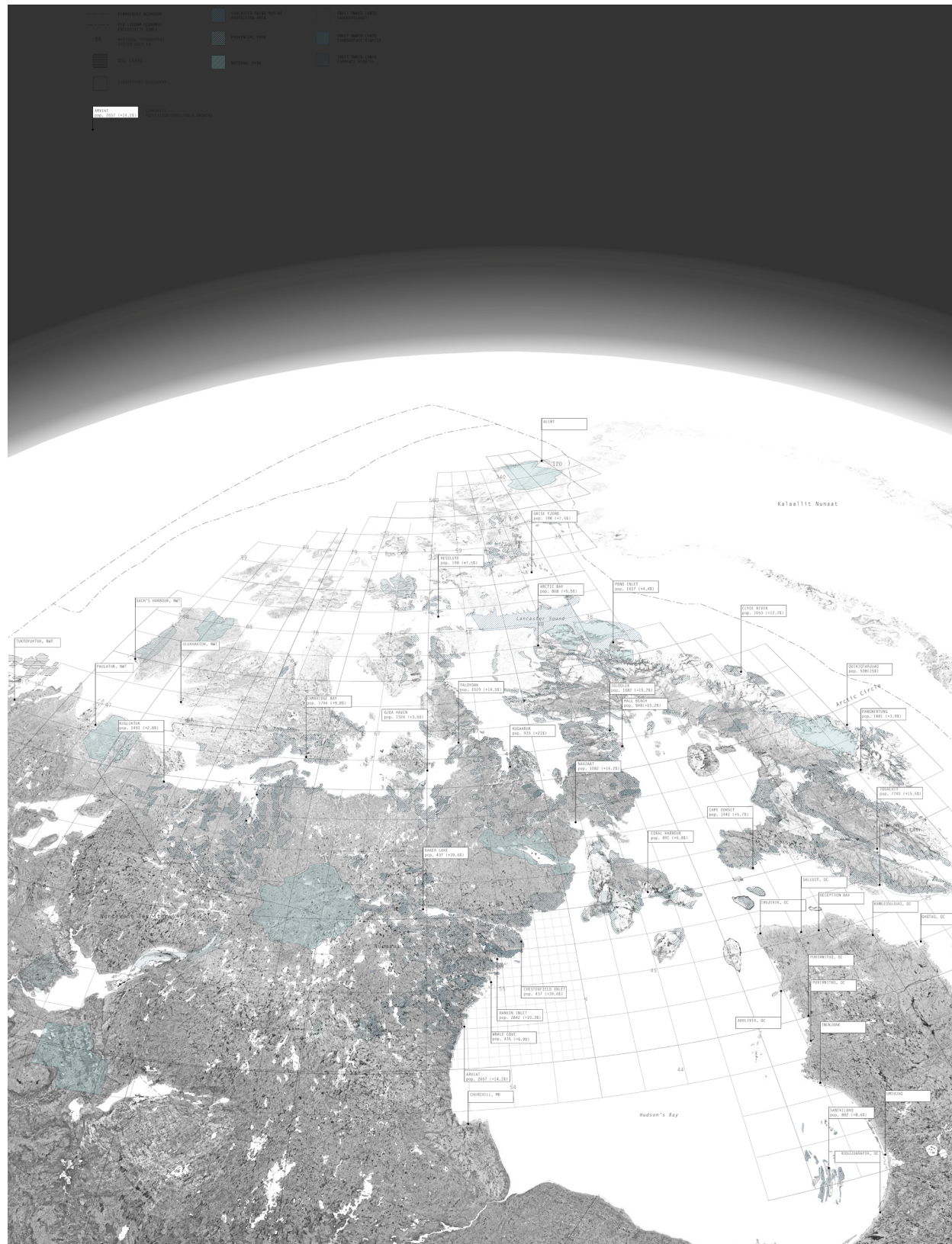
To understand what is unique about *the ground*, we need to understand it as a politically negotiated territory. Extended land claims negotiations, resulting in the Nunavut Land Claims Agreement in 1993, and finally the partitioning of Nunavut into a new territory in 1999 asserted legal and political boundaries on the map that demarcate Inuit rights and title over geology, ecology and representation of the ground itself.²³ The legal grounds of Inuit self-determination as an indigenous people is their lived connections to the land, and the land claims process was the first step in restoring authority to those connections.²⁴

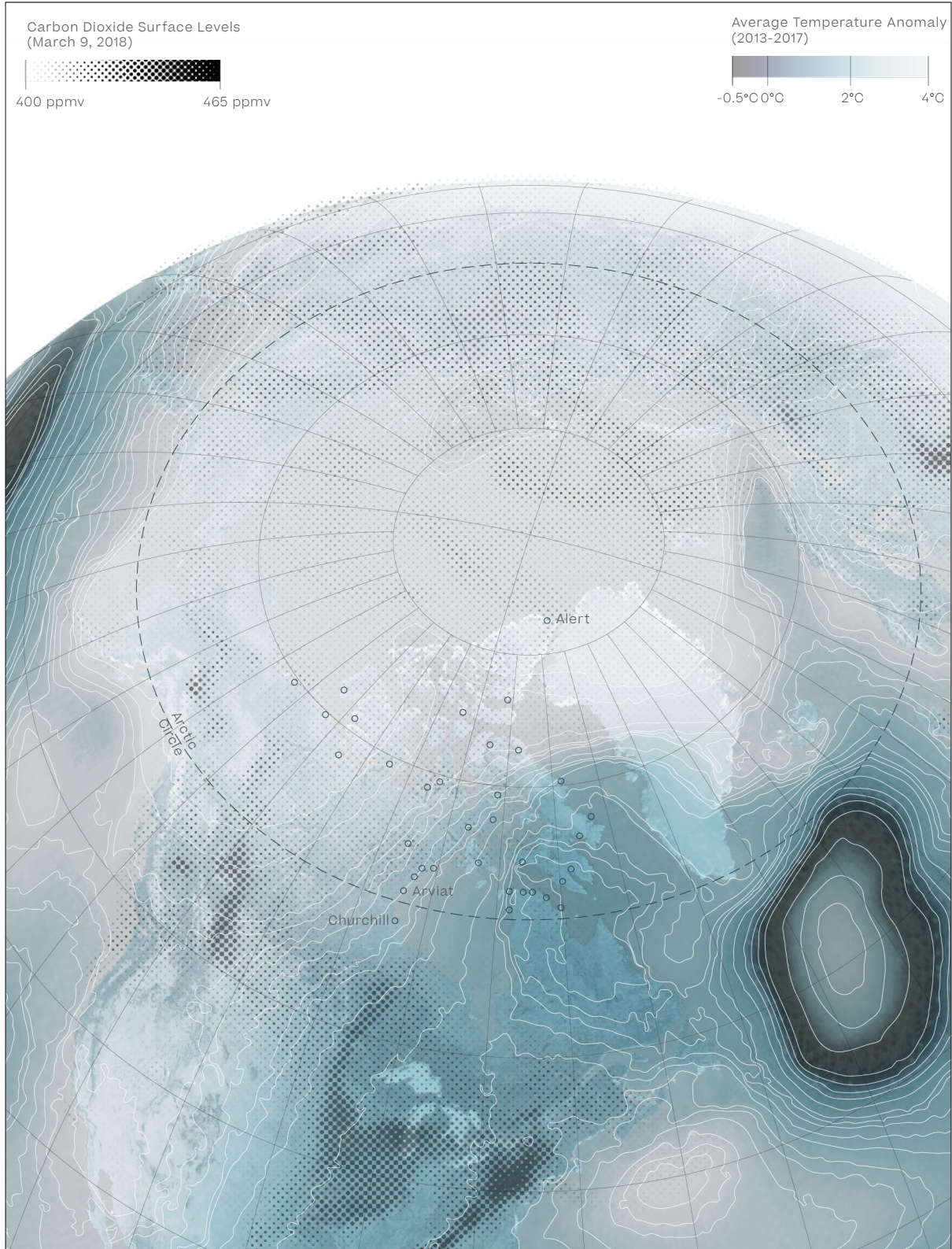
All Canadian citizens are responsible to the legal obligations of treaties across the country and the land claims in the North. Negotiations around climate change and environmental rights are a useful example to consider the ongoing political power dynamics asserted on the ground. As the impending climate crisis unfolds in the North, a large burden is placed on Inuit to adapt to accelerating changes that threaten their right to exist as an Indigenous People. The Canadian constitution, written in 1860, does not give any rights to environmental health itself, nor rights to Canadian citizens to live in a healthy environment. In lieu of any constitutional responsibility for the environment, conservation efforts often fall on the protected rights given to Indigenous nations, who then advocate for their land and water. The result is some of Canada's most impoverished people fighting extended legal battles against problematic infrastructural and resource development projects.²⁵

For example, Inuk filmmaker Zacharias Kunuk and anthropologist Ian Mauro produced *Inuit Knowledge and Climate Change* in 2011 to record the most dramatic effects of anthropogenic climate change on the planet as observed by Inuit across the high Arctic.²⁶ Despite the fact that their conclusions were identical, the scientific community disregarded the Inuit observation and concern regarding a changing relationship between the fluctuating climate and their readings of the land.²⁷ Scientists and policy makers considered their understanding to be more viable than the Inuit.

The conflicting epistemologies and authority over who can interpret the changing environment is documented in artist and researcher Susan Schuppli's video installation, *Can the Sun Lie*. While the elders observed the change from their multi-generational understanding of environment, uncertainty embedded in modern climate modelling enables those

f 1.9 Global temperature anomalies and North American CO₂ production, 2013-2017.





who stand to profit from the changing climate to challenge the cause of the warming arctic air.²⁸ This epistemic divide is not necessarily one of competing knowledges but a difference in how matter and meaning are related to land and territory. The scope with which scientists observed climate change was too broad: the communities reporting the phenomena, who relied on the position of the sun and stars to guide their hunters' home, appeared out of focus to researchers.

To consider traditional knowledge and technology as holding opposite meanings in reading the climate is a simplification that is embedded in the buildings of communities. Established building technology manufactures structural stability by insulating the extreme weather or by drilling deeper into the ground in search of stable geology. While traditional knowledge of embedded material and territorial changes in the land has expanded to understand new buildings, and dwellings in particular through the seasonal identity of the land, the limited view of building science and structural engineering fails to recognise the volume of information, observation, and data that informs communities' sense of place within the landscape.

Endnotes - Notes on the Ground

- ¹ Oxford English Dictionary, 'ground,' accessed: <http://www.oed.com/view/Entry/81805?result=4&rskey=8CS22y&> (March 25,2019).
- ² *Angry Inuk* (2016), directed by Alethea Arnaquq-Baril, traces the relationship of hunting, economy, policy and animal rights groups around Inuit participation in the global economy by traditional activities. She closely documents the fight of hunters to be heard by the European Parliament, whose ban on seal products disproportionately affects Inuit, who depend on the seals as economic generator and food source.
- ³ Anna Lowenhaupt Tsing, *Friction: An Ethnography of Global Connection* (Princeton and Oxford: Princeton University Press, 2005), 173.
- ⁴ Tsing, *Friction*, 176-202.
- ⁵ Claudio Aporta, 'The Trail as Home: Inuit and their Pan-Arctic Atlas,' *Human Ecology*, no. 37 (2009), 135.
- ⁶ Mark Kalluak, 'About Inuit Quajimajatuqangit,' *Inuit Quajimajatuqangit*, edited by Joe Karetak, Shirley Tagalik and Frank Tester (Halifax and Winnipeg: Fernwood Publishing, 2017), 43.
- ⁷ Joe Karetak, Frank Tester, "Inuit Quajimajatuqangit, Truth and Reconciliation," *Inuit Quajimajatuqangit*, edited by Joe Karetak, Shirley Tagalik and Frank Tester (Halifax and Winnipeg: Fernwood Publishing, 2017) 9-15.
- ⁸ George W. Wentzel, 'From TEK to IQ: Inuit Quajimajatuqangit and Inuit Cultural Ecology,' *Arctic Anthropology*, 41(2), 2004, 240-241.
- ⁹ Pamela Stern, 'Upside Down and Backwards: Time Discipline in an Inuit Town,' *Anthropologica*, 45(2004), 150.
- ¹⁰ Molly Lee, Gregory A. Reinhardt, *Eskimo Architecture: Dwelling and Structure in the Early Historic Period* (Fairbanks: University of Alaska Press, 2003), 43.
- ¹¹ Charles Lyell, *Principles of Geology: Or the Modern Changes to the Earth and its Inhabitants, volume 1, 11 ed.*, (London: Spottiswoode and Company, 1872), 1.
- ¹² Lyell, *Principles of Geology*, 3.
- ¹³ James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven and London: Yale University Press, 1998), 2.
- ¹⁴ Joseph F. Dracup, "Geodetic Surveying: 1940-1990," NOAA, 2006, accessed November 21, 2017, http://www.history.noaa.gov/stories_tales/geod1.html.
- ¹⁵ Robert Israel, "Mercator's Projection," University of British Columbia, 2003, accessed November 21, 2017, <http://www.math.ubc.ca/~israel/m103/mercator/mercator.html>.
- ¹⁶ Gilles Deleuze and Felix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia* (Minneapolis and London: University of Minnesota Press, 1987), 223, 353.
- ¹⁷ Lisa Stevenson, *Life Beside Itself: Reimagining care in the Canadian Arctic* (Oakland: University of California Press, 2014), 29.
- ¹⁸ Stevenson, *Life Beside Itself*, 96.
- ¹⁹ Sheila Watt-Cloutier, *The Right to be Cold: One Woman's Story of Protecting Her Culture, The Arctic and the Whole Planet* (Toronto: Penguin Canada Books, 2015), iii.
- ²⁰ Eyal Weizman, *Forensic Architecture*, 52.

- ²¹ Alessandro Petti, Sandi Hilal, Eyal Weizman, *Architecture After Revolution* (Berlin: Stenberg Press, 2013), 18-19.
- ²² Tiffany Shaw-Collinge with Harriet Burdett-Moulton, Wanda Dalla Costa, Kelly Edzerza-Bapty, and Ouri Scott titled "Indigenous perspectives on the notions of architecture," accessed: <http://www.thesitemagazine.com/read/indigenous-perspectives> (July 14, 2018).
- ²³ *Agreement Between the Inuit of The Nunavut Settlement Area and Her Majesty the Queen in Right of Canada* (Nunavut Tunngavik Inc. and the Minister of Indian Affairs and Northern Development and Federal Interlocutor for Métis and Non-Status Indians, 2010)
- ²⁴ Calls to action supporting Indigenous self-determination, while formalized in the Truth and Reconciliation Commission of Canada final Report, have been an unfolding political struggle between all Indigenous peoples and the Canadian State. In the north, the landmark Mackenzie Valley Pipeline Inquiry completed in 1976 was the first formal recognition of Indigenous perspectives and aspirations on what was then rampant industrial expansion into the North. Thomas R. Berger, *Northern Frontier, Northern homeland: the report of the Mackenzie Valley Pipeline Inquiry, volume one* (Ottawa: Supply and Services Canada, 1977), accessed: <http://publications.gc.ca/site/eng/9.700299/publication.html> (December 15, 2017).
- ²⁵ Terri-Lynn Williams Davidson and David R. Boyd interviewed by Lev Bratishenko, 'From Commodity to Community,' *It's All Happening So Fast: A Counter-History of the Modern Canadian Environment*, edited by Lev Bratishenko and Mirko Zardini (Montreal: Canadian Centre for Architecture, 2016), 84-85.
- ²⁶ One such observation by Inuit hunters from Resolute, Nunavut was the movement of the setting sun from the nearside of the tallest mountain peak to the far side—the sun was not setting where it was supposed to. Elders had observed a dramatic, global climatic shift during the course of their lifetime. The warming arctic air had caused a deep shift at a geological scale whereby thermal inversions and atmospheric refraction had disrupted the position of the sun and stars relative to observers on the ground. Zacharias Kunuk, *Inuit Knowledge and Climate Change*, Isuma TV video. First screened at imagiNATIVE Film & Media Arts Festival, October 2010.
- ²⁷ Susan Schuppli, *Can the Sun Lie?*, Vimeo video. Originally exhibited at *Forensis*, Haus Der Kulturen der Welt, Berlin, March 2014.
- ²⁸ Schuppli, *Can the Sun Lie?*, 9:30.



f 1.10 Camps and cabins north of Arviat.

f 1.11 Aerial photograph of Arviat in May, 2018.





f 1.12 Coastline north of Arviat, obscured by blowing snow on the ground, May 2018.





f 1.13 Aerial photo 2 kilometres north of Arviat, August 2018. Around the modern townsite of Arviat is a landscape of camp sites and trails that navigate the landscape of esker ridges and low lakes.





f 1.14 Thermokarst landscape north of Arviat from the air. The ground is covered with shallow lakes and wetlands on the ice rich permafrost, creating a landscape that is fluid under temperature changes.





Documenting the Ground

Designers and researchers in the Canadian North have been influenced by particular data sets and perspectives cast over the ground. Landscapes and buildings are sited by designers not only in the physical place but also within the maps of the masterplan and technical requirements of building codes. Through satellite imagery, surveyed cadastral maps and geotechnical taxonomies, designers address the ground with vast distances between the design studio and the actual construction site.¹ The disciplinary tools of design translate physical places into what land artist Robert Smithson calls the 'non-site,' or the conceptual place that designers construct in the studio.² The 'non-site' is a constructed representation of the physical place, which for Smithson often involved the gathering of rocks, gravel samples maps and photographs into the gallery.³

Moreover, documenting the ground in a colonized territory is a problematic practice. Western traditions of research remove samples and information from Indigenous land and produce disembodied readings of places through collected taxonomies and tools of representation.⁴ The first perspective of the north for qallunaat is almost always from a distance: out of the window of an airplane or through a map of the vast geography. While these infrastructures are what allow researchers to better connect to the communities they work with (flying into Arviat is in fact the only way visit the community), they fundamentally shape the representation of the territory.

This research itself began with the existing readings of the land, recorded through remotely gathered geospatial data-bases, literature and imagery of Northern ground. The ever-expanding availability of remotely accessed data within federal and territorial geo-databases and atlases, from Google maps and geo-tagged photos shared across social media are recording the North in real time. Publicly available, these new data sets produce an image of Northern ground at continuously increasing resolution.⁵ As Landsat-8 collects new global imagery every 16 days, northern ground can be remotely read in real time.⁶

On the Ground

In response, this project has engaged in a continuous process of zooming in and out through scales and across geographies. Two visits to the community interspersed the research and design work in the studio, engaging in a cycle of research, speculation and ground truthing in different seasons and at different stages of the design work. Layering information from the perspective of the ground, in photographs, sketches, site notations and conversations challenges the scale and perspective from which architecture engages the land. The current site for the architectural project is demarcated by legal lot boundaries of the cadastral map, surveyed onto the physical land.

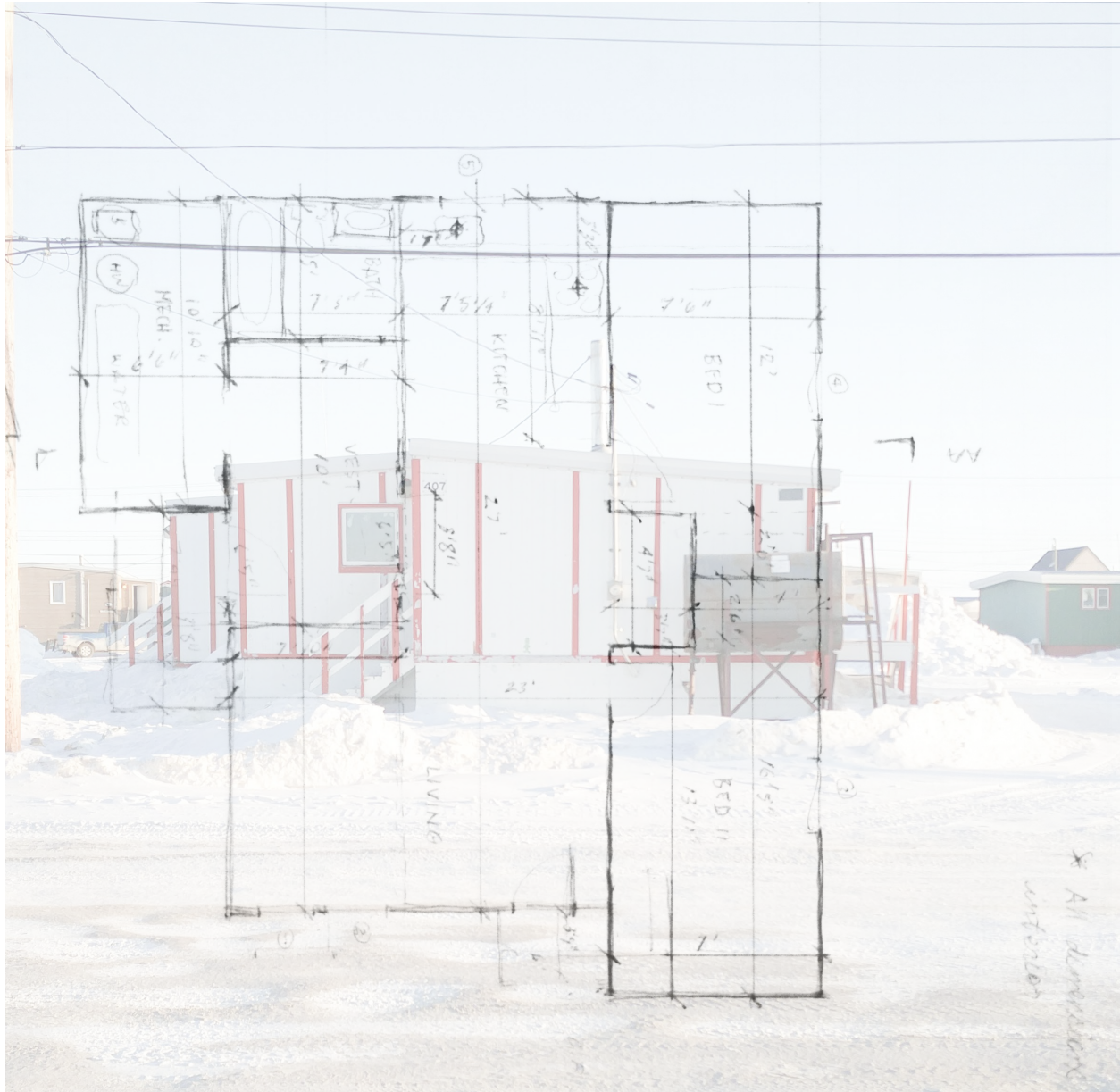
In conversations with the Arviat Housing Association, the local Hamlet government, and community members, the difference between Indigenous experience and the settler perception of this experience became increasingly apparent in their different responses to the changing ground. Communities relate to place through lived practices on the land while the latter is an assumption of the values and practices—both physical and cultural—in these places. Ideas about tradition, family and dwelling held outside the community are steeped in decades of a multi-faceted effort to colonize and obscure the north.



f 1.15 Walking route through Arviat in May, 2018.



f 1.16 Driving around town inspecting foundations with Jason Gibbons of the Arviat Housing Association. Time spent on the ground reveals the frictions, and also the opportunities between default mode of producing new space and maintaining older buildings.



f 1.17 Revised plan sketch incorporating additions and modifications over 40 years. Housing, which was first constructed to separate Inuit from the land, is slowly reconnected to the land, as layers of additions, porches and then outbuildings.

Building on relationships in the community, I focused on understanding specific perspectives on housing and the land in the community. Conversations at the territorial level around planning practices or infrastructures that have been inherited from before the land-claims negotiations continue to drive the construction of the town, the maintenance of housing and community life.⁷

Conversations crossed scales regularly. For instance, the setbacks mandated by the fire marshal and the standard lot dimensions set by the Hamlet do not accommodate spaces for sheds and garages, which threatens the ability of community members to maintain a Honda or snowmobile to spend time out on the land. These conversations revealed contesting readings of secondary data recording change in the ground. Between the Hamlet Government, the housing association and the stories told by residents, they each engage particular scales, histories and material processes in their reading of the landscape. Maps and data sets at the scale of the territory are important methods for documenting the ground, but they need to be sited within and challenged by the observations of community members.

Distance / Mapping the Ground

“As a creative practice, mapping precipitates its most productive effects through a finding that is also a founding; its agency lies in neither reproduction nor imposition but rather in uncovering realities previously unseen or unimagined, even across seemingly exhausted grounds. Thus, mapping unfolds potential; it re-makes territory over and over again, each time with new and diverse consequences.”

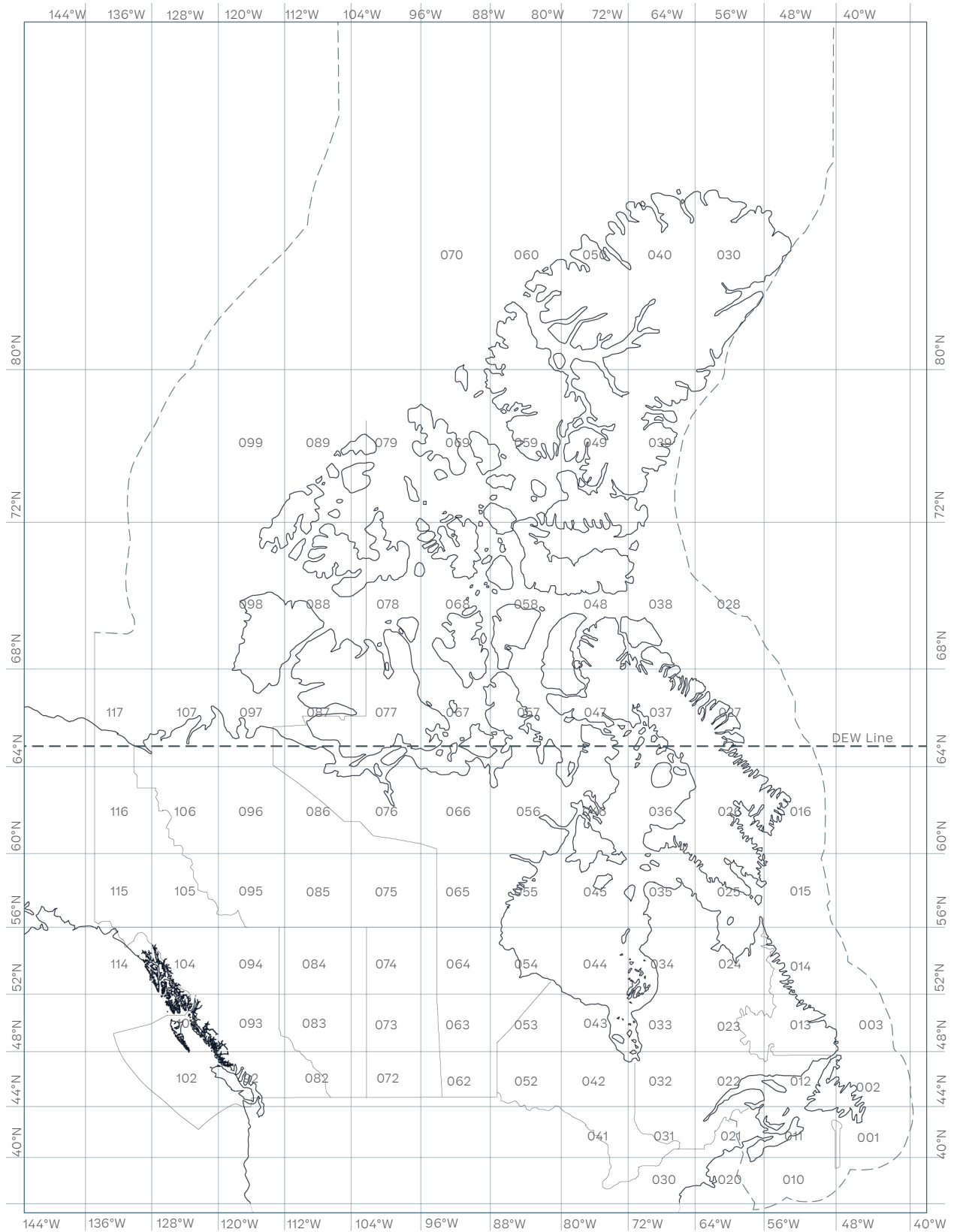
James Corner, *The Agency of Mapping: Speculation Critique and Invention*, 213.

The territory, mapped within the UTM grid, represents landscapes as geographically determined locations. As expressed by the Department of Energy, Mines and Resources, the grid territorializes all information (including what has not yet been discovered) within the boundaries of the map, becoming the ideal framework for exploration. The federal maps of the early 20th century administered the ground through 1000-, 250- and 50-kilometre subdivisions of National Topographic System maps, rigorously documenting the land at set scales, obscuring traditional land uses and inhabitation that crossed gridlines and boundaries.

Scale, or the mathematical distance between the Mercator map and the ground, determines what can be read on the land. Intentional distortions in the scale of representation can construct a ‘cleared site,’ which, for example, can erase change over time or activity at local scales to establish a selected site as an empty surface, awaiting architectural speculation and intervention. It presumes that all previous physical and conceptual material has been cleared from the site.⁸ Colonial sites in the north referred to a particular criterion of empty-ness – *terra nullius* – that specifically cleared the nomadic forms of Inuit land-use from the ground. In the incipient urbanization of the north, aerial photographic surveys and geotechnical taxonomies used to site military installations in the territory first cleared the land for construction.

For example, the permafrost and muskeg identification guides developed by the National Research Office defined the natural ground condition being surveyed by its relative stability for development within the geography of the National Topographic System cadastral map.⁹ The small memoranda included not only morphological information defining millions of square kilometres of what was then the Northwest Territories,

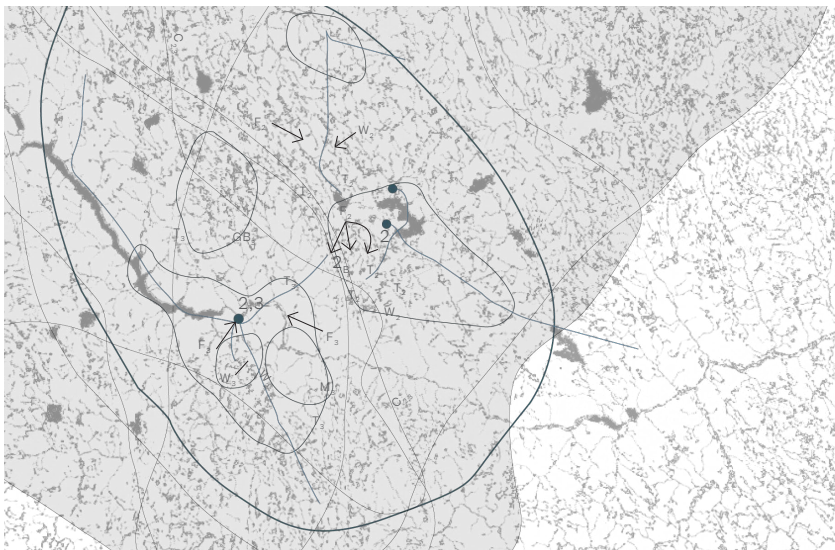
f 1.18 The Universal Transverse Mercator projection was first developed by the United States Army Corps of Engineers in response to the emerging global battlefield of the Cold War. Onto the UTM framework, the National Topographic System Grid was used to identify and subdivide Canadian territory for development.



but also a methodology from which the suitability of the ground for development could be established. Geologists could be flown into any site across the North and establish the stability of the permafrost for construction.¹⁰

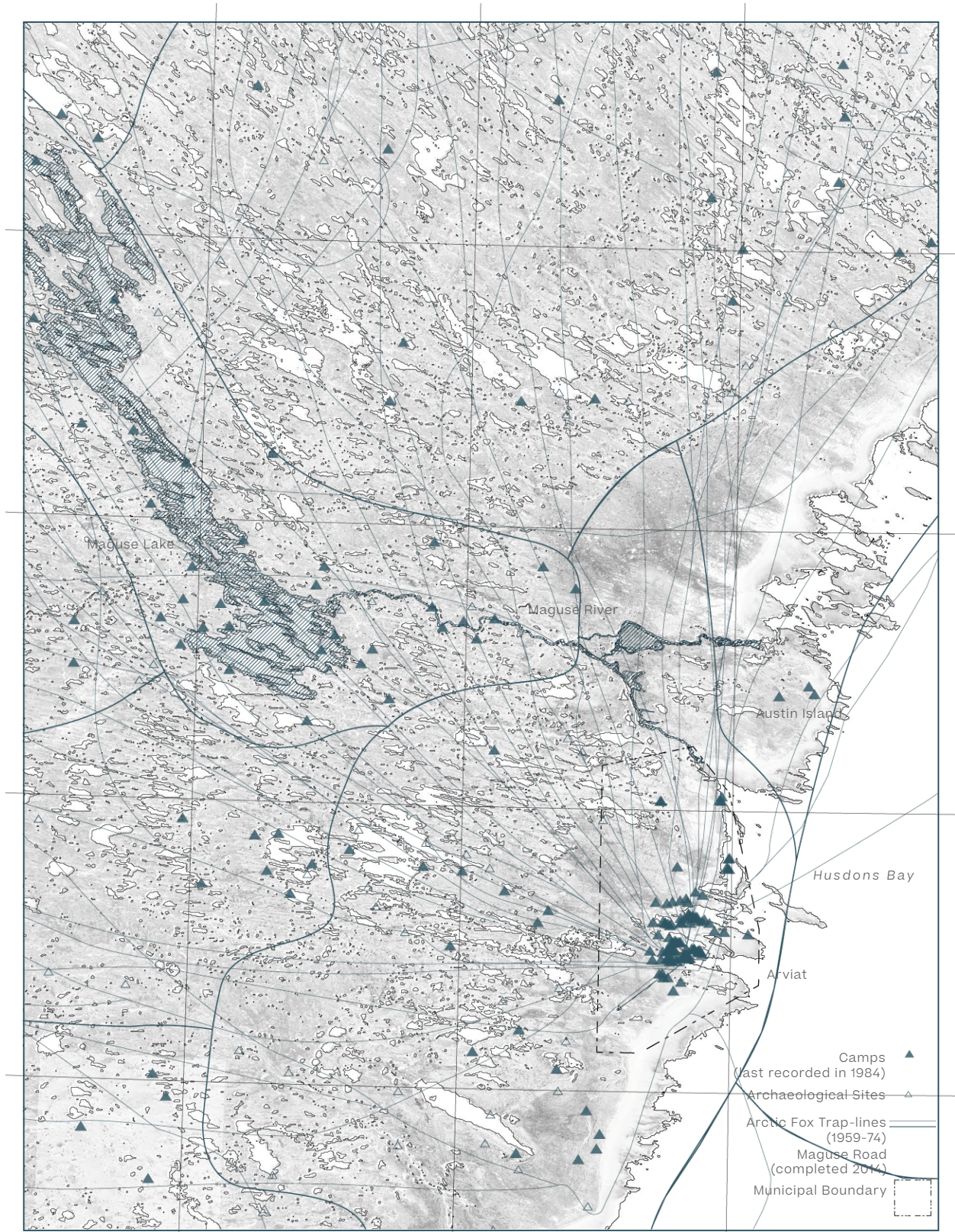
Landscape architect and theorist James Corner writes that the agency of mapping is to create and remake territory to reflect the cultural project of the cartographer.¹¹ Corner sees mapping practices as a way to produce new understandings of a given territory. A series of documents that would inform the negotiation of the Nunavut Land Claims Agreement in 1993 illustrate how the reading of the state maps are transformed by shifting the perspective to the ground as Inuit made their voices heard in Canada. The Inuit Land Use and Occupancy Project (1976), and later the Nunavut Atlas (published in 1984) became cartographic foundations and legal grounds for negotiations in Inuit Nunangat. Through extensive consultation in communities, the itineraries, hunting grounds and trails were aggregated onto state maps and offered a counter-map the territory in the eyes of the Canadian State.

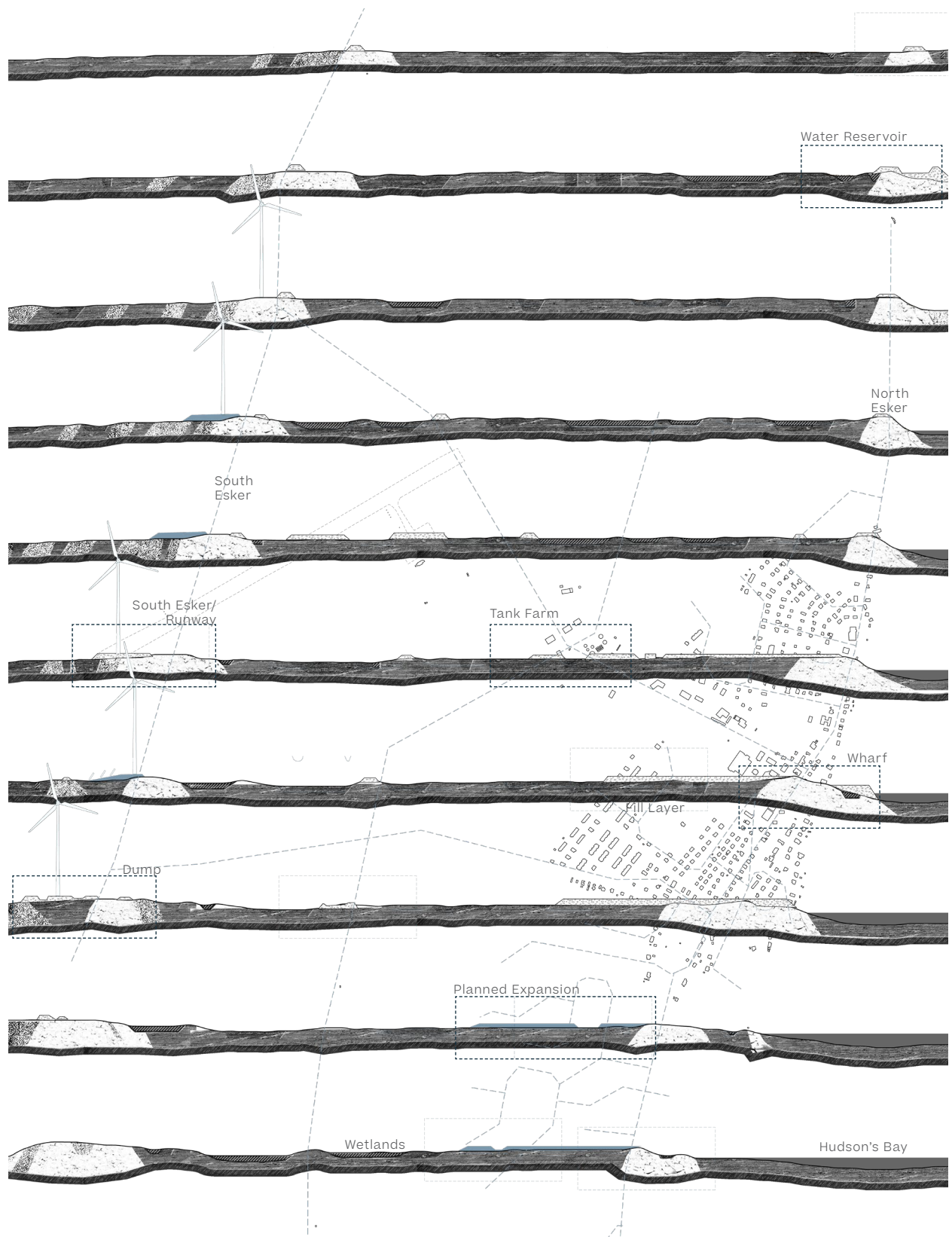
Inuit inhabitation of the land in the Nunavut Atlas is represented by a system of notation that represents the inhabitation and temporality of the land. The maps begin to track movement of people and species, intensities of use and collective memory of the ground by open-ended annotations on the geographically determined UTM maps of Natural Resources Canada. Between the physical ground and the mathematical precision of the UTM grid, the lived boundaries of Inuit land introduce a



f 1.19 The Inuit Land Use and Occupancy Project created maps out of specific itineraries shared by hunters. Itineraries extended from camps into important hunting territories and features of the landscape.

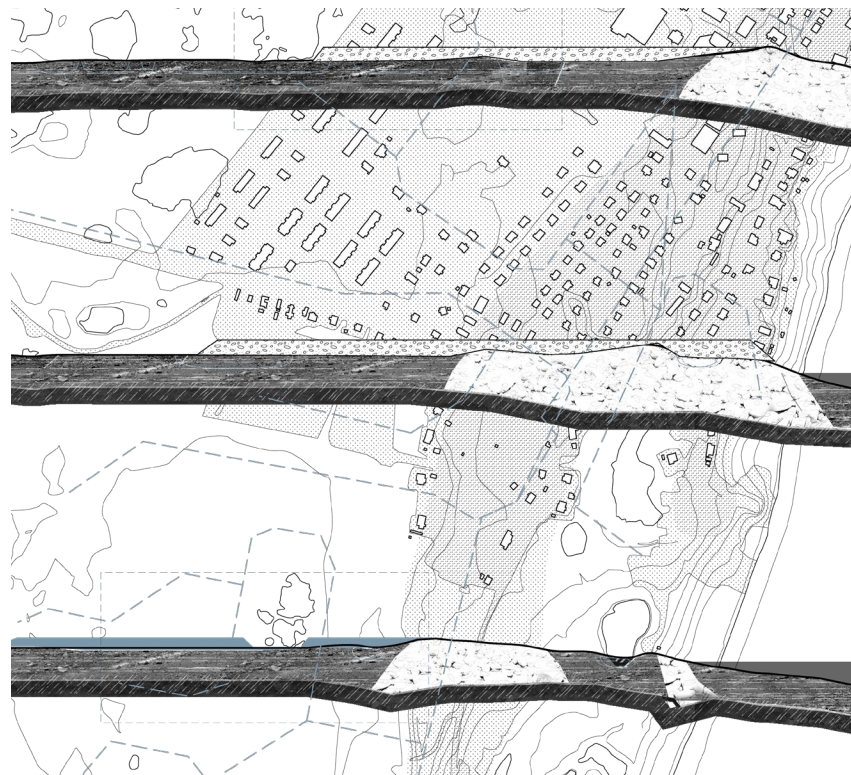
f 1.20 The Nunavut Atlas maps introduced an annotation of temporality and of intensity onto the gridded Natural Resources Canada maps.





qualitative image of inhabit a landscape intensely populated by camps, caches and landmarks that aided travel across the land.

The site of this project was constructed through a series of composite maps at different scales and in different mapping projections to study shifting geology, construction projects, the atmospherics of weather and climate changes. Temporal data and community observations can be overlaid on the geospatial data in official databases, countering the static image of borders and shorelines. The typical scales of the Territory, the region and then the town abstract the relationships that extend from the house, to lived boundaries on the land and the global atmospherics of the climate. The first scale considers the circumpolar globe, including geographies of carbon dioxide production in the United States and southern Canada into the maps of the north. The second scale examines the immediate landscape of camps, lakes and trails on the topography of the region. The third scale nests the house, one of the design studies of this project, within the community, territory and environment. Each scale represents change across different geological and temporal scales, from the industrial revolution accelerating atmospheric change to the changing seasons that drive domestic life.

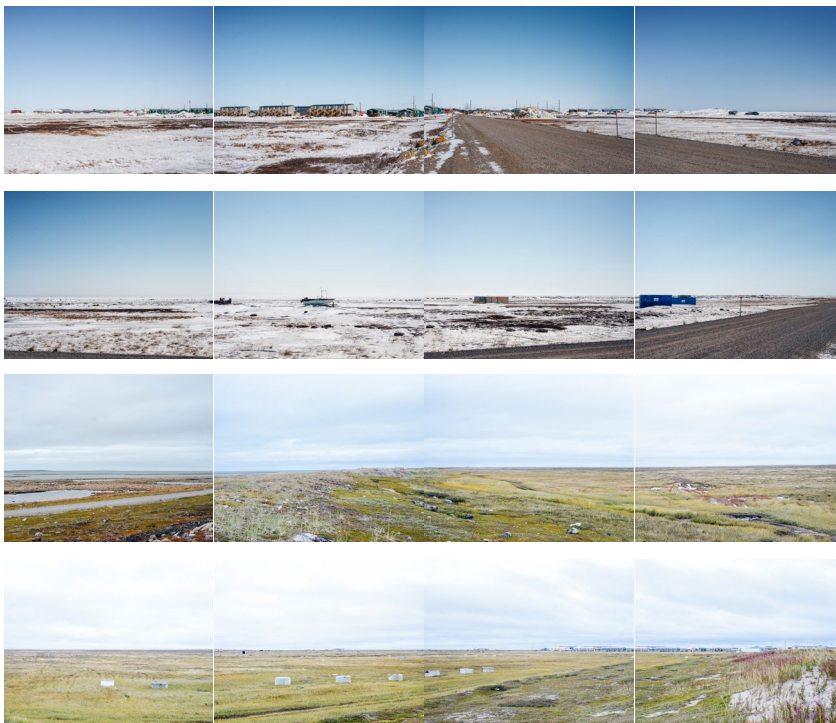


f 1.21 Composite projection of the community plan and geological sections to identify frictions between the ground and the masterplan.

Duration / Photographing Change on Northern Ground

On unsettling ground, geology is literally on the move, and the interplays of fluid geology, climate and the development over the past century can be tracked through photographs of the ground. What is missed in data sets collected at a distance is the immediate experience of the land. The Community Plan and land use map that define the construction of space represent regulated ground conditions that generalize the character of the land as natural or constructed. However, the landscapes around Arviat are continuously transformed by weather, construction and changing community uses through the year. Photography on the ground reveals the intensely populated hinterland that is otherwise drawn as pristine natural ground. From these photographs, community observations describe the value of natural landscapes by its role in cultural practices. The sled dog camps, seacans and trails that populate the landscape describe an intimate and active relationship with the land.

The aerial photograph, which was problematic in the practice of founding settlements, has become a useful tool that has recorded the interactions of development projects and changing ground conditions through colonization and now climate change in the north. A photographic archive of global ground has gradually come to focus on the North and



f 1.22 The changing landscape. Panorama studies from May to August, 2018.



f 1.23 The changing landscape, photographic studies from May to August 2018.



reveals, through the past three decades of satellite imagery, the changing ground not seen in the mapping conventions territory and building. Gathering early aerial photography from the 1950s and 60's, and then satellite imagery from the 1980's to the present day, the history of the constructed town and indigenous land can be read through the changing surface of lakes, wetlands and gravel fill. Beneath projects of development on the ground (see *f 1.24*), the topography of the natural terrain is itself shifting and settling, which can be tracked in changing hydrology.

In both site and aerial photographs, the recorded spaces, landscapes and environments are embedded with different temporal and territorial scales that impact Northern ground. Images recorded over time begin to reveal the complex material and environmental relationships between northern development, communities and the changing ground.

Typical development projects, such as new housing and infrastructure are undertaken at a scale that can be recorded from a distance, members of the community shared stories that populate these coarse images from above with the rhythms of daily life and subtle geological changes impacting the town. For example, geological instability, in the shifting permafrost, can be most clearly identified in foundations beneath the building, or in the cracking walls and jammed doors inside the houses, which act as active sensors of the shifting land below. Residents and local builders have a fine-grained knowledge of where in the town foundations are heaving or land is subsiding.

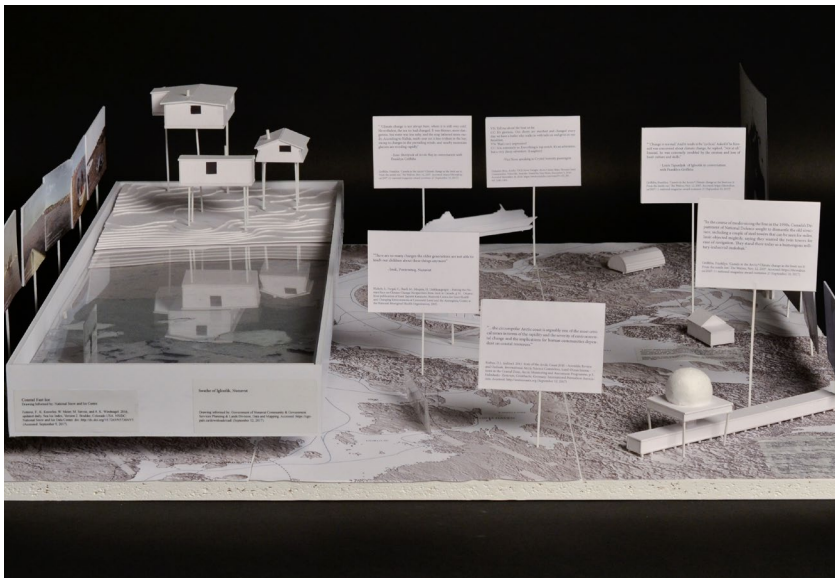
In each photograph, the dissonance between these material layers of ice, gravel and plywood needs to be understood through complex rates of change between the indigenous landscape, constructed ground and the climatic shifts in earth's atmosphere. In Arviat, this process is most clearly illustrated by the relationship of filling ground and the permafrost it insulates. The unstable geology of wetlands and ice-rich permafrost being covered is rendered unseen by the thin carpet of fill covering the land. Elders in Arviat expressed concerns as the town expansion was surveyed over the low wetlands to the east of town, yet the inertia of the gridded plan, as a design response to the growing population, obscured the knowledge shared by elders in favour of engineered stability of fill and foundations in order to keep the regular street layout of the community. In the older neighbourhoods, the land beneath the uniform carpet of fill fractures the image of stability. Buried lakes, muskeg and ice lenses all move at different speeds in the ground, and as a result are pulling the buildings apart.¹²

f 1.24 The changing landscape of development, 1962 - 2017. Detail of a composite map of aerial and satellite imagery from 1955 - 2017.

Depth / Modelling the Ground

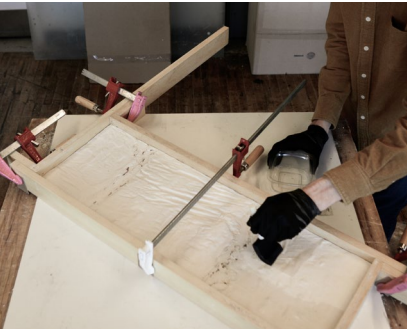
Site research in this project unfolded through conversations and informal interviews about the community projects documented through photography, while the design speculations were carried out in Waterloo. To begin forming the maps, community-based research into a coherent site, a series of three-dimensional, physical models exploring ground, the community plan and housing types were built. For architects, constructing a scale model of the site is a nearly ubiquitous practice within design disciplines to understand different characteristics of the real site in the design office. The models (whether digital or made of foam, plastic and cardboard) translate the two-dimensional information of maps, regulatory frameworks, existing plans and material conditions of the real site into the design studio. Through the process of design, the model declares the value of the real place, and the grounds for design.

Constructing models at 1:500 or 1:2000 at the scale of the community and the landscape or 1:100 models of individual buildings back in Waterloo, working with physical models centred the material relationships important to the community in the design work. The models are made with indeterminate materials such as plaster, sand, wax and wood at scale, translating the precision of topographic and geographic information of GIS databases and drawings to the looseness of shifting permafrost on the ground. Models of the landscape and buildings are always in progress, and can be continuously cut apart, reassembled, carved or frozen in real time.



f 1.25 Matters of concern. Multi-scalar research model from Thesis Research and Development 1 studio.

f 1.26 Multi-layer casting process of the permafrost using rocks, wax and plaster.



I first began to study the natural ground that underlies construction projects by modelling the changing materials of the landscape through a series of casting experiments in plaster. I began by modelling the topography and the major land forms in the community by composing geological materials within each model. The material variability of the terrain around Arviat contrasts sharply with the uniform layer of gravel that is built on, and so the models documented this landscape. Through casting, the digital precision of geospatial data is translated into material ground of plaster, gravel, sand, soil and wax. As each freeze thaw cycle changes the topography around Arviat, each subsequent casting produces a changed topography.

At the architectural scale, building studies in physical models allow for clear explorations into the architectural elements that define housing. Structure, envelope and partitions within the construction of public housing are constructed by the state in their purest form, prefabricated for rapid construction. The designed forms of the Nunavut Housing Corporation are then acted on, hacked and modified by the community. Working on the model, the closed form of building types such as the Five-plex can be cut apart and reconfigured in school as it is in the community.

As the design studio filled with the recorded ground, photographs, composite maps and models introduced the changing material, cultural and political grounds in the community as possible sites for design.



f 1.27 Breaking apart the Five-plex. Various model studies of the typical Five-plex housing type. Growing the Five-plex over time (top); earthwork and foundation studies (middle); facade and massing studies (bottom).

Endnotes - Documenting the Ground

- ¹ Martin Hogue, 'Matter Displaced, Organized Flattened,' *Landscape 5: Material Culture*, edited by Jane Hutton (2017), 175.
- ² Robert Smithson as cited in Martin Hogue, 'Site as Project: Lessons from Land Art and Conceptual Art,' *Journal of Architectural Education*, 57 (3), 2004, 54-55.
- ³ Robert Smithson, *Six Stops on a Section*, 1968. Detail: one bin 8x8x24", map section, photos, in Jack Flam, editor, *Robert Smithson: The Collected Writings* (Berkeley and Los Angeles: University of California Press, 1996), 176.
- ⁴ Linda Tuhiwai Smith, *Decolonizing Methodologies: Research and Indigenous Peoples*, Second Edition (London & New York: Zed Books, 2012), 52-53.
- ⁵ Access to mobile networks is expanding throughout the north, and the built areas of a number of northern communities, such as Cambridge Bay and Iqaluit in Nunavut are now entirely documented in Google Street View.
- ⁶ Ann Sofi Rönnskog and John Palmesino, 'Arraying Territories: Remote Sensing and Escalation in the North,' *Architectural Design*, vol 84, 1 (2014), 38.
- ⁷ Conversations do not follow a representational sample of the community, but rather reflect a snowball sample tracking the questions through the community. Each conversation led to a suggestion of who to talk to next, and in this way, developed an interesting cross section through housing interests in the community.
- ⁸ Carol Burns, 'On Site: Architectural Preoccupations' as quoted in Martin Hogue, 'The Site as Project: Lessons from Land Art and Conceptual Art,' *Journal of Architectural Education*, 57 (3), 2004, 54.
- ⁹ Macfarlane, I. C, *Guide to a Field Description of Muskeg*, (Ottawa: National Research Council, 1957), 2-35.
- ¹⁰ Michael Glover, ed., 'Community Participation in the Planning Process,' *Building in Northern Communities* (Arctic Institute of North America, 1974), 25.
- ¹¹ Corner, James 'The Agency of Mapping: Speculation, Critique and Invention,' *The Map Reader: Theories of Mapping Practice and Cartographic Representation* (Hoboken: Wiley-Blackwell, 2011), 213.
- ¹² The changing land can be measured by charting the movement and size of lakes in the landscape. Archival aerial photographs used to plan the community and an ever-growing record of satellite imagery forms the foundation of this study, and conversations in Arviat and analysis of frost jacking and differential settlement in buildings allows the buried land to be recovered as an agent in the history of the town.

f 1.28 Forms, moulds
and cast artifacts.





f 1.29 Modeling ground.
Mixed media casting
studies of the land with
plaster and ice.





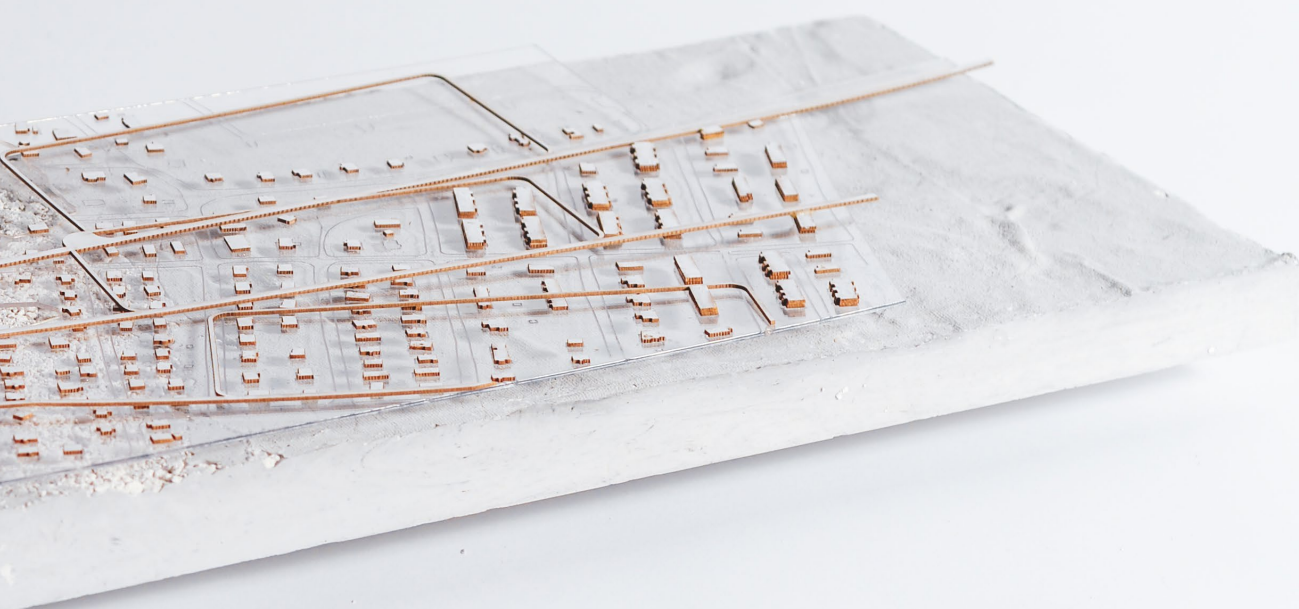


f 1.30 Mixed media models of the land. The modeled ground is constructed from canvas, cork and wood, and then plaster molds were taken .



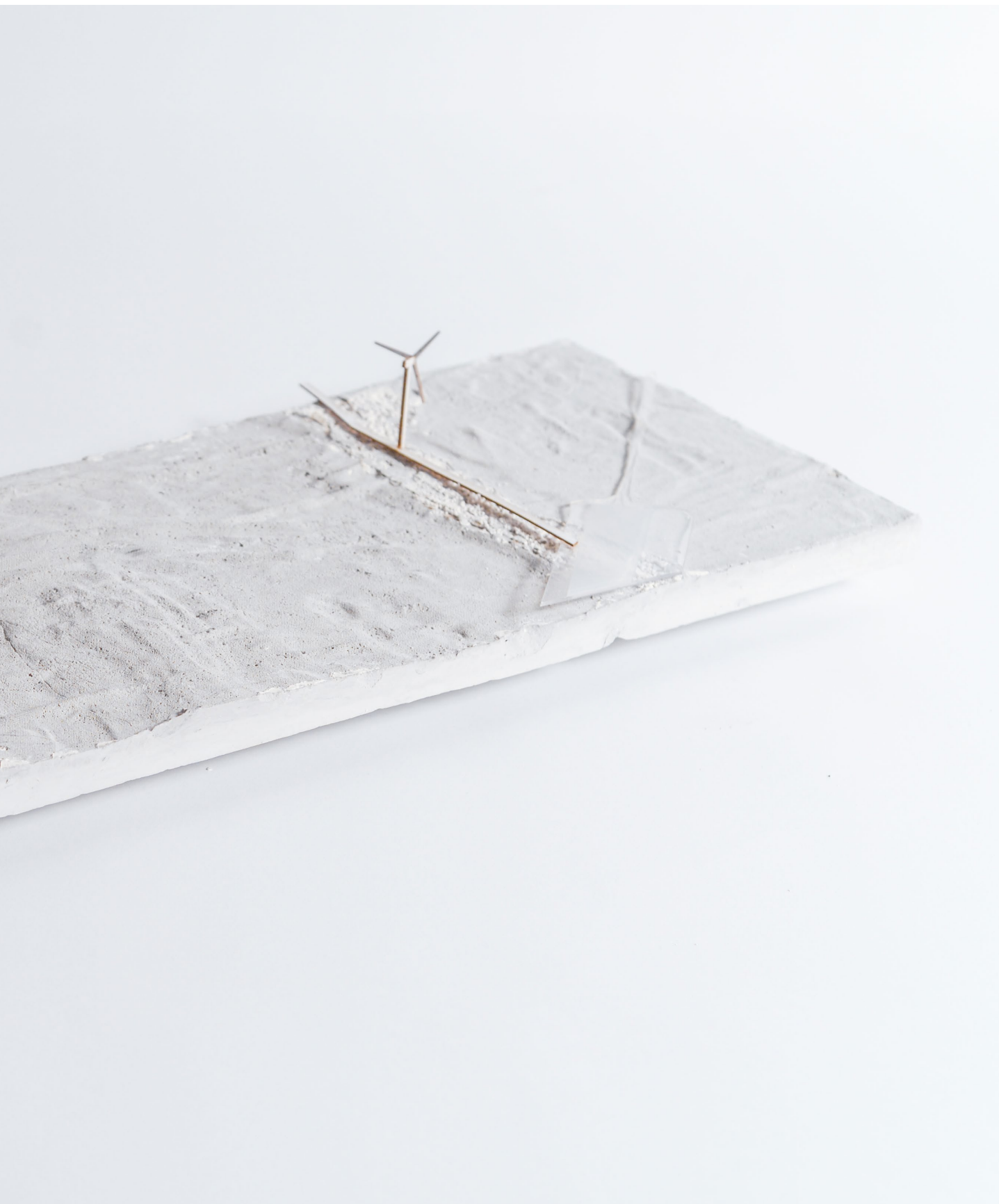
f 1.31 Plaster and wood
model study of a utilidor in
the existing urban fabric.





f 1.32 Plaster and wood model study of infrastructure on the land.







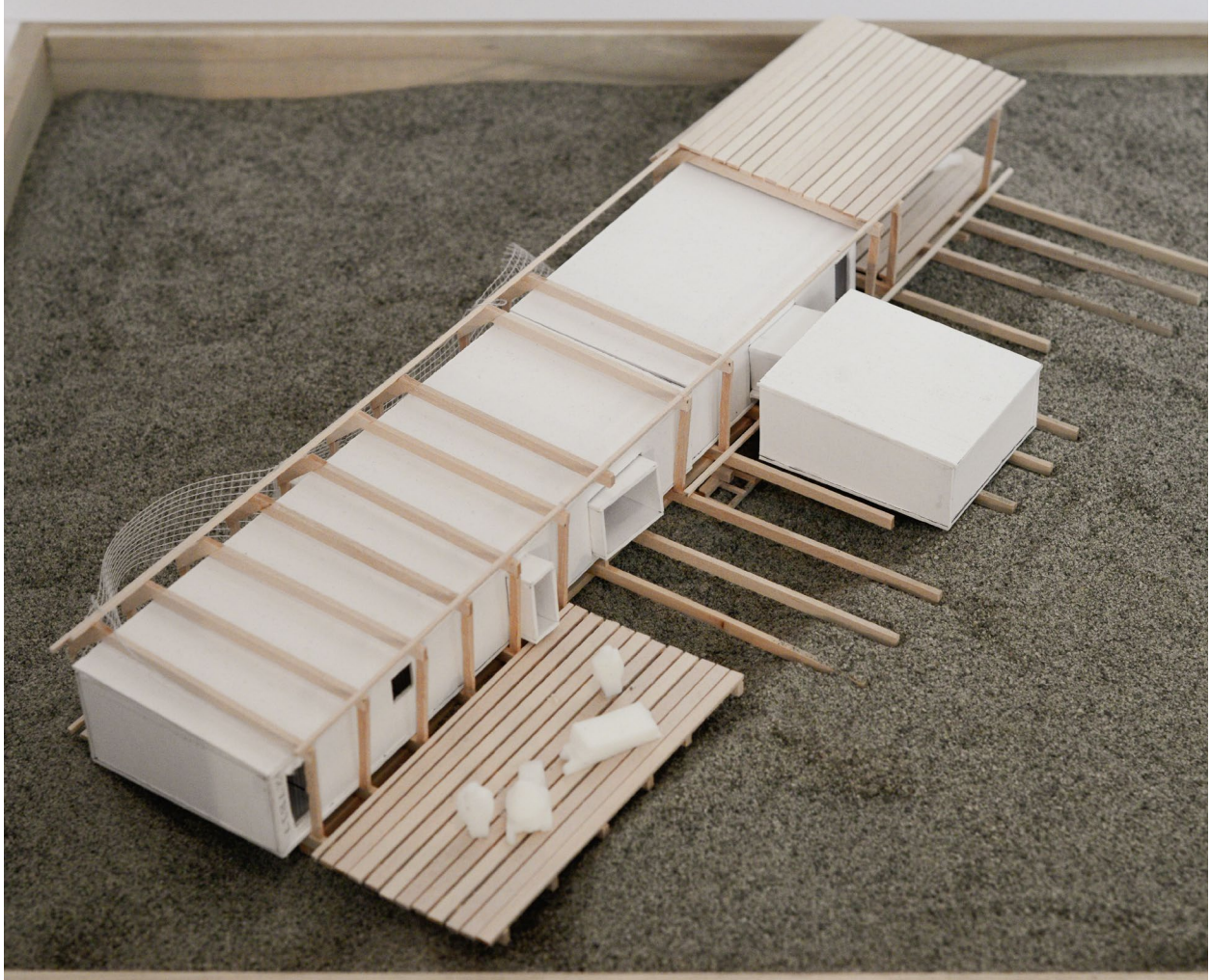
f 1.33 Stratigraphic
casting of piles plaster, wax
stones and soil. .



f 1.34 Stratigraphic casting of plaster, wax stones and soil along the Arviat beach .



f 1.35 Bending the
Five-plex study model on a
sand topographic model.



f 1.36 Breaking apart the Five-plex study model on a sand topographic model.

f 1.37 Presenting in progress research and design.





Arctic Urbanism on Unstable Ground

Building on the Ground

Material economies are indelibly tied to building in the North. The traditional architecture of Inuit was shaped not only by the driftwood, skins and snow that were available, but that each building material was directly connected to travel, food sources and seasonal cycles of the Arctic. Globalized trapping and mining projects that were imposed on the North by qallunaat abstracted the direct material exchanges between environment, economy and space for Inuit into the flux of global markets and unstable geo-politics. The imported architecture of trading posts, mines and military bases that were constructed within development projects spatialized new territories of extraction and administration on the land.

The modern towns that grew out of new economies were the result of economic and political pressures that had disrupted life on the land for Northern communities. While Inuit had little say in the dramatic transformation of their land, they quickly adapted to the new material exchanges and technologies that were imposed on them from abroad. Around Arviat, the collapse of the fur trade and retreat of the Hudson's Bay Company from the interior in the 1950's drove Inuit to migrate from the remote outpost camps to the remaining Eskimo Point trading post for work and wages, or to send their children to school.

Where economic and military development by the HBC and Department of Defense had imposed new economic and political relationships to the ground, the administration of the North within the Canadian welfare state employed architects and planners to dislocate Inuit economic and political agency. A series of housing programs imposed new forms of domestic spaces and economic models on traditional kinships with prefabricated buildings and surveyed residential neighbourhoods in the new town plans. Rows of early plywood and tarpaper houses of the 1960's lined gravel streets along the alluvial esker and stone beach of the Arviat shoreline, but the ballooning population of the community in the 1970s' soon pushed development to sprawl across the unstable permafrost, lakes and wetlands.

June to November

Through the summer, small skin tents would be carried into the interior to hunt caribou. Because of the soft ground, Inuit along Hudson's Bay carried their tents, rather than pulling them on sleds.



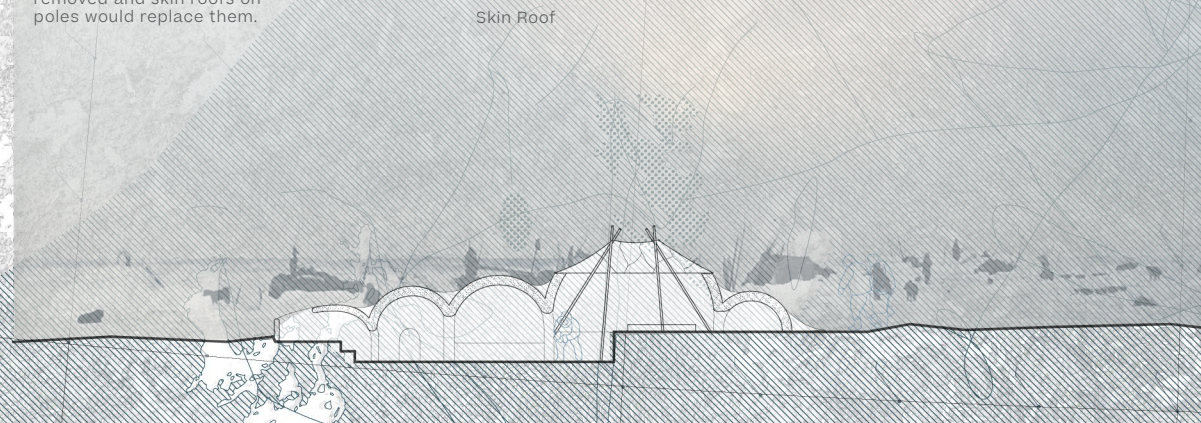
Animal Skin Shelter

Tent poles were driven into the ground

Stone anchor ring

May to June

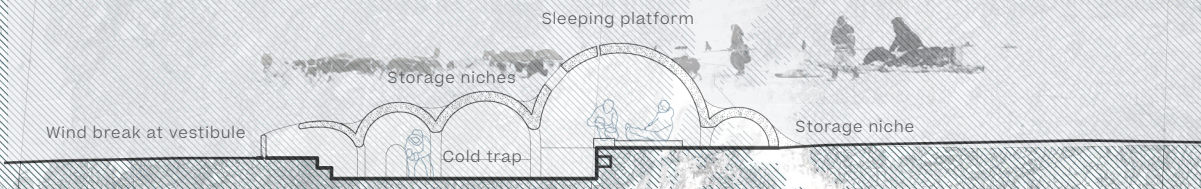
For Caribou groups, the iglu was inhabited through the spring. Melting roofs were removed and skin roofs on poles would replace them.



Skin Roof

November to May

Iglu would be inhabited through the winter on the sea ice. Between Caribou migrations, seal were an important source of food.



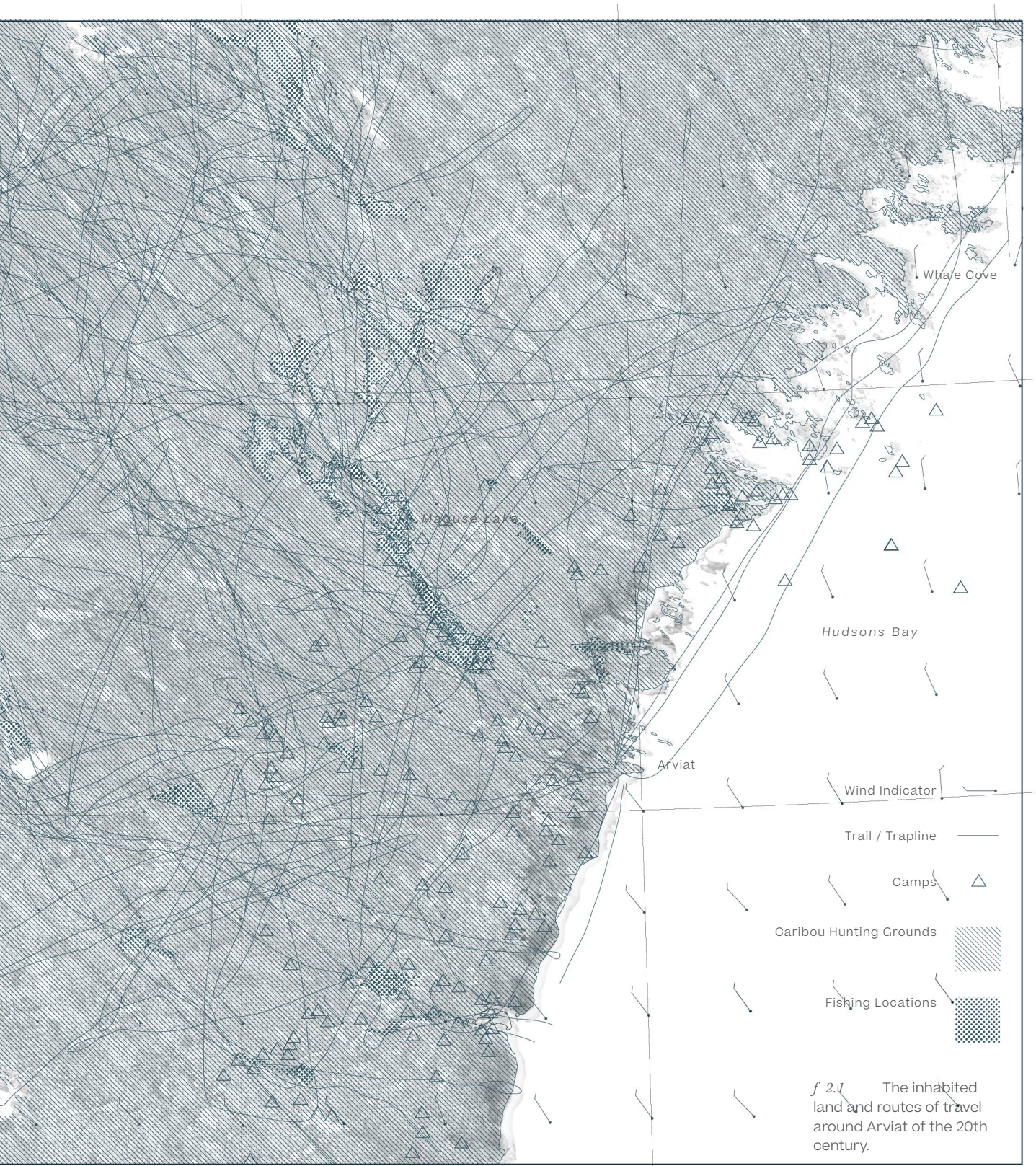
Sleeping platform

Storage niches

Wind break at vestibule

Cold trap

Storage niche



The Hudson’s Bay Company and Territories of Extraction

The foundation of Arviat within the fur trade economy reconfigured the geography of trade and settlement between Inuit, the land and the Canadian state. While the land around Arviat had long been engaged in whaling and trapping, it was in the economic collapse of the global fur trade and the militarization of the Canadian North through the Second World War that colonial interventions in the Kivalliq region attained a new spatial, material and economic scale.

From the 1870’s, when whalers first arrived in the Canadian Arctic, Inuit had engaged in trade, and worked as guides for qallunaat arriving in the Arctic. As an economic frontier, the North has been dependent on the relationships with southern markets who have historically viewed the landscape as a resource hinterland for Canada.¹ The Hudson’s Bay Company formalized the seasonal trading between whalers and trappers around Arviat, building a trading post (then known as Eskimo Point) in 1921.²

Subregion 6A: ESKIMO POINT - NUEL TIN

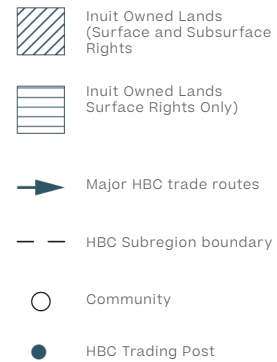
6A1 - Eskimo Point (now Padlei Co-op)	1921 -
6A2 - Maguse River	1938 - 1950
6A3 - Tavani	1928 - 1951
6A4 - Whale Cove (now Issatilk Co-op)	1963 -
6A5 - Maguse Lake	1925 - 1926
6A6 - Padlei	1926 - 1960
6A7 - Tha-anne River	1940 - 1949
6A8 - Smith Bay	1928 - 1930
6A9 - Windy River	1940 - 1950
6A10 - Simons Lake	1928 - 1933
6A11 - Red River	1926 - 1941
6A12 - Windy Lake	1928 - 1936

Subregion 6B: BAKER SOUTHAMPTON

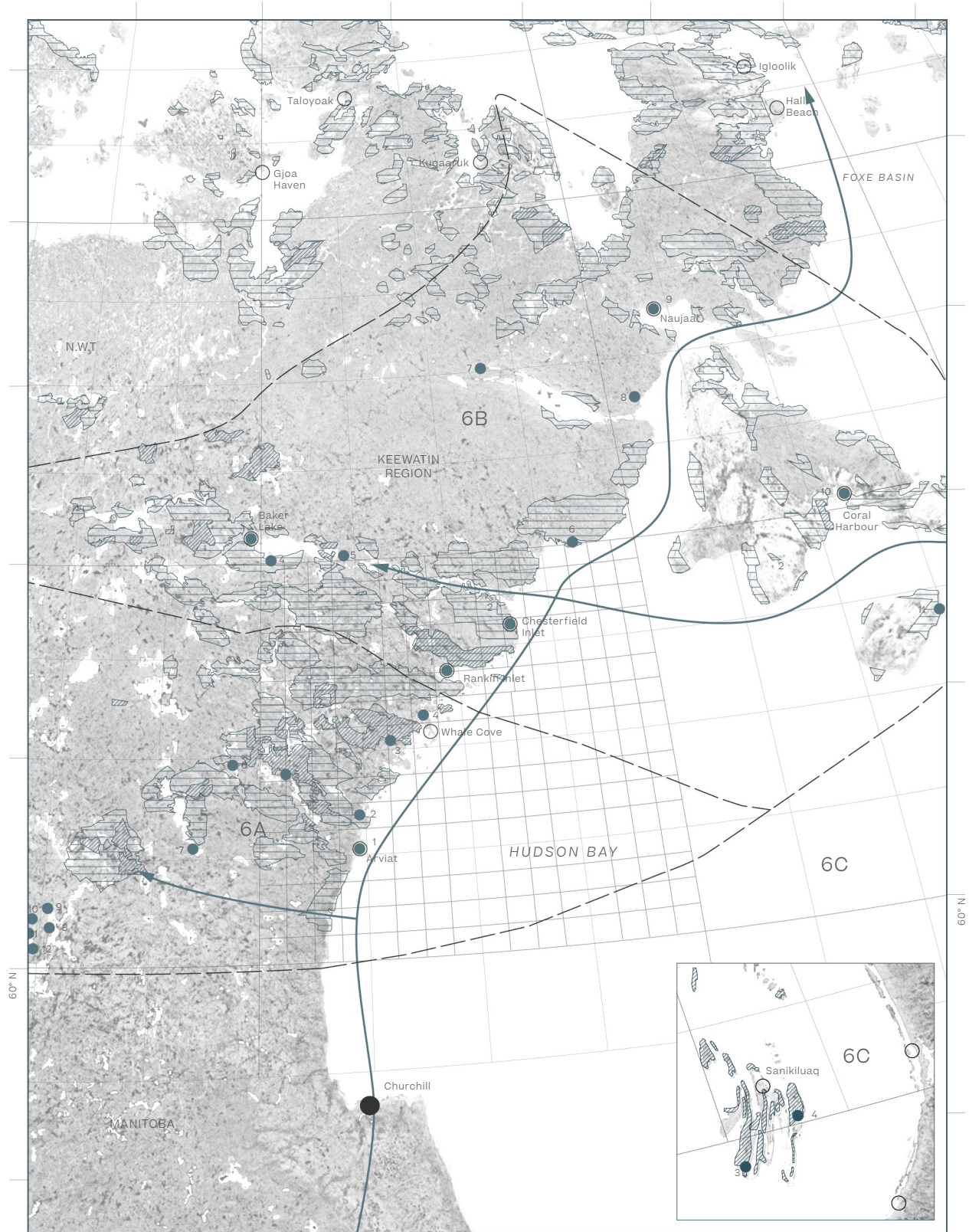
6B1 - Rankin Inlet (now Kissarvik Co-op)	1957 -
6B2 - Chesterfield Inlet (now Pitsiulak Co-op)	1911 -
6B3 - Baker Lake (now Sanaavik Co-op)	1924 -
6B4 - Big Hips Island	1914 - 1926
6B5 - Baker Lake Narrows	1920 - 1922
6B6 - Fullerton Harbour	1913 - 1919
6B7 - Wager Bay	1926 - 1947
6B8 - Bury Cove	1914 - 1926
6B9 - Repulse Bay (now Naujat Co-op)	1920 -
6B10 - Coral Harbour (now Katudgevik Co-op)	1916 ---
6B11 - Coats Island	1918 --- 1928

Subregion 6C: HUDSON BAY (see inset)

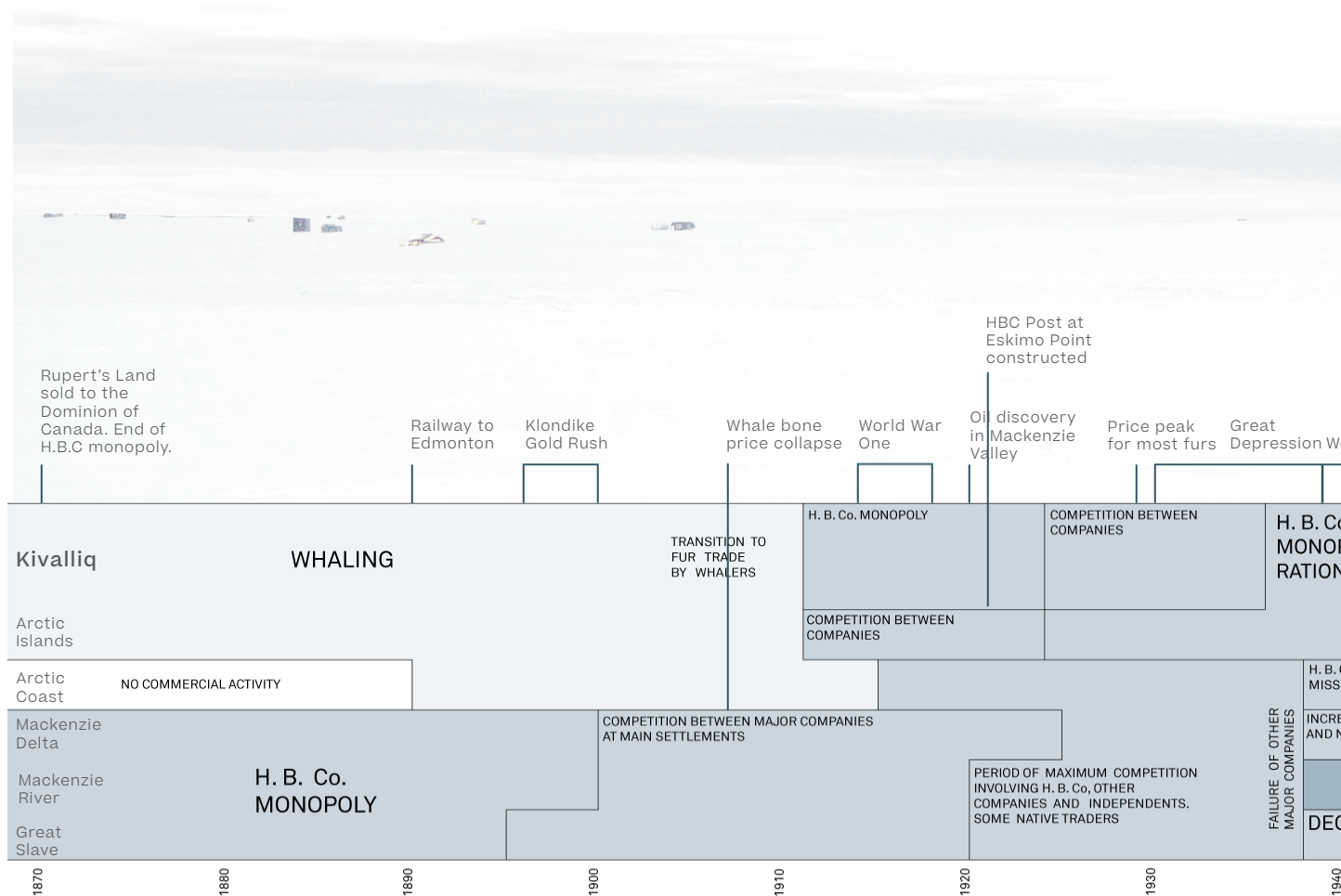
6C1 - Mansel Island	1925 - 1949
6C2 - Cape Smith	1924 - 1952
6C3 - Belchers, SE side	1928 - 1937
6C4 - Belchers, Tukarak Island (now Mitiq Co-op)	1937 -



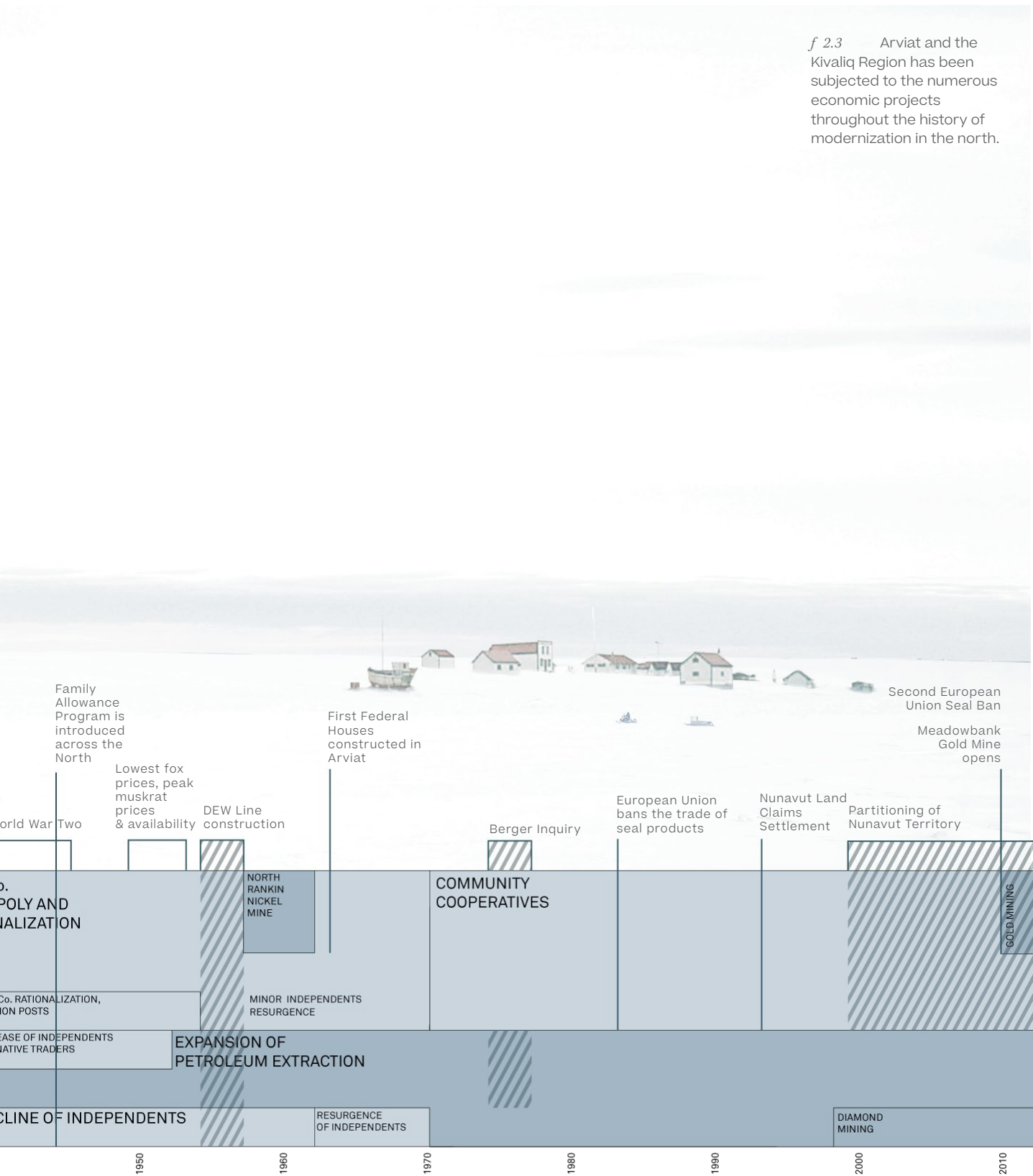
f 2.2 Trading posts of the Keewatin Region. The Hudson’s Bay Company was responsible for the foundation or growth of communities in the region. As the HBC left the North, community cooperatives took over those in the towns.



What the fur trade allowed, unlike mining, was for Inuit to continue living as they always had, in dispersed camps across the land. Their intimate knowledge of the land translated directly into their economic agency.³ The permanent trading post allowed the HBC to introduce systems of credit to Inuit and early social assistance. A wide territory of traplines from the coast to Ennadai Lake deep in the interior managed by Inuit converged on the small cluster HBC buildings on the coast. The white clapboard and gable roof buildings were the first permanent spaces of colonial economies, territorializing the traplines of each Inuk in the global fur trade.⁴ HBC sloops, sailing out of Churchill, Manitoba brought new supplies and new trading opportunities to the inland camps of the Kivalliq (formerly Keewatin) region.



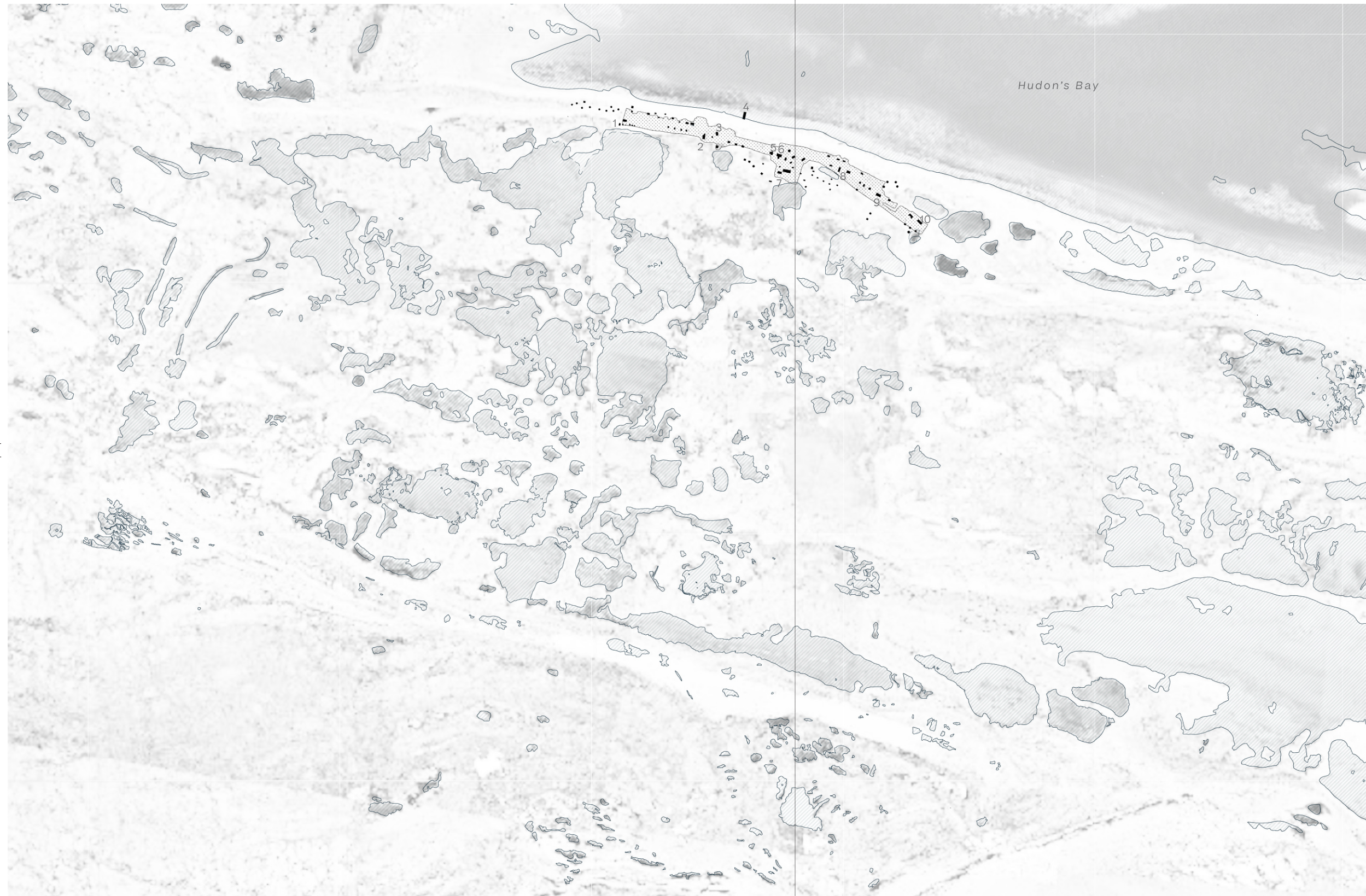
f 2.3 Arviat and the Kivalliq Region has been subjected to the numerous economic projects throughout the history of modernization in the north.



Coastal posts such as Eskimo Point became the centre of trade and also administration between Inuit, the HBC and Canada into the Post-War Period (see schedule and map of posts in the Kivalliq region in *f*2.2). The federal administrators of the Northwest Territories had sought to keep Inuit out on the land, away from the RCMP stations and military bases of the DEW Line into the 1960s. What the Policy of Dispersal did not recognize was the ongoing migration and gathering of Inuit around these sites was the result of feedback loops of economic upheaval, food insecurity and illness introduced through colonization. The parental beliefs of the RCMP and State that what was best for Inuit was to stay on the land meant that settlements lacked sanitation, services and adequate health care for arriving Inuit, and their responses to the crises payed little regard to what community needs.⁵ It wasn't until tragedies such as starvations around Henik and Ennadai Lakes that led to the evacuation of families by the RCMP to Eskimo Point, or the brutal tuberculosis outbreak among the snow houses and shacks of Arviat in 1962 that public pressure pushed the federal government to respond.⁶

Arvait, 1962

Population: N/A



1. Pentacostal mission
2. Federal Day School
3. Hostel
4. Wharf
5. RCMP Station
6. Nursing Station
7. Power Station
8. HBC Post
9. Roman Catholic Mission
10. Pentacostal Mission



f 2.4 The Hudson's Bay Company Trading Post at Eskimo Point, 1955 (top).

f 2.5 Plan of Arviat, 1962 (see foldout).

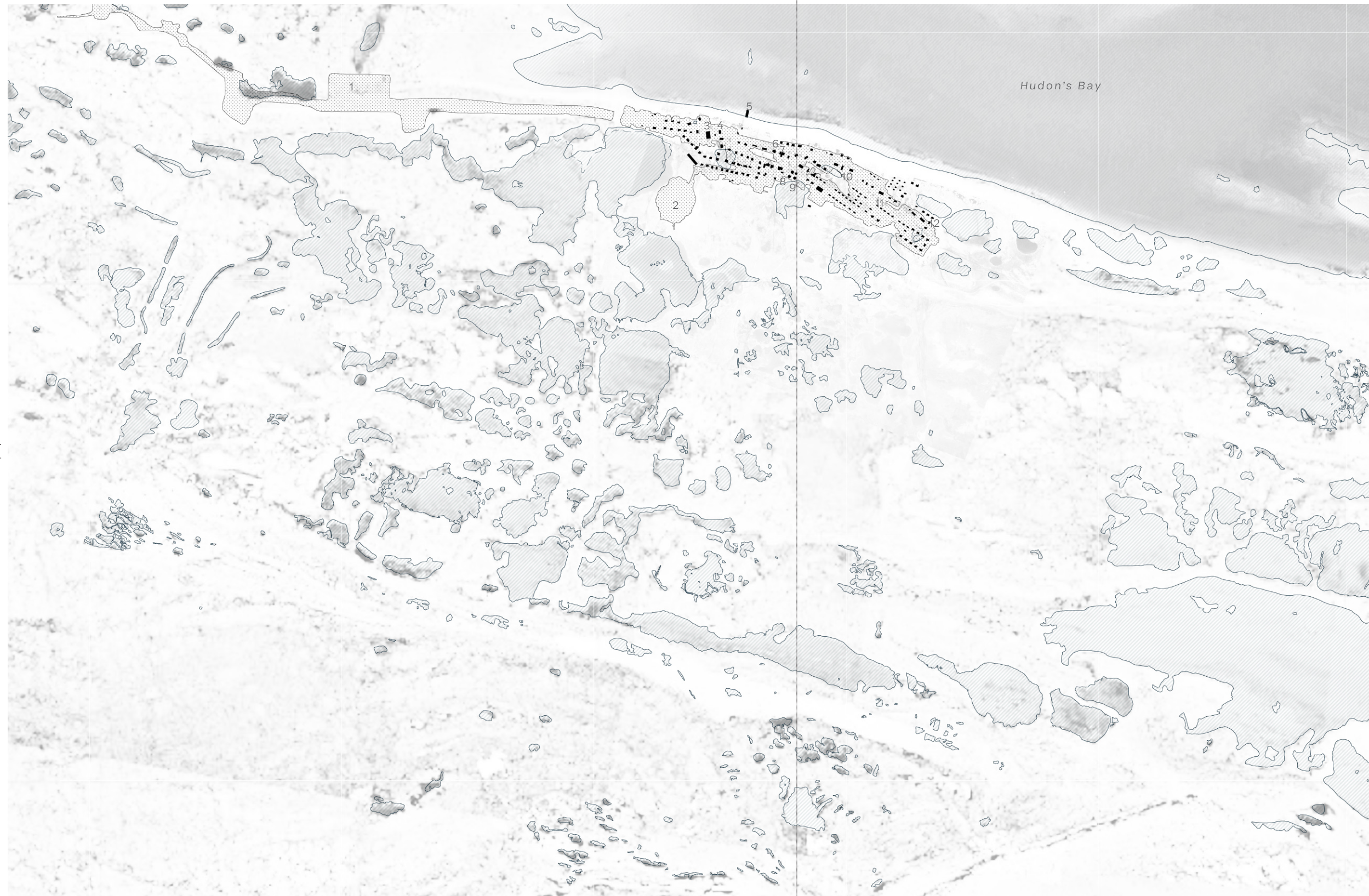
Arctic Suburbs: Planning the New Town

Following the post-war decline of the fur trade, federal policies over Inuit, reflecting the changing attitude of Canadian society towards indigenous peoples, asserted a new geography of social and economic stability over the North. Planning and architecture became spatial agents of government welfare and allowance programs that sought to assimilate Inuit into the domestic and economic models of the archetypal modern Canadian town.⁷ Collective life in the plan for Arviat was formalized around the territorial anchor of the trading post, church missions, a federal day school and later nursing station would grow to become the community core of the present town plan.⁸ As centres of education, administration and healthcare, for better and worse these buildings became central to town life in the across the Northwest Territories.⁹

Geographically fixed settlements in the north obscure the geological instability of the permafrost and seasonal changes that defined the lived boundaries of communities on the land. Community plans sited buildings instead within the organization of residential and commercial zones that defined modern planning in the south. The surveyed town plan translated political control of the territory into the scale of the community.

Arviat, 1969

Population: N/A



1. Water Reservoir
2. Old Water Reservoir
3. Federal Day School
4. Hostel
5. Wharf
6. RCMP Station
7. Nursing Station
8. Power Station
9. Fuel Tanks
10. HBC Post
11. Roman Catholic Mission
12. Pentacostal Mission



f 2.6 The interior spaces of the urban block are filled with outbuildings, seacans and crossed by constantly changing informal trails. These spaces become collective spaces of storage, transit and exchange.

f 2.7 Plan of Arviat, 1969 (see foldout).



f 2.8 A line of Weber houses constructed in the 1970s. The Arviat Housing Association had just completed leveling and aligning the houses to the street.

Arviat (1998)

Population: 1769



- 1. Water Reservoir
- 2. Eskimo Point Lumber Supply
- 3. Community Centre
- 4. RCMP Station
- 5. Nursing Station
- 6. Power Station
- 7. Fuel Tanks
- 8. Wharf
- 9. Northern Store
- 10. Padlei Co-op
- 11. School Campus
- 12. Catholic Church
- 13. Sea Lift Landing Area
- 14. Airstrip
- 15. Scrap Metal Dump ('Canadian Tire')
- 16. Town Dump
- 17. Sewage Lagoons



f 2.9 The commercial spaces of the modern town are as generic as those in the south. KFC and Tim Hortons, operated by Northern Stores offer southern foods at inflated prices.

f 2.10 Plan of Arviat, 1998 (see foldout).



f 2.11 Ten-plex, c2014. Increasingly urbane forms of mass housing have become the default types of public housing.

Arvait (2016)

Population: 2514



1. Water Reservoir
2. Eskimo Point Lumber Supply
3. Community Centre
4. RCMP Station
5. Nursing Station
6. Power Station
7. Fuel Tanks
8. Wharf
9. Northern Store
10. Padlei Co-op
11. School Campus
12. Catholic Church
13. Sea Lift Landing Area
14. Airstrip
15. Scrap Metal Dump ('Canadian Tire')
16. Town Dump
17. Sewage Lagoons

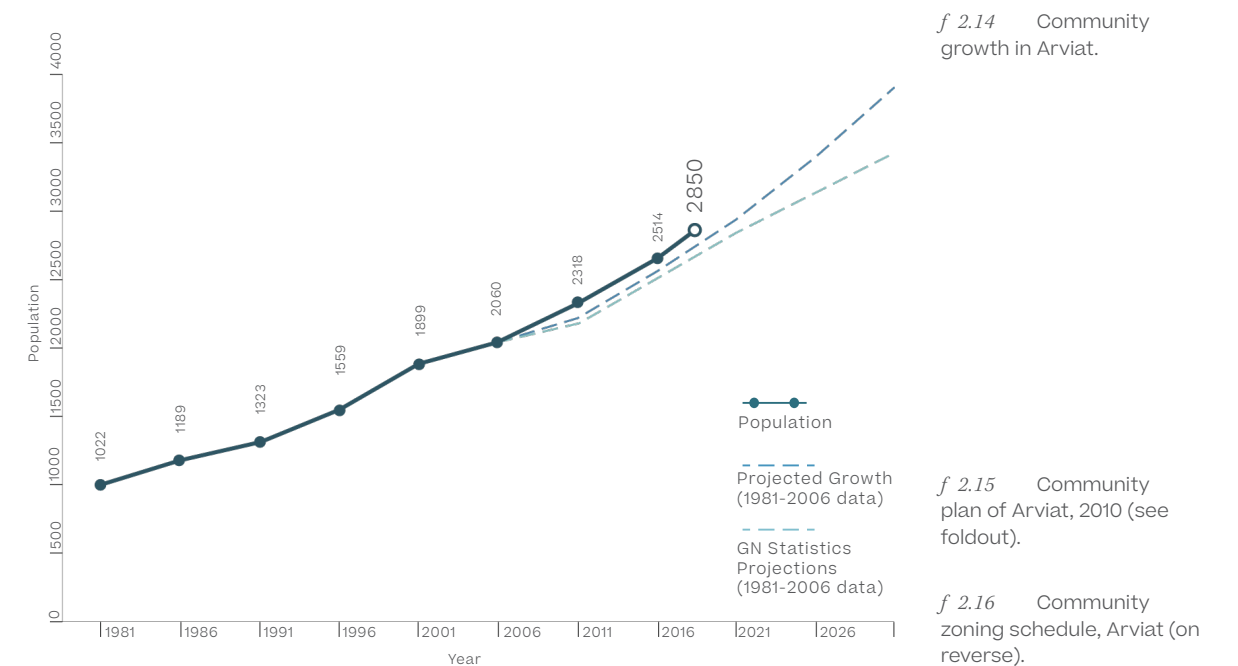


f 2.12 Seam between the old town and new public housing development, August 2018.

f 2.13 Urban extents of Arviat, 2014 (see foldout).

The current planning process is highly centralized, and the plans produced within the Planning and Lands division of the Department Community and Government Services are anonymously address the vibrant landscape of communities.¹⁰

The Community plan is a spatial diagram that orders the allowed use of surveyed property that is individually serviced by infrastructure. In Arviat, the subdivision of lots is determined by the necessary fire setbacks in the north for a typical detached house. While the plan presumes that each subdivided lot will be individually purchased and developed, the structure of property and the houses constructed only fulfill the image of the town, but do not reflect the how the ground is owned. All lots in the town are leased from the Hamlet, who develops the land for construction. More importantly, on top of the layer of fill, 80% of the residential lots in the community are held by the Nunavut Housing Corporation.¹¹ As the town has expanded, subsidized public housing has been the only economic model used to address pressures of rapid population growth and limited economic opportunity in the community, and almost all of the community lives in public or staff housing.¹²



f 2.14 Community growth in Arviat.

f 2.15 Community plan of Arviat, 2010 (see foldout).

f 2.16 Community zoning schedule, Arviat (on reverse).



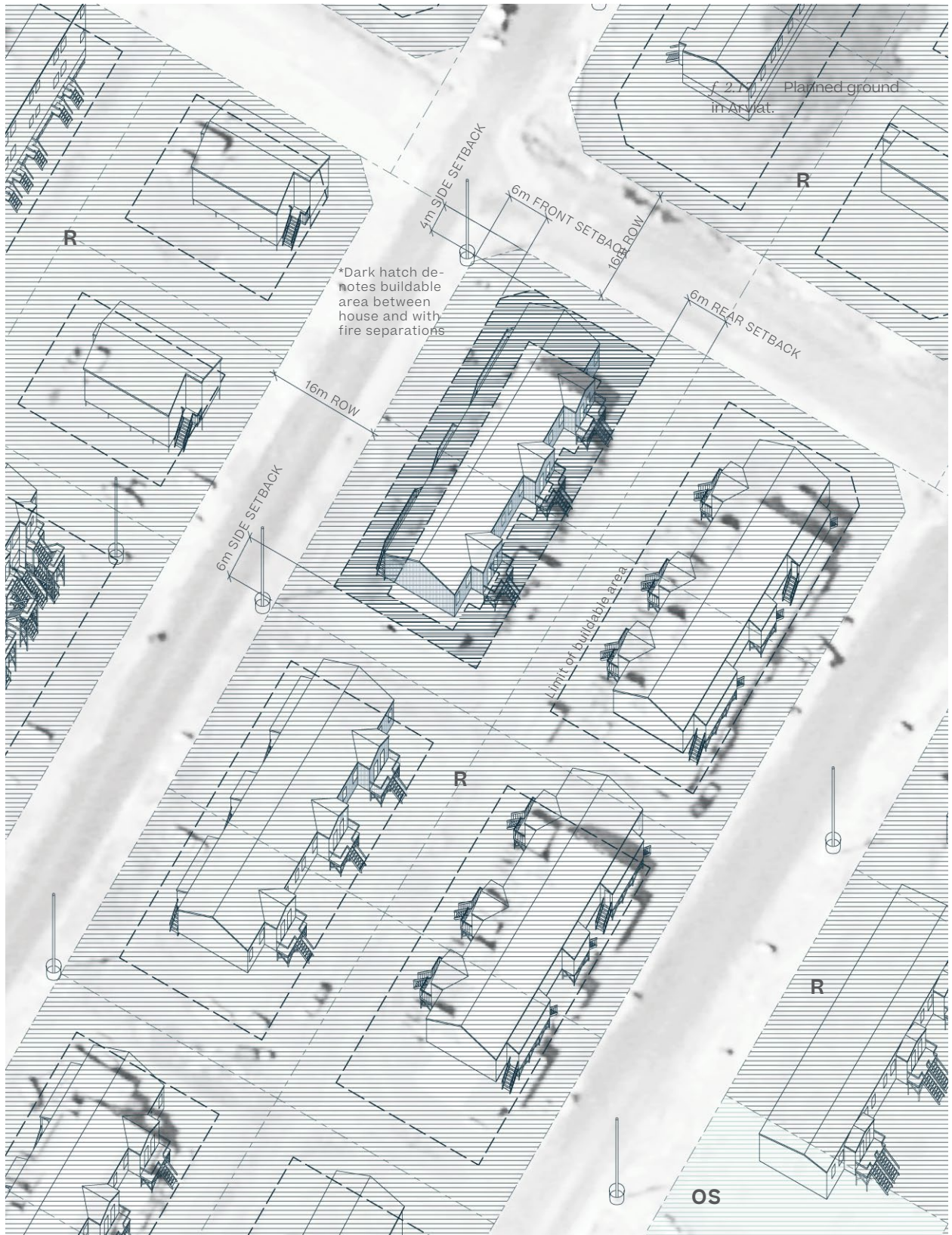
In Arviat, the two coastal eskers have already been developed, with the town beginning on the northern esker, and much of the southern esker being excavated to construct infrastructure such as the water reservoirs, sewage lagoons and the community airstrip.

- R** Residential
- R₁** Residential - Proposed
- CU** Community Use
- CC** Community Core
- C** Commercial
- OS** Open Space
- M1** Light Industrial
- M2** Heavy Industrial
- M2** Heavy Industrial
- W** Waste
- MR** Municipal Reserve

Unsettling Ground

Building on the Ground

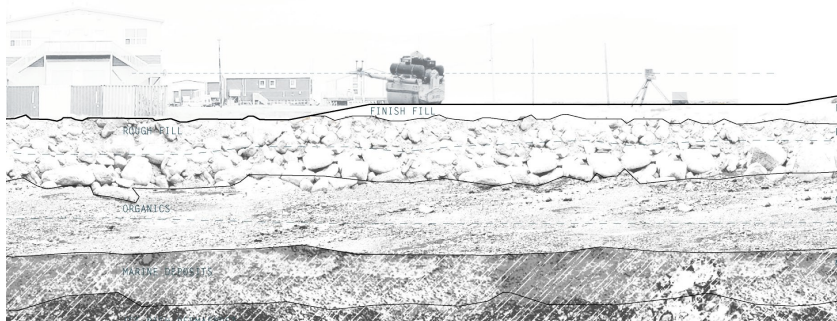
	Permitted Uses		Conditional Uses	Setbacks	Maximum Height	Zoning
Residential	Dwelling, Single Detached Unit Dwelling, Semi-Detached or Duplex Dwelling, Rowhouse Park Any accessory building structure or use subject to Section 5.1		Bed and Breakfast Craft Studio Day care Centre Dwelling, Multi-unit, Mini-Home Residential Care Facility / Group Home Home Occupation Secondary Suite Utility Installation	Front = 6 metres (20 feet) Rear = 6 metres (20 feet) Rear, backing onto OS Zone = 2.5 metres (8 feet) Side (Exterior) = 4 metres (13 feet) Side (Interior) = 6 metres, or as required by the Fire Marshal (20 feet)	8.5 metres (26 feet)	R
Community Use	Community Hall or Centre Day Care Centre Education Facility Emergency and Protective Services Government Office Group Home Healthcare Facility Place of Assembly Place of Worship Post Office Recreation Facility Residential Care Facility Any accessory building, utility, structure or use, subject to Section 5.1		Cemetery Communications Facility Community Freezer Utility Installation	Front = 6 metres (20 feet) Rear = 6 metres (20 feet) Rear, backing onto OS Zone = 2.5 metres (8 feet) Side (Exterior) = 4 metres (13 feet) Side (Interior) = 6 metres, or as required by the Fire Marshal (20 feet)	10.7 metres (35 feet)	CU
Community Core	Bank Commercial Recreation Convenience Store Craft Studio Hotel Office	Park Parking Lot Personal Service Establishment Restaurant Retail Store Uses permitted in Community Use Zone (CU)	Multi-Unit Dwelling Dwelling Unit(s) in a non residential building provided that the dwelling unit(s) are above the ground floor	Front = 3 metres (10 metre) Rear = 6 metres (20 metre) Side (Exterior) = 4 metres (13 metre) Side (Interior) = 6 metres, or as required by the Fire Marshal (20 feet)	13 metres (43 feet)	CC
Commercial	Automotive Gas Bar Bank Broadcasting Studio Business Services Caretaker Unit Commercial Recreation	Convenience Store Craft Studio Custom Workshop Day Care Centre Hotel	Medical Facility Office Parking Lot Personal Service Establishment Restaurant / Retail Store Any accessory building, utility, structure or use, subject to Section 5.1	Front = 6 metres (20 metre) Rear = 6 metres (20 metre) Side (Exterior) = 4 metres (13 metre) Side (Interior) = 6 metres, or as required by the Fire Marshal (20 feet)	10.7 metres (35 feet)	C
Open Space	Beach Shack Boat Storage Dock Monument, cairn or statue Park or playground Sports Field	Snow Fence Temporary outdoor storage of equipment during sealift Washroom Facility Shed to store equipment for traditional, cultural, and recreational activities taking place in the zone.	Communications Facility Dog Teams	Front = 10 metres (33 metre) Rear = 10 metres (33 metre) Side (Exterior) = 10 metres (33 metre) Side (Interior) = 10 metres, or as required by the Fire Marshal (33 feet)	31 metres (10 feet)	OS
Light Industrial	Automotive Gas Bar Automotive Repair, Sales or Facility Broadcasting Studio Building Supply or Construction Shop Caretaker Unit Communications Facility	Community Freezer Custom Workshop Heavy Equipment or Vehicle Yard Municipal Garage Research and Development Centre Service and Repair Shop Utility Installation Warehouse	Marge staging and landing site with associated warehousing Fuel Storage Facility Outdoor Storage Power Generation Facility Waste Processing and Transfer Facility	Front = 6 metres (20 metre) Rear = 6 metres (20 metre) Side (Exterior) = 4 metres (13 metre) Side (Interior) = 6 metres, or as required by the Fire Marshal (20 feet)	13 metres (43 feet)	M1
Heavy Industrial	Commercial Land Farm Fuel Storage Facility Heavy Equipment and Vehicle Yard Manufacturing Plant Marshaling Area	Outdoor Storage Utility Installation Waste Processing and Transfer Facility Any accessory building, utility, structure or use, subject to Section 5.1		Front = 6 metres (20 metre) Rear = 6 metres (20 metre) Side (Exterior) = 4 metres (13 metre) Side (Interior) = 6 metres, or as required by the Fire Marshal (20 feet)	13 metres (43 feet)	M2
Transportation	Airport Commercial uses related to aircraft services and travel Communications Facility Docking, loading and off-loading of ships	Fuel Storage Facility				T
Hinterland	Dog Team Temporary Tenting or Camping		Beach Shack Quarry Cemetery Commercial Harvesting Communication Facility Permanent hunting or fishing cabins or camps Resource exploration and development Snow Fence Tourist Facilities Wind Turbines	Front = 10 metres (33 metre) Rear = 10 metres (33 metre) Side (Exterior) = 10 metres (33 metre) Side (Interior) = 10 metres, or as required by the Fire Marshal (33 feet)	3.1 metres (10 feet)	H
Waste Disposal	Waste Disposal Site Sewage Disposal Site					WD
Municipal Reserve	The Municipal Reserve Zone identifies lands that may be interesting for future redevelopment. No development is permitted in the MR Zone unless of temporary nature, subjected to Council Approval					MR



Sited for an accessible harbour and beach, the low-lying topography and wetlands pose a problem for the sprawling growth of the community. The regular street grid extends over lakes, wetlands and ice rich permafrost. The Hamlet has developed a method for filling the uneven terrain of lakes and wetlands, raising the surface of the town for drainage, and insulating the permafrost from the construction and activity above. The carpet of fill covers the land within the surveyed lot lines and rights of way. The thin layer of gravel fill is excavated from the eskers that striate the landscape and graded into a 1 metre layer of insulation between the permafrost and the seasonal temperature shifts in the environment.¹³



Land development over the wetlands and muskeg of arviat is enabled by a technique of artificial fill which is layered continuously over the landscape. 1-1.5 metres of rough fill is spread across the ground.



A thin layer of finishing fill (around 0.5m thick) builds the structure of roads, drainage and graded lots over the otherwise flat plane of filled ground.



A thin topping is layed out, on which the foundations for the new five-plex to be built here will be set.

f 2.18 Land development in Arviat.



f 2.19 The frontier of the town. The layer of fill is continually being expanded to accommodate new houses.

f 2.20 The carpet of fill will be developed into housing in the coming years.

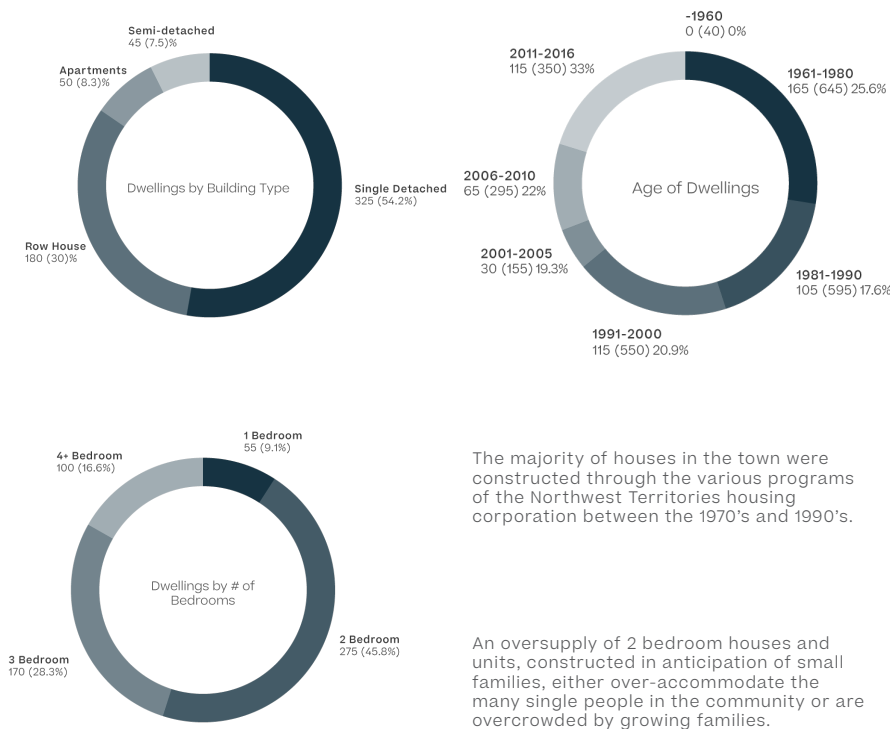




New Houses: The Architectures of Colonization and Welfare

Within the Community Plan, the *house* imposed new relationships between dwelling and the land. Housing programs from the 1950's until present have consistently failed to meet the desires of communities. Early 'Matchbox', 'Rigid Frame' and '512' type houses introduced southern domestic spaces to the north. The architectural responses to housing programs sited domestic spaces within conflicting ideas that houses were on one hand a form of welfare and but also a commodity in the North to assimilate Inuit into the Canadian economy.¹⁴ The house, as a western building type, shapes domestic life by economic, social and structural stability with *property*, circumscribed by the lot lines in a town plan. Property, defined by its address in a town plan, is considered to be valuable because of its stability. The architecture of housing, through its construction, materiality and ownership sought to create self-contained, independent and stable models of the European nuclear family.¹⁵

Government houses were hastily constructed through the 1960's, and before the end of the decade the entire town had been housed.¹⁶ Early houses were small, often overcrowded and utterly ill-adapted to the harsh climate. Despite being cheaply built, an unable to accommodate the



f 2.21 Housing profile of Arviat.



f 2.22 Early public housing unit from the 1970's under snow drifts.

unique needs of large families, consecutive subsidized programs sought to house communities across the north in the new houses. Caught between economic challenges and the rapidly growing community, any available development – often pilot experiments by the Northwest Territories Housing Corporation or the Canada Mortgage and Housing Corporation – was readily accepted by the community regardless of suitability to the environment or the unique needs of Inuit.¹⁷

The pressures on limited housing budgets on the Nunavut Housing Corporation has led to increasingly urbane building types that negotiate energy efficiency, land development costs, maintenance budgets while increasing density. The Five-plex emerged as the architectural type of choice for the Nunavut Housing corporation in the early 2000s.¹⁸ A hybrid of suburban row-houses and the military barrack that defined the incipient urbanization and militarization of the North in the 1950's and 60's, the Five-plex types can be efficiently transported by sea-lift and constructed in communities. Five-plexes contain five two-bedroom apartments and a common mechanical room, within a simple shed envelope across two of the standard 30m lots in the community plan.



1. Mechanical Room
2. Living Area
3. Bedroom 1
4. Bedroom 2
5. Storage Room

f 2.23 Plan of a standard 2010 NHC Five-plex .



f 2.24 Recently completed 10-plex housing block on the edge of Arviat.

f 2.25 Early Five-plex type and outbuildings.





f 2.26 Walking the streets in a late spring blizzard in Arviat.





The Architecture of Community Adaptation

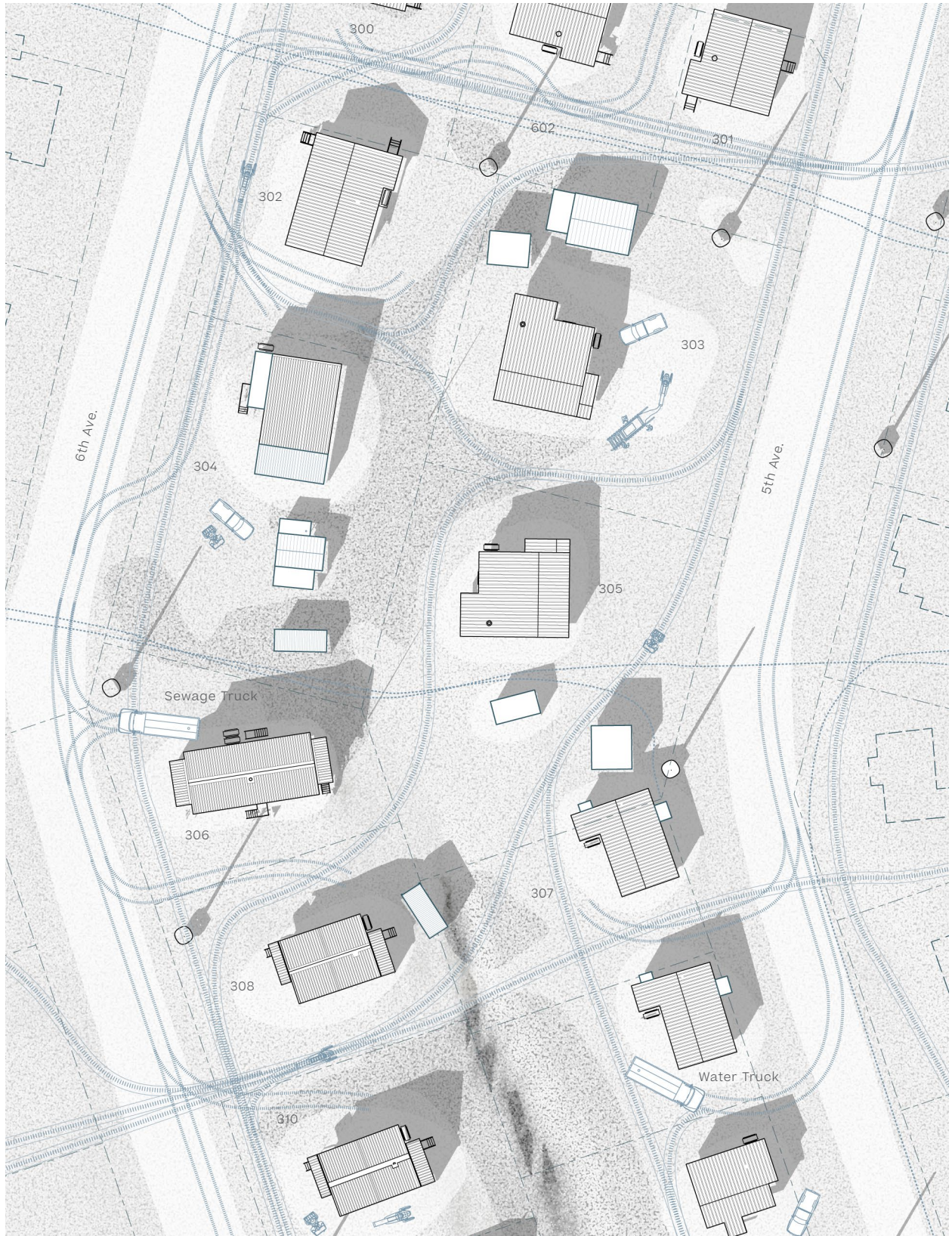
Despite the changing attitude of administrators through the 1960's and 70's that Inuit should first be kept out on the land and then moved into towns, northerners had been themselves managing complex economic relationships between the land and settlements since the earliest trading posts appeared in the Canadian Arctic. The friction between the town and the melting land is addressed through a series of material interventions by community members and the Arviat Housing Association, who maintains the public housing units in the town. These community responses, unfolding at different scales, are reconnecting the imposed structures of the territory, the plan and the house to unstable ground.

For instance, property lines that divide public and private space for government planners are understood very differently by the community. While fire separations largely drive the position of houses within each individual lot, the open ground between buildings is appropriated within an alternate network of pedestrian and snowmobile routes through the community. This ground is defined by subtle changes in topography of gravel fill that collects snow through the winter or is worn overtime into paths that cross between individual properties.



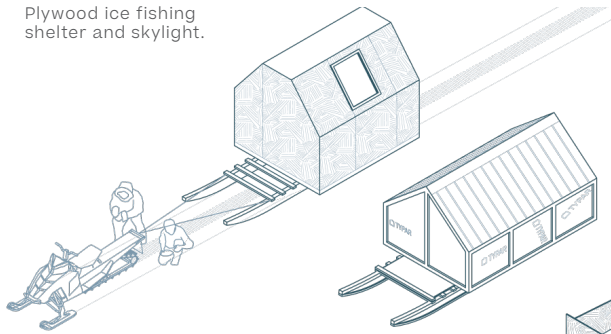
f 2.27 Public housing types of the 1970s and 1980s in a typical block of Arviat, August 2018.

f 2.28 Informal trails and paths through the urban block.



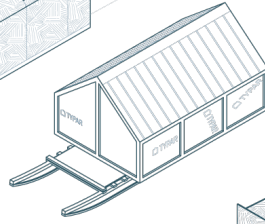
Building on the Ground

Plywood ice fishing shelter and skylight.

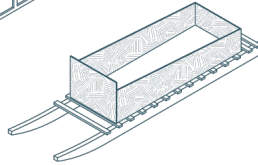


Snowmobile

Qamutik with TYPAR and 2x4 tent frame

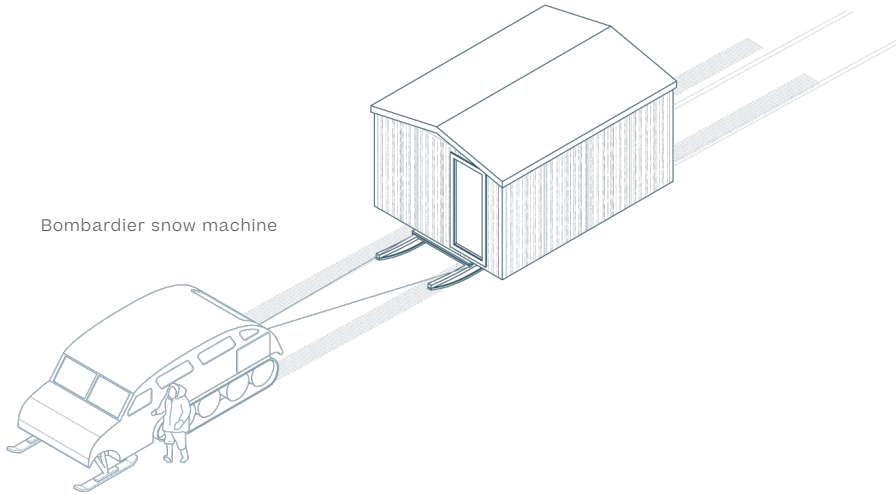


Qamutik with plywood box



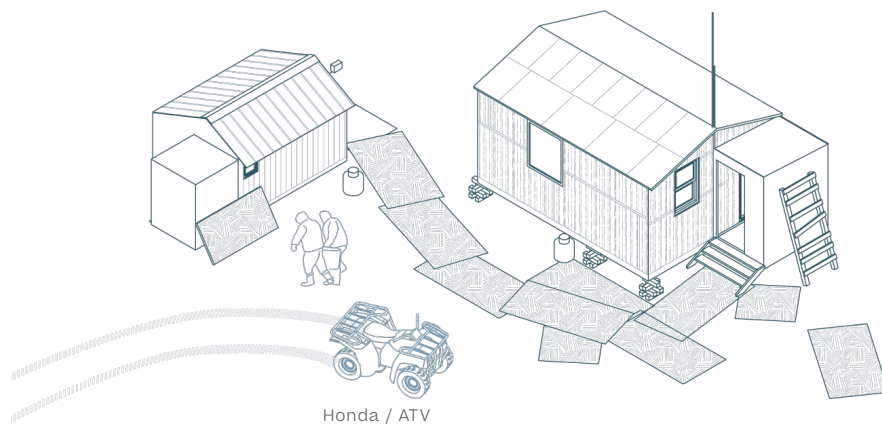
Qamutik, formerly pulled by dog teams across the land and sea ice are adapted for to many functions: hunting, transportation, or ice fishing.

Bombardier snow machine



Wood framed cabins are constructed in town and then towed onto the land, or between seasonal camp sites.

Scrap wood, old windows and cladding are used to repair and expand camps.



Honda / ATV

f 2.29 Architecture of the land. A series of structures have been constructed on the land for fishing, hunting and reconnecting with the landscape.

The “expandable” house defines the unique domestic architecture in the north, where ownership and lot sizes have allowed community members to undertake their own construction projects. Building envelopes are regularly modified and expanded in response to the environment (wind, cold and warm porches), changes in families (expanded living areas and extra bedrooms) and to economy (garages, storage, studios and workshops). Modifications can be read as envelope expansions, additions and outbuildings.

While community life re-centred into towns in the 1960’s, a nomadic architecture of seasonal camps, cabins and trails continues to define the lived boundaries of Northern life.¹⁹ This new architecture of the land is a dynamic responses to seasonal cycles such as the caribou migrations, kinships and growing families in the town and sharing economies not recognized within the modern spaces of the town.²⁰

The cabins and tent frames that move across the landscape are constructed from extra and reused materials from construction work. Sheets of building wrap, broken down shipping crates and palettes are inexpensive and available materials for these projects. While houses in the town are located by street and house numbers, camps on the land are carefully sited within the topography of lakes and low ridges, kinships in



f 2.30 Cabin north of Arviat along the Maguse Road.

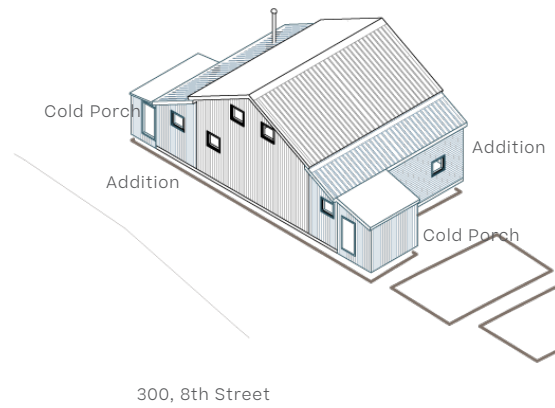
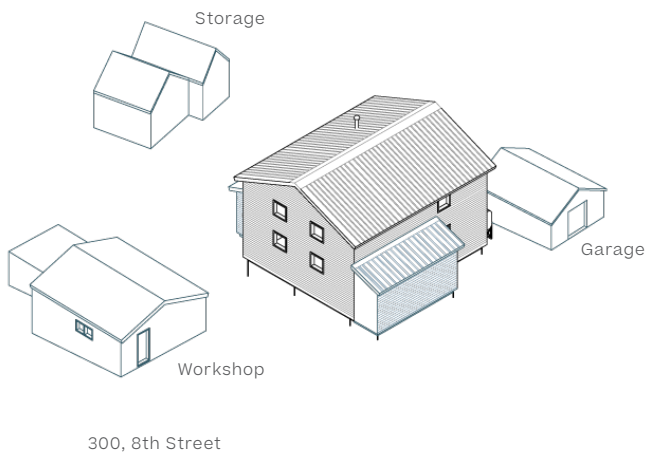
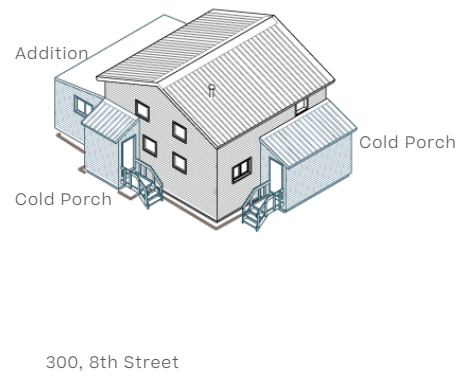
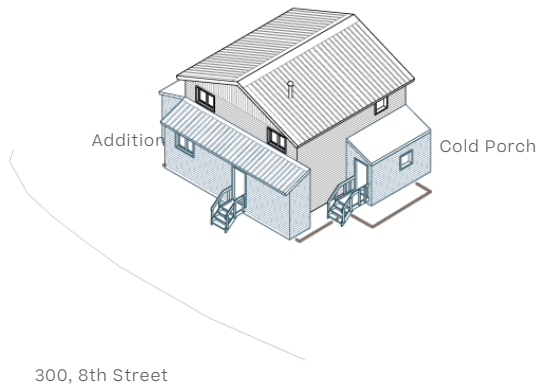
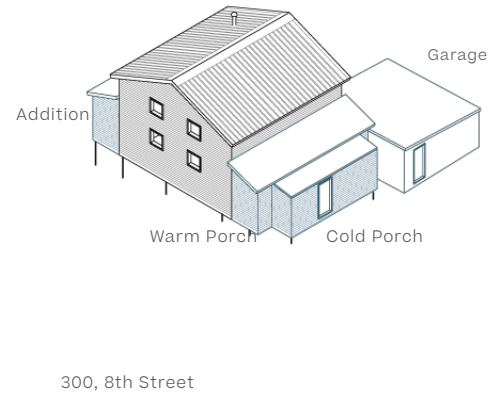
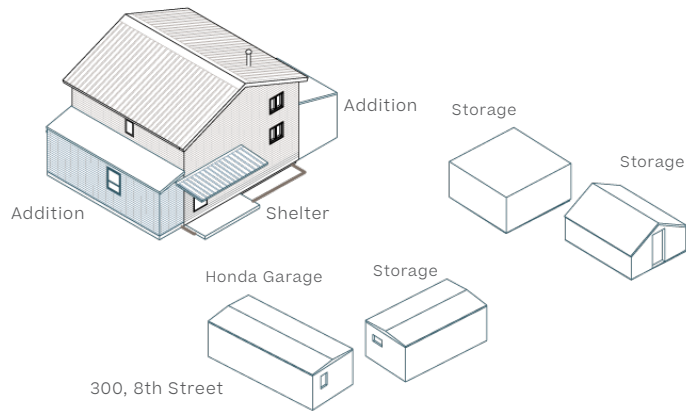
the community. These outbuildings are an extension of domestic spaces for hunting, restoring family relationships and connecting with the land. These spaces allow a unique domestic rhythm on weekends and through holidays between the town and the land.

Envelope expansions are undertaken by the owner, and require the extension of insulation, waterproofing and structure from government floor plans to accommodate growing families or larger living areas. The most commonly adapted housing type are the HAP (Housing Assistance Program) houses, which were constructed through the 1980s by their residents.²¹ The HAP program provided materials, drawings and tools to families to construct their own houses, which resulted in certain modifications being made in the original construction, and then many others over time. While the project was expensive for the Northwest Territory Housing Corporation, many of the HAP houses constructed in Arviat remain among the few privately owned houses in the community. Community members specifically noted that the ability to modify the house as needed enabled them to live with growing families.



f 2.31 HAP A type housing with a large addition constructed of the front, a wind porch off the side and two Matchbox houses that are serving as a workshop and a garage for the families Honda ATV's.

f 2.32 Modified HAP A houses of Arviat.



The older parts of town, constructed in the 1960's, 1970's and 1980's are continuously being retrofitted and renovated by the Arviat Housing Association. Buildings in the town have become geological records of new building materials imported into the town. Building envelopes have had layers of insulation and cladding added on the exterior, while new services are accommodated in new stud cavities layers in the interior. Outside of the building envelope, layers of porches attune generic buildings to wind patterns and snow drifting. Between interior spaces and the permafrost, foundation piles that were heaving and shifting are being cut, and houses raised on adjustable block and wedge cribbing to respond the moving geology.²² The cracks and repairs in houses register changing technology, social upheaval and the melting ground beneath buildings.

The fragility of buildings on the changing terrain through the seasons raises questions about the projected growth of the town will address instability in the ground. Considering the growth of the town through the thermal, economic and political relationships to the land generates radically different projections of how urbanism in the Arctic might address the instability of the. By scraping back the constructed layers of buildings and streets on the map reveals a rich landscape that has been covered over.

Endontes - Building on the Ground

- ¹ Frank Tester (dir.), *Beneath the Surface: Inuit Miners at Rankin Inlet, 1957-1962 / Ujarangniaqtiuvallauqtut: Kangiq&inirmi, 1957-mik 1962-mut*, Vimeo Video. Spinnaker Productions, 2016. Later projects in the region, such as North Rankin Inlet Nickel Mine (c. 1957), approached the land in a far more brutal fashion. The industrialized scale of extraction of the mine reconfigured material economies, from the ground into wage labour and global trade that began at Rankin Inlet in the 1950s. saw Inuit not as necessary partners in the economy, but as cheaper labour than white workers moving from the south
- ² David Damas, *Arctic Migrants / Arctic Villagers: The Transformation of Inuit Settlement in the Eastern Arctic* (Montreal and Kingston: McGill-Queen's University Press, 2002), 19-20.
- ³ Anna Tsing, *Frictions: An Ethnography of Global Connection* (Princeton & Oxford: Princeton University Press, 2005), 184
- ⁴ Where the economic exchanges of the fur trade occurred at the scale of the individual trapline, hunter and trading post, the mine operated at an industrial scale of extraction. The economy of material exchanges during the fur trade reflected the complex architectural relationships to the land shared by the nomadic family groups living in camps. An intimate knowledge of the land allowed Inuit to become key players in the economy. Furs and skins could be traded into the market economy for fuel, bullets, and other supplies as time allowed, because Inuit did not need money for much of their food and shelter. While important hunts required the full effort of hunters, less intensive times could be devoted to maintaining long traplines across the land. The value of the species is more complex for Inuit than the market value of its fur. When prices were good, hunters could focus on trapping, but when markets were depressed, hunters spent more time hunting for their own food and clothing, negotiating the instability of the supply of the land and the demand of the market.
- ⁵ The first Arctic hospital was constructed only following a petition from the community of Kugluktuk to the federal government over the lack of care in the community. These disparities in care persist today, as residents need to fly to southern centres like Winnipeg, Montreal and Edmonton for much or their medical treatment.
- ⁶ Damas, *Arctic Migrants / Arctic Villagers*, 90.
- ⁷ Shelagh McCartney, 'Re-Thinking Housing: From Physical Manifestation of Colonial Planning Policy to Community-Focused Networks,' *Urban Planning*, 1(4), 2016, 21.
- ⁸ Frank Tester, 'Colonial Challenges and Recovery in the Eastern Arctic,' *Inuit Quajimajatuqangit: What Inuit Have Always Known to Be True*, edited by Joe Karetak, Frank Tester and Shirley Tagalik (Winnipeg: Fernwood Press, 2017), 22-23.
- ⁹ Damas, *Arctic Migrants / Arctic Villagers*, 126. An RCMP station had been constructed in 1937 and was followed by a nursing station and then a federal day school in 1959.
- ¹⁰ From private conversations in Arviat in May and August 2018. Community consultations are undertaken through the planning review process, however community members perceived that their input and critiques of plans were not reflected in the legal document that is then produced in Rankin Inlet at the regional planning office. One particular critique was that the knowledge elders have of the land are regularly ignored in the surveying of new land and development.
- ¹¹ *Census Profile, 2016 Census: Arviat Hamlet*, Statistics Canada, accessed: <https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=6205015&Geo2=CD&Code2=6205&Data=Count&SearchText=arviat&SearchType=Begins&SearchPR=01&B1=All&TABID=1> (November 15, 2017).
- ¹² From a meeting with the Nunavut Housing Corporation, August 2018. Development fees are key source of income for the Hamlet to fund projects like parks and sports facilities, however the majority of this development is conducted by the Nunavut Housing Corporation. However, both bodies receive their funding from the Government of Nunavut.

- ¹³ Forbes, et al, 'Reconnaissance and assessment of landscape hazards,' 191.
- ¹⁴ Pamela Stern, 'Wage Labour, Housing Policy and the Nucleation of Inuit Households,' *Arctic Anthropology*, vol 42, 2 (2005), 72-74.
- ¹⁵ G.H. Needham, *Living in the New Houses*, (Ottawa: Education Division, Northern Administration Branch, Department of Indian Affairs and Northern Development, 1968), 68-69. Full publication available at: <http://publications.gc.ca/site/eng/9.839771/publication.html>.
- ¹⁶ Damas, *Arctic Migrants / Arctic Villagers*, 180.
- ¹⁷ From a private communication in Arviat, March 2018.
- ¹⁸ In 2014, a number of 10-plex type apartment buildings were constructed. Despite the improvements to building envelope, mechanical systems and energy efficiency, the 10-plex is perhaps the most disliked housing type in the town. These forms of mass housing, constructed as quickly as possible, have eliminated nearly all variability in the newer parts of town. In the past decade, nearly all of the constructed public housing is made up of two-bedroom units in multiplexes.
- ¹⁹ The practice of the caribou hunt was, at one time, the primary source of food for inland camps and shaped by colonial policies of conservation and settler stereotypes of Indigenous peoples. In Arviat, the caribou continue to be critical to food security in the community. Through the integration of new technologies such as firearms, snowmobiles and now GPS navigation that continue to connect the next generation of Arviat to their land.
- ²⁰ As land-based economies have centred around the town, hunters today use tools like the Ski-doo, and GPS navigation traverse the longer distances to hunting grounds. Across the long trails from the town out onto the land, a series of architectural interventions stitch the modern architecture of the town back to the land. As was observed by the author in early May, the harvested caribou is butchered, smoked, dried, and shared within the community while the bones and antlers provide material for carving. The hide is used for clothing and crafts within the community and sold on the global market. Land-based economies are not simply subsistence sources of food and material but are at the heart of a growing entrepreneurial class tied to larger external supply chains.
- ²¹ Robert Robson, 'Housing in the Northwest Territories: The Post War Vision,' *Urban History Review*, 24(1), 1995, 15-17.
- ²² From a private conversation with the Arviat Housing Association, August 2018. As the piles were quickly driven into the permafrost and constructed on, no records were made whether they were bearing on bedrock or not. When the piles begin settle and jack, tearing buildings apart, the community is forced to cut away the piles and put houses and buildings up on wood block and wedge cribbing.



f 2.33 Private house with a series of storage sheds and garages.

f 2.34 The interior spaces of the urban block are filled with outbuildings, seacans and crossed by constantly changing informal trails. These spaces become collective spaces of storage, transit and exchange.





f 2.35 Storage sheds, qamutik and snowmobiles parked in the centre of town, August 2018.





f 2.36 HAP A type housing on the beach with numerous outbuildings for parking and storage, August 2018.







f 2.37 HAP B type housing with a large porch constructed and a large addition off the right end of the house. A shed off the right has been constructed in three stages, and a large seacan is just outside the right edge of the picture, May 2018.



f 2.38 Privately owned house in Arviat.





f 2.39 This house was vacated 2 years previously and evaluated. The materials for the repair and retrofit arrived by sealift in the fall of 2017, and work will begin in the summer of 2018. Arviat, August 2018.

Three Instabilities in Northern Ground

Inuit communities have always lived in an ecologically dynamic North, using complex traditional knowledge of climate and territory, but instability created at a global scale, and therefore largely outside of the political control of Inuit, is acutely felt in the remote northern communities across Nunavut. The rapid pace of climatic and technological change in growing towns such as Arviat continues to be driven from abroad. The acceleration of climate change results in melting permafrost, which in turn causing the federally built housing in the community to literally fall apart as foundation piles shift and structures fail. Meanwhile, the new houses being constructed by the Nunavut Housing Corporation seek to address emerging change with new building and mechanical systems models that need to be adapted to and maintained by the community without questioning the existing building types and public housing models that are now taken for granted in the Territory.

Design disciplines which have imposed structural and social stability through planning and construction need to reframe the ground in light of its instabilities. Communities are simultaneously confronting modernism's planned disregard for the existing land, and the social dislocations, economic uncertainty and structural instability that result. Instability, which has been seen in opposition of modern planning and building practices, needs to be re-framed as a productive and emerging condition on the ground.

Today, as Arviat continue to re-centre, negotiate and stake ownership over the land across political boundaries and territories, they are confronting not only the challenges of Northern life they have always known, but three emerging instabilities between existing projects of development, colonization and the warming arctic air. Each instability can be understood through local, seasonal cycles, the regional history of economic and material colonization and the land claims, and deep geological time of glaciation and global climate change.

Instability 1 / Fluid Geology

The ground condition of permafrost makes arctic geology unique: layers of soils and peat, frozen around buried formations of ice are subjected to annual cycles of freeze and thaw. In some cases, the ground is made up of more water than solid material. Seasonal thawing in the summer creates an *active layer* of thawed ground close to the surface, turning ground that appears stable in the winter into lakes and wetlands. Through annual cycles of freeze and thaw, the ground is continuously reshaped into a patterned surface of ice formations, boulders and lakes.¹

The geology of the Hudson's Bay basin that underlies Arviat was formed through cycles of glaciation and retreat. As the Laurentide ice sheet retreated west across the Hudson Bay lowlands, outwash streams deposited the long eskers of loose gravel and sand that striate the land. The glacial sea that followed the glacial retreat deposited layers of salt-rich sediment, creating saline permafrost that responds acutely to the warming arctic air.² The differential stability between the permafrost and the eskers is the primary challenge for the growing community. While the town first grew along an alluvial esker and the beach ridges along the coast, from the 1970s to present the community has sprawled across the permafrost.³



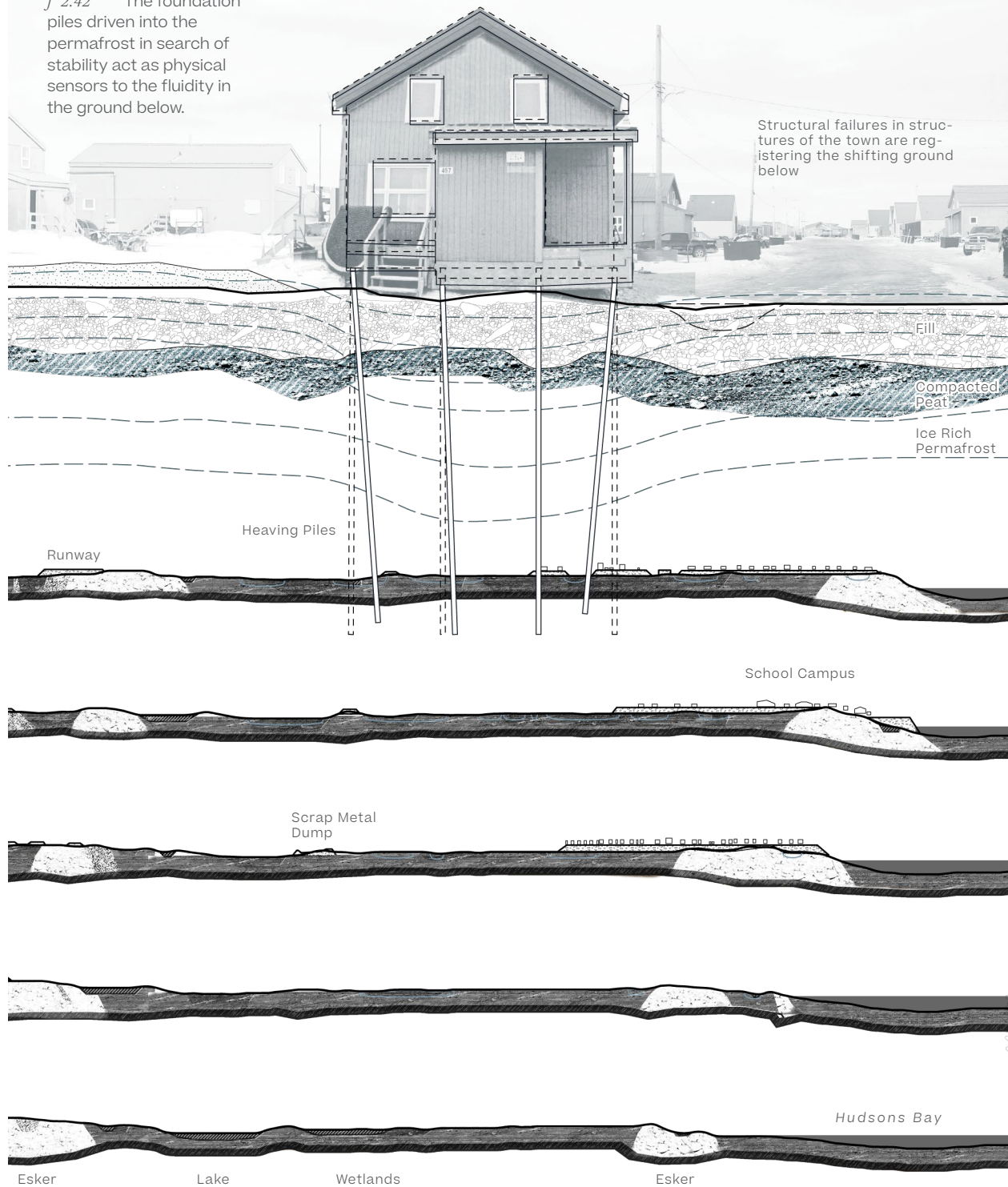
f 2.40 Land development and housing projects impose stability on the ground. However, the shifting permafrost asserts itself on buildings through the layers of fill and substructures.

f 2.41 The layer of fill has covered a shifting landscape of wetlands and lakes, latering the topography and hydrology around the town.



f 2.42 The foundation piles driven into the permafrost in search of stability act as physical sensors to the fluidity in the ground below.

Structural failures in structures of the town are registering the shifting ground below



Today, the geology of the coastline continues to move beneath community. Following retreat of last glaciers, the land itself is rebounding from the weight of the kilometres thick ice sheet. Isostatic rebound, or the rising of the earth's crust, is causing the exposed land to rise, and new coastline to emerge from the water, changing the topography of shoreline and the bathymetry of the seabed which the community depends on for the delivery of supplies and fuel. While temporary hunting camps outside of the town are moved in response to the changing geological conditions, the town itself is now fixed on unstable ground.

While the gravel fill separates the buildings in Arviat from the melting lakes and wetlands of Arctic tundra, foundation piles were driven into the frozen land mass to support structures. Digging deeper in search of structural stability, the variable rates of change in frozen soil and ice formations push and pull on the structures that bear on them, causing the houses above to literally fall apart.

The long geological glacial processes of the Holocene, the latest geological epoch we have experienced continues within what climate theorist Charles Baudel labels the *longue durée*, or the imperceptible scale of geological cycles outside of human activity.⁴ However, the frozen ground can no longer be counted on as a stable foundation. Temperatures in the north are rising faster than anywhere else on the planet, and the melting permafrost of the Arctic is caught in accelerating feedback loops between carbon dioxide and methane emissions and economic development.⁵

f 2.43 This house was vacated 2 years previously and evaluated. After cutting the foundation piles and raising the house on block and wedge cribbing, the interior will be renovated and repaired. Arviat, August 2018.



Instability 2 / Lived Boundaries on the Land

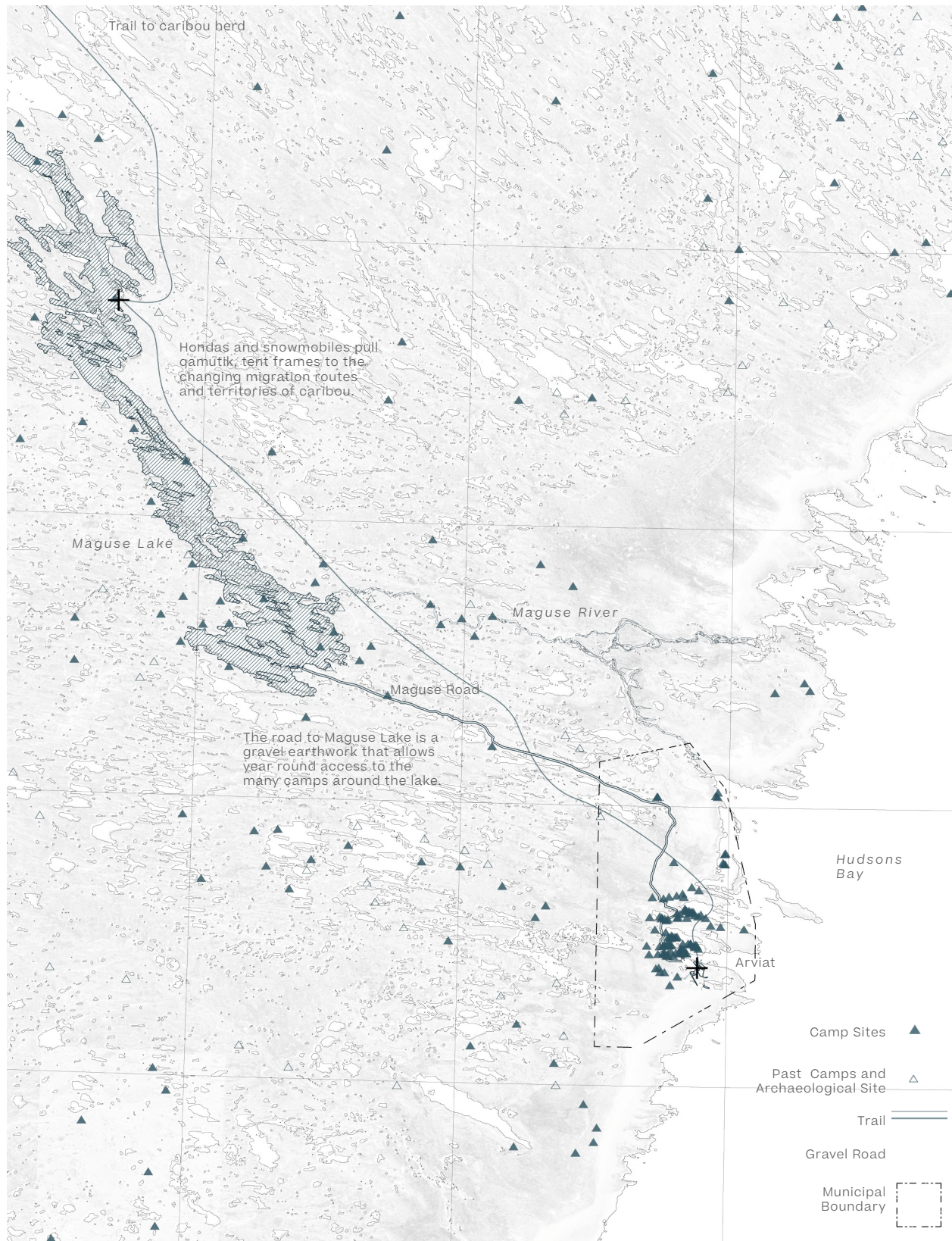
Inuit inhabit two worlds: that of the modern Canadian town and traditional life on the land.⁶ Many in Arviat were born on the land or are only one generation removed from a life before houses and settlements. Family and kinships were formed within the camps and across the land, and relationships were maintained through the seasonal migrations for hunting and trading.⁷ The fluidity of life on the land was productive, responding to changes in the environment.

Where instability on the land had traditionally been responded to in exchanges of material through traditional social responsibilities, the towns introduced new instability by dislocating these relationships.⁸ The seasonal cycles that centre in ethnographies of Inuit are were not considered as northern administrators began constructing the first permanent settlements.⁹ The architecture of the Canadian nuclear family was imposed, and largely failed, the multigenerational Inuit families and their extended kinships. The collective terrain of sharing and dwelling was fragmented into impositions of public and private spaces in the new towns. For example, the critical shortage of housing across Nunavut configures how families live throughout the town. The allocation of scarce housing resources based on family size and need often result in families being fragmented throughout the town.¹⁰



f 2.44 Tent frame for ice-fishing mounted on a qamutik, May 2018.

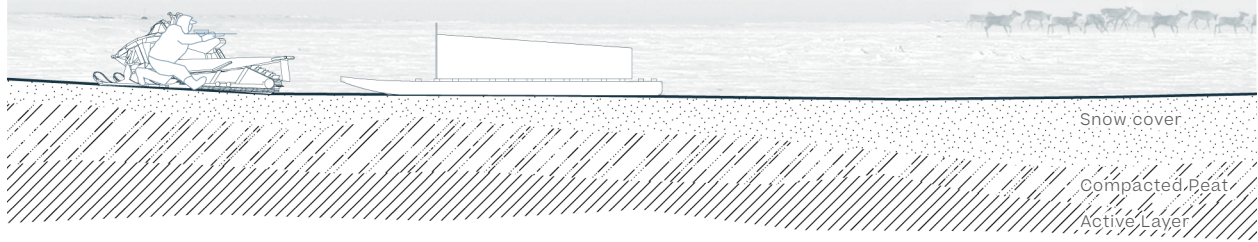
f 2.45 The inhabited urban territory of Arviat includes the town, Maguse Lake and along trails to the migrating caribou.



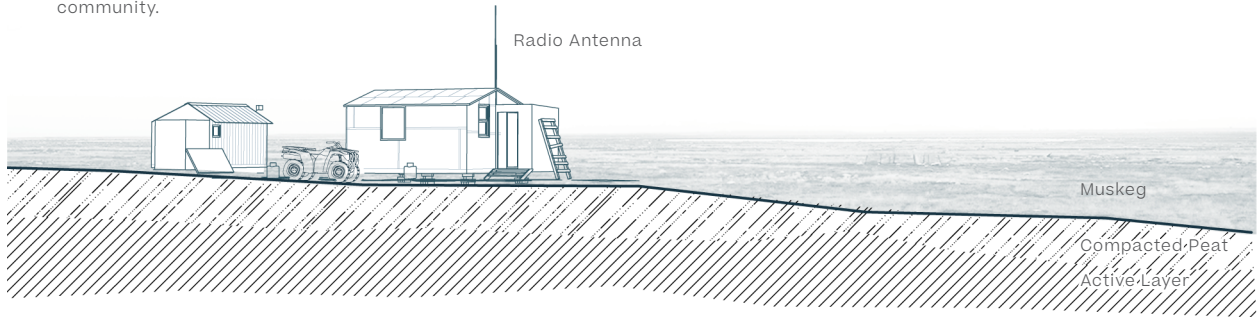
Three Instabilities in Northern Ground

f 2.46 Architecture of the town, the camp and the trail.

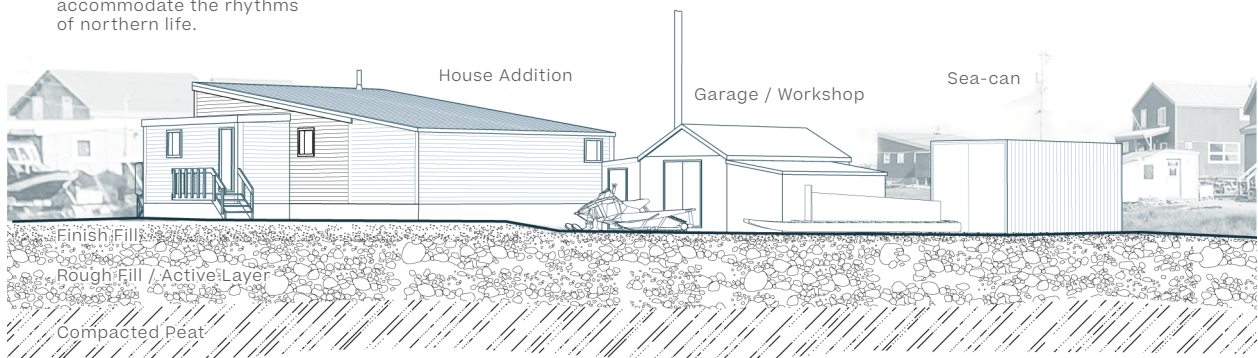
Qamutik and snomobiles map the edges of lived land.



Camps and cabins are constructed around important landscapes of the community.



The domestic spaces in the town are retrofitted and expanded through additions, outbuildings and sea-cans to accommodate the rhythms of northern life.



The open spaces of the planned town are sites where the community navigates the architectural impositions of the formally designed town to the land. For younger generations growing up in Arviat, a unique set of domestic norms are emerging in the town, somewhere between what are understood as traditional family structures and southern norms. While young families increasingly desire independent space, kinships remain strong in child rearing and sharing networks. The shifting cultural baseline in the community generates friction amplified by the imposed separations of town spaces from the land which dislocate the traditional relationships from the land on which they are based.

The architectural response by the community to the social dislocation of the house responded to the vast territory of camp sites and hunting grounds on the land. The importance of seasonal cycles and species migrations, and the hunts that focus around them are reflected in the architecture of the land. Between these spaces are trails that reconfigure the public and private spaces in the town into collective ground. Where the roads follow the surveyed plan, an alternate network of routes navigate the seasonal topography of ground conditions, the deposition of snow through the winter or direct pedestrian routes between shops or relatives through the town cross established boundaries of property lines. The culture of life on the land is central to the collective life of the community and travelling out of town is an important part of renewing social relationships and reconnecting with extended family on the land.

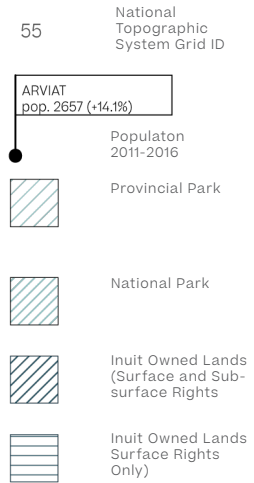
f 2.47 A modified Weber house, with a tent frame under construction in the foreground, storage shed in the back left and an added wind porch outside of the existing cold porch in early May, 2018.



Instability 3 / Uncertain Economics of Property

The remote geography of northern communities creates extended and often tenuous connections to supply chains and economies. The exchange of tools, food and knowledge were central to Inuit society and culture prior to contact and colonization in the north. Uncertainty in species migrations, as well as the rapidly shifting weather meant that the sharing of materials was central to collective adaptation and survival on the land.¹¹ Embedded in the practice were careful calculations of supplies and energy reserves for the year ahead.

Historically, the economic instability of the north within resource-based economies is contingent on global economic forces. In major development projects, the economic value of the ground is distorted by speculation and demand, and northern communities have negotiated between subsistence economies of hunting and trapping, and the market economies imposed on the land. Throughout the arctic fur trade, Inuit hunters and trappers had control over the supply, and could respond to the fluctuating prices of the Hudson's Bay Company, balancing the economics of trading for food at the post and hunting out on the land.

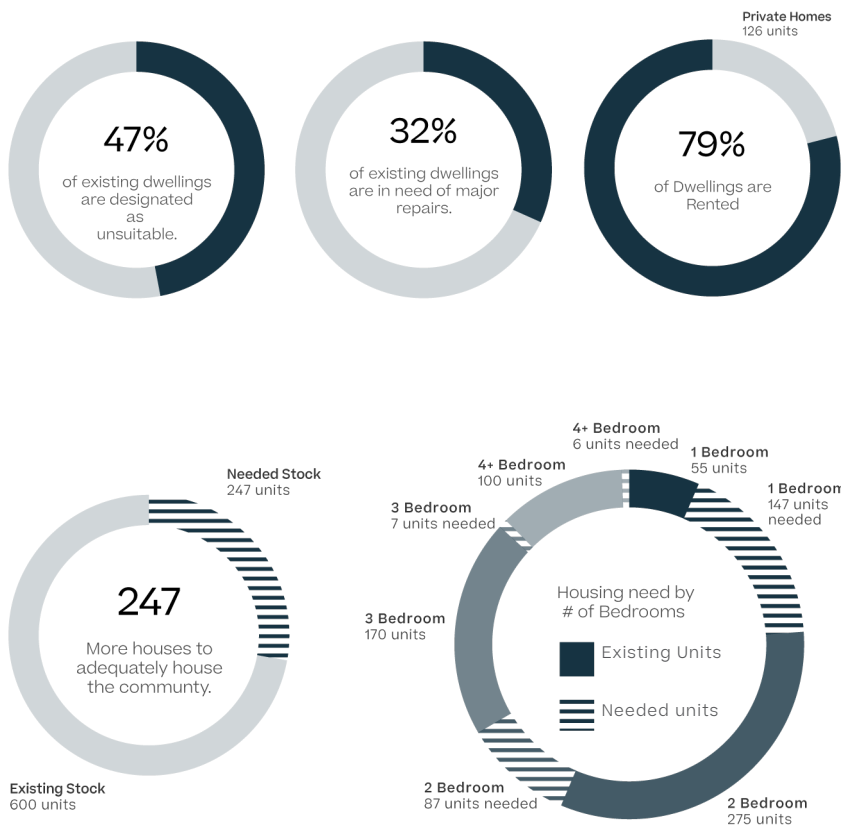


f 2.48 Calm Air ATR 42 on the apron of the Arviat Airport (YEK). Outside of the single annual sea lift, all the mail, goods and people arrive by plane.

f 2.49 Regional infrastructures by sea and air connect the remote communities of Nunavut to southern Canada and global economies. Primary air access from the South flies through Winnipeg (YWG) into Rankin Inlet (YRT).

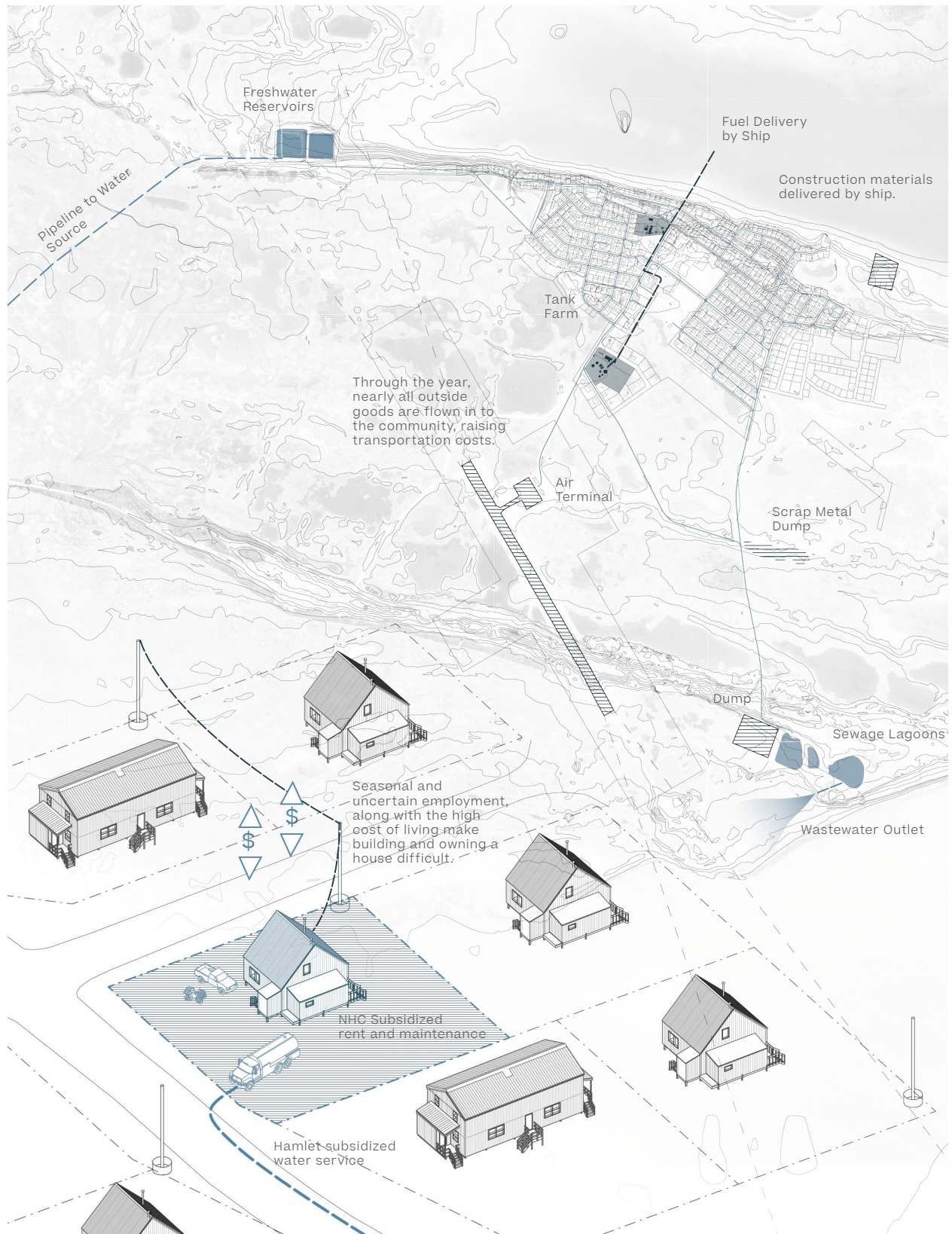


Where the community negotiates economic uncertainty over time, and through seasons, public housing has been the dominant architectural response of administrators to create economic instability in communities. Subsidized property, services and housing across the territory translated the rhythms of seasonal labour and hunting into regularized regimens of monthly rent and bill payments. Houses, in the surveyed plan obscured the economic precarity of individuals in response to the collapse of the fur trade, but furthermore they limit the agency of individuals and traditional sharing economies. For instance, subsidies on the high cost of water services discourages investment in more efficient appliances or community infrastructure over the long term, distorting the value of spaces themselves to community members and public housing organizations. Administrators were interested in economic and social stability that could be read at the scale of the territory, and in doing so limited the economic autonomy of family.



f 2.51 The housing crisis in Arviat.

f 2.50 Property in the community is serviced by subsidized infrastructures and ownership, suppressing the economic autonomy of residents.



Moreover, domestic spaces are the site of both traditional crafts and land-based economies, but also seasonal and gig-based workers, and an emerging entrepreneurial class.¹² The separation of domestic spaces and those of production in the official plan belies the reality on the ground, where living rooms, kitchens and outbuildings within the boundaries of a residential are often the dominant spaces of both traditional land based economies such as hunting and trapping, but also in research, art and service businesses throughout the town.

The seasonal cycles that organized hunts, migrations and life on the land for Inuit are changing. The imperceptible time of climate, thought within modern climate theory to be separate from human history is becoming entangled with perceptible, environmental time. The permafrost on which the modern spaces of the arctic are built, and on which Inuit culture is defined is caught in accelerating feedback loops between carbon emissions, rising temperatures and intensifying resource economies.¹³ To plan for the future in the north, new tactics are needed to help the community address the deeper strata of geology thawing each year, as the very ground which is built upon becomes fluid.

Endnotes - Three Instabilities

- ¹ For an in-depth tour of permafrost landscapes around the town, see Arviat Wellness Centre, 'Landscapes of Arviat,' YouTube video, accessed: <https://www.youtube.com/watch?v=vscCgXaia20>.
- ² D. L. Forbes et al., 'Reconnaissance and assessment of landscape hazards and potential impacts of future climate change in Arviat, southern Nunavut,' *Summary of Activities, Canada-Nunavut Geoscience Office* (2013), 189.
- ³ Forbes, et al, 'Reconnaissance and assessment of landscape hazards,' 191.
- ⁴ Eyal Weizman, *Forensic Architecture: Violence at the Threshold of Detectability* (New York: Zone Books, 2017), 253
- ⁵ Eyal Weizman, *Forensic Architecture*, 253.
- ⁶ Beatrice Collignon, *Knowing Places: The Inuit, Landscapes and the Environment* (Canadian Circumpolar Institute Press, 2006), 207.
- ⁷ David Damas, *Arctic Migrants / Arctic Villagers* (Montreal and Kingston: McGill Queen's University Press, 2002), 14-17
- ⁸ Pamela Stern, 'Upside Down and Backwards: Time Discipline in an Inuit Town,' *Anthropologica*, 45(2004), 67-68.
- ⁹ Stern, 'Upside Down and Backwards,' 153.
- ¹⁰ From a private conversation with the Arviat Housing Association, May 2018.
- ¹¹ Kalluak, 'About Inuit Quajimajatuqangit,' 41.
- ¹² Arviat based Hinaani Designs is one of a number of emerging businesses and creative collectives in the north. Anubha Momin, 'Three up and coming Nunavut designers are representing Inuit culture in innovative ways,' *CBC Arts* (July 10, 2017), accessed: <https://www.cbc.ca/arts/three-up-and-coming-nunavut-designers-representing-inuit-culture-in-innovative-new-ways-1.4195739>
- ¹³ Karen Northon, ed., 'Long-Term Warming Trend Continued in 2017: NASA, NOAA,' *NASA*, January 18, 2018, accessed <https://www.nasa.gov/press-release/long-term-warming-trend-continued-in-2017-nasa-noaa> (June 14, 2018).

Unsettling Ground

Unplanning the Ground

The three studies that follow re-examine potential relationships of architecture to unstable ground in the Arctic, challenging the building and planning conventions that have historically defined development. Of the three design proposals, one studies the role of *infrastructure* in the community plan, and two schemes are at the scale of the house. The first considers the building envelope and *collective space* across the land, while the other studies the relationship of foundations and the *thermal gradients* deep in the ground.

The question posed in each of these studies is how the construction of space might be seen within the geological, social and economic negotiations of Arviat. They each respond to stories shared by community members who have a deep connection to the land despite the rigid formality of current planning practices. *Unplanning* the ground a process that begins to adapt the existing design conventions that drive construction to the emerging instabilities in the ground. Through tactics that introduce flexibility and adaptability over time, the interventions encourage the creation of an emerging northern collective realm by challenging contemporary housing types and planning practices of the Nunavut Housing Corporation. The design schemes amount to an incomplete collection of tactics that can begin to *un-plan* the rigorous grid of the community.

An Index of Tactics for Unplanning the Ground

Instability 1 / Fluid Geology

The community navigates uncertainty and scarcity in wage economies with land-based economies. The exchanges of goods across the ground engages a series of spaces and terrains that are dislocated across global scales

The first layer of negotiation is between the town plan and the unstable geology on the ground. Renegotiating the rigorously gridded plan around hydrological features, and the ecological value of the landscape to the community.

The non-plan needs to negotiate the changing ground over time, between the 20year review periods for the community.

Instability 2 / Lived Boundaries on the Land

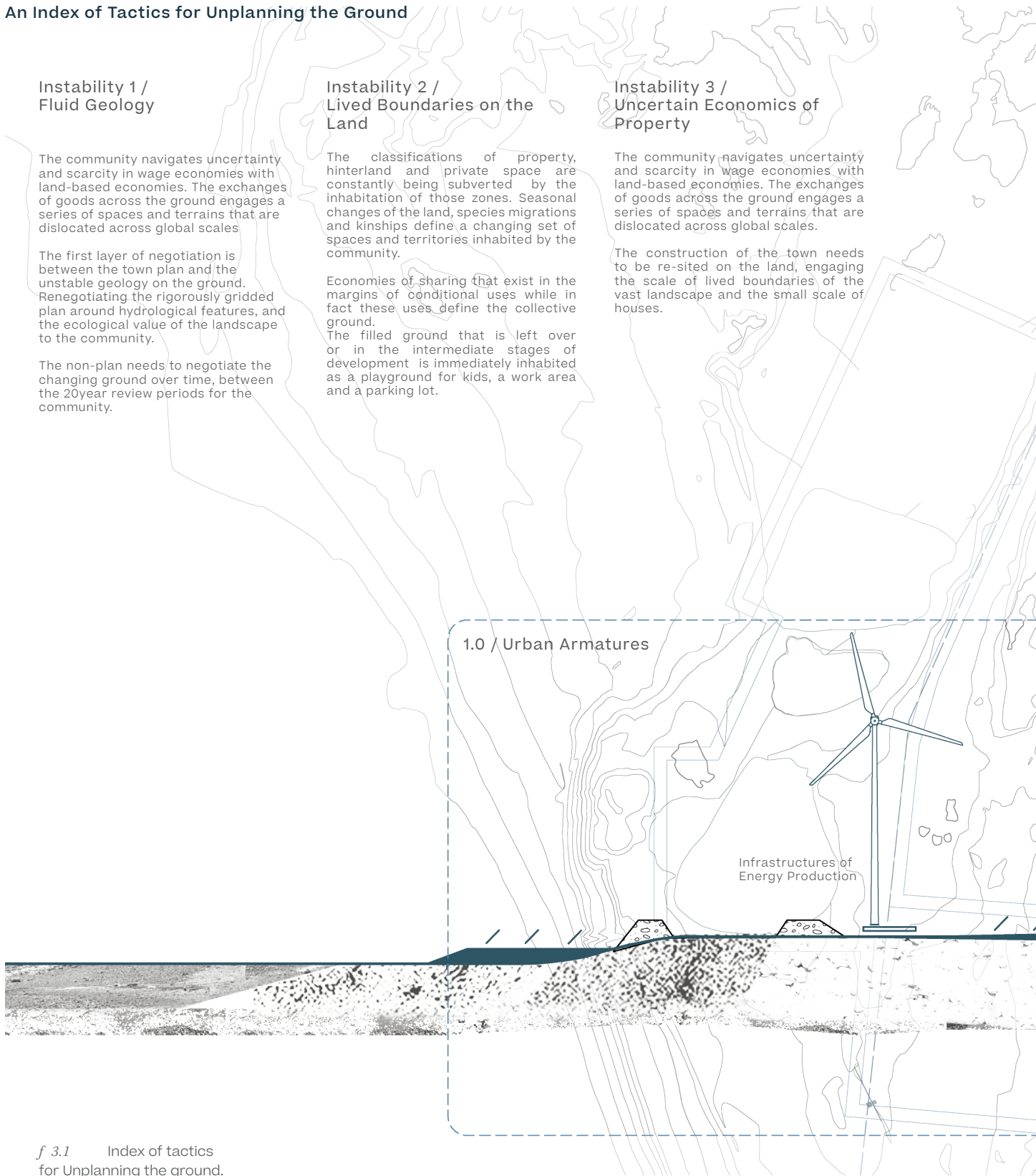
The classifications of property, hinterland and private space are constantly being subverted by the inhabitation of those zones. Seasonal changes of the land, species migrations and kinships define a changing set of spaces and territories inhabited by the community.

Economies of sharing that exist in the margins of conditional uses while in fact these uses define the collective ground. The filled ground that is left over or in the intermediate stages of development is immediately inhabited as a playground for kids, a work area and a parking lot.

Instability 3 / Uncertain Economics of Property

The community navigates uncertainty and scarcity in wage economies with land-based economies. The exchanges of goods across the ground engages a series of spaces and terrains that are dislocated across global scales.

The construction of the town needs to be re-sited on the land, engaging the scale of lived boundaries of the vast landscape and the small scale of houses.

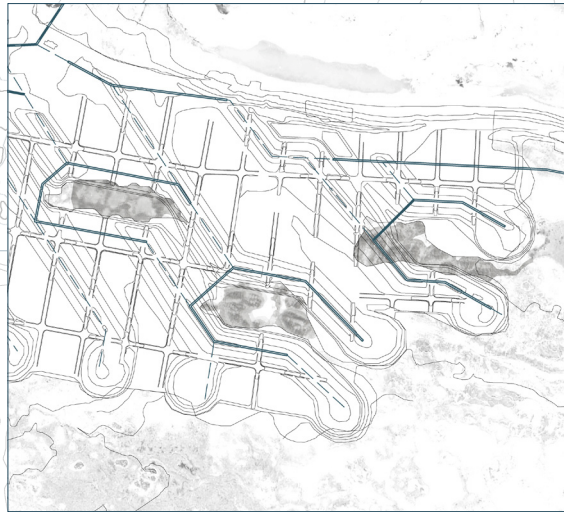


f 3.1 Index of tactics for Unplanning the ground.

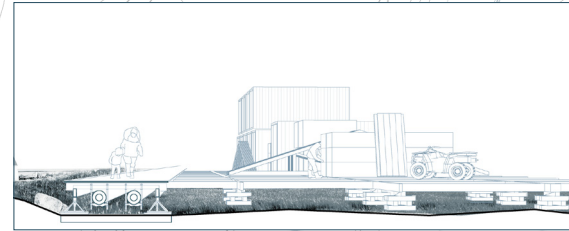
Proposal 1 / Urban Armatures

The urban form of the town needs to be re-sited in constructed relationships to unstable ground. **Landforms** of artificial fill mediate the structural instability of the permafrost and the changing ground of snow and ice.

Physical infrastructures become elements in that shape **collective landscapes** at the community scale.



On fluid ground infrastructure acts as a spine for development, connecting new areas of construction through a **utilidor** that services new construction.



The spine of infrastructure enables new economies connecting spaces of **production**.

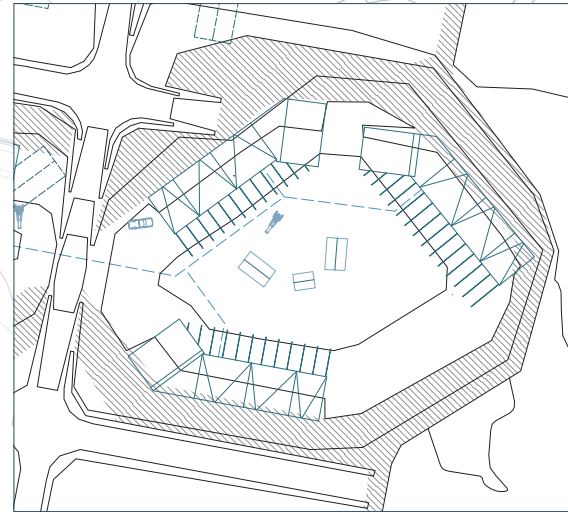


The transient infrastructure of **trails** connects storage areas to the hunting grounds around the community.

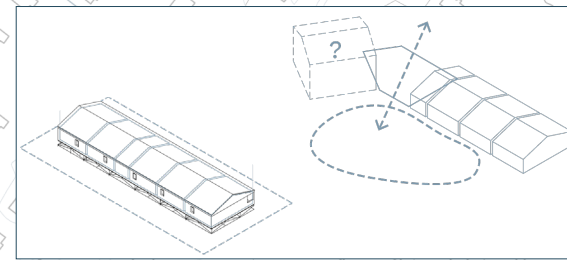
Proposal 2 / Housing on Collective Ground

Buildings exist as objects, figures, in the organizing grid of streets and property lines. By reconsidering the building as an instrument to form **collective spaces**, new relationships between the town and the land can be made.

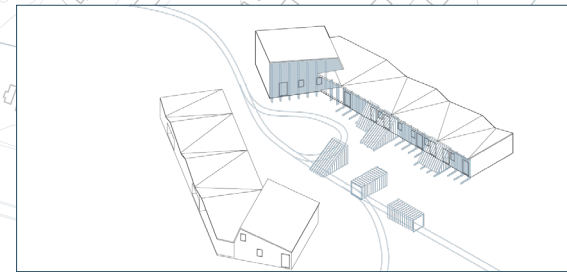
New clusters of houses around filled ground carves open spaces that are shared spaces for play, construction and storage.



Bending the plex transforms the relationship between the building, the town and the collective spaces between houses, figures, in the surveyed grid of the town.

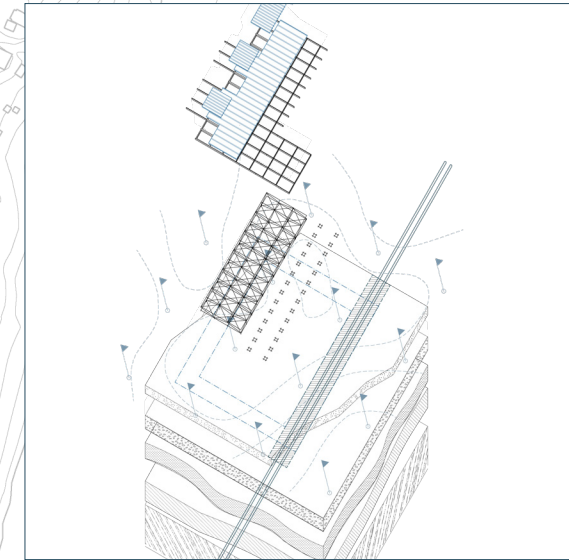


The **collective walls** in the interior and **shared facades** that face shared spaces can be modified, build on and expanded to accommodate changing needs of families.

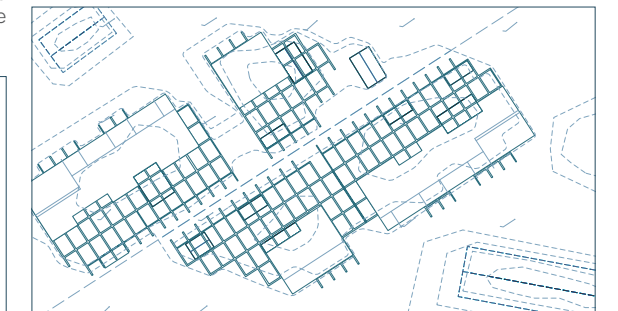


Proposal 3 / Housing on Thermal Ground

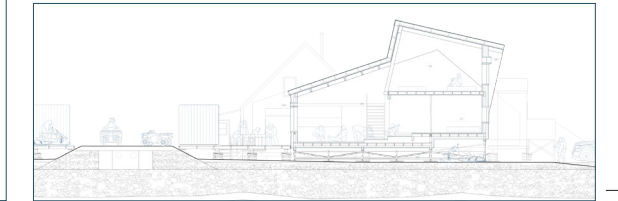
The architecture of housing is affected by the **multiple thermal conditions** under seasonal cycles and climate change. Different layers, from the frozen geology, to weather conditions and interior environments have different rates of change and are inhabited by the community differently.



The **substructures** of footings and decks establish stable grounds for construction that be adjusted to the shifting ground below.



Layers of platforms at different elevations from the ground work with the **thermal gradients** between the unique domestic activities of the community and spaces of housing.



2.0 Collective Ground

Camps and Outbuildings

3.0 Thermal Ground

New Collective Housing

Collective Wetlands

New Constructed Landforms

Regional material flows

New Grounds 1 / Urban Armatures

Presently in the community, infrastructure is distributed along the gridded streets and lot lines that drive the urban form of the town. The current plan negotiates development pressures after filling over the uneven terrain, but opening community planning to the differential changes of fluid geology and the collective ground of the community opens new possibilities for the growing community.

Arviat rapidly grew through the 1970s and 1980s, and infrastructure to service the sprawling houses needed to be expanded rapidly and inexpensively. The detached houses and multiplexes are serviced individually by fuel, water, sewage and garbage trucks in a non-stop circulation of vehicles throughout the town. The first, and most active infrastructural negotiation in the proposal is between the surveyed roads that cross trails and open spaces in the landscape which form a network of seasonal circulation. While the gridded streets ensures water, sewer and firetruck access throughout the proposed plan, breaking the grid around important landscape features and existing trails mixes the spaces and circulation on the land through the urban fabric.

Through the summer, the softened ground limits travel to the raised gravel roads and eskers but the drainage wetlands and ditches that are inaccessible freeze and fill with ice and snow from November to May, creating new trails for snowmobiles in particular through the town. These open spaces also create new recreational landscapes and collective spaces to prepare for travelling out onto the land.

f 3.2 Infrastructure on trails and wetlands. The existing process of filling ground covers over the specific relationships of community space and the landscape.

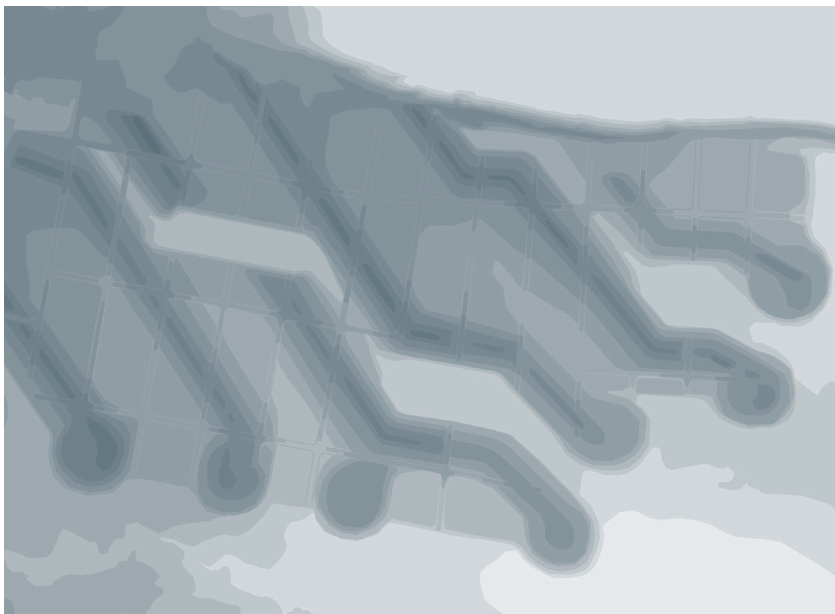
1.1 / A Network of
Trails and Roads

The grid of streets and fill are overlaid on the permafrost through surveys, and dimensioned by the grid of 30m residential lots.



Next, the landform of *artificial fill* insulates the fragile permafrost from buildings and activity in the town. As all constructed ground is already terra-formed into a leveled carpet of gravel, land-forming the fill into a new topography of ridges, flat areas and depressions negotiates both the terrain being covered over and the weather above.

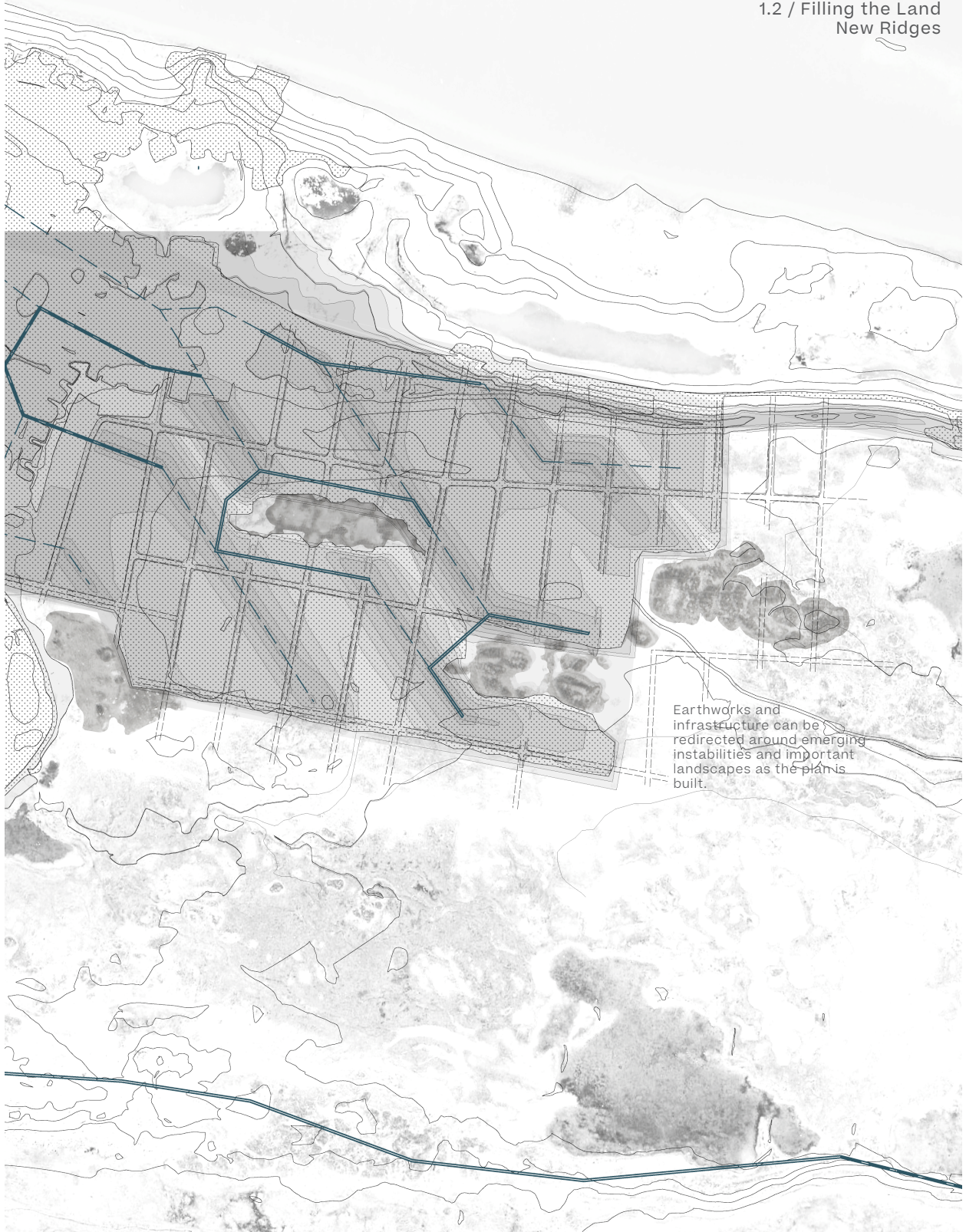
Articulating the uniform fill layer to follow the existing geology, with depressions over wetlands and a series of ridges that are oriented with the wind patterns around the town generate a topography that controls snow drifting in the community in the winter while draining the town in the spring and summer. The ridges form a well-drained and stable footing to intensify infrastructure and development. The existing expansion plan for the community will erase an important series wetland that drain melt water away from the town towards the coast. Incorporating this natural infrastructure into the proposed filling strategy will help mitigate flooding and ponding while carving new collective spaces and access to the land out of the urban fabric on the ground.



f 3.3 Generated topography of fire access, drainage and wind fields.

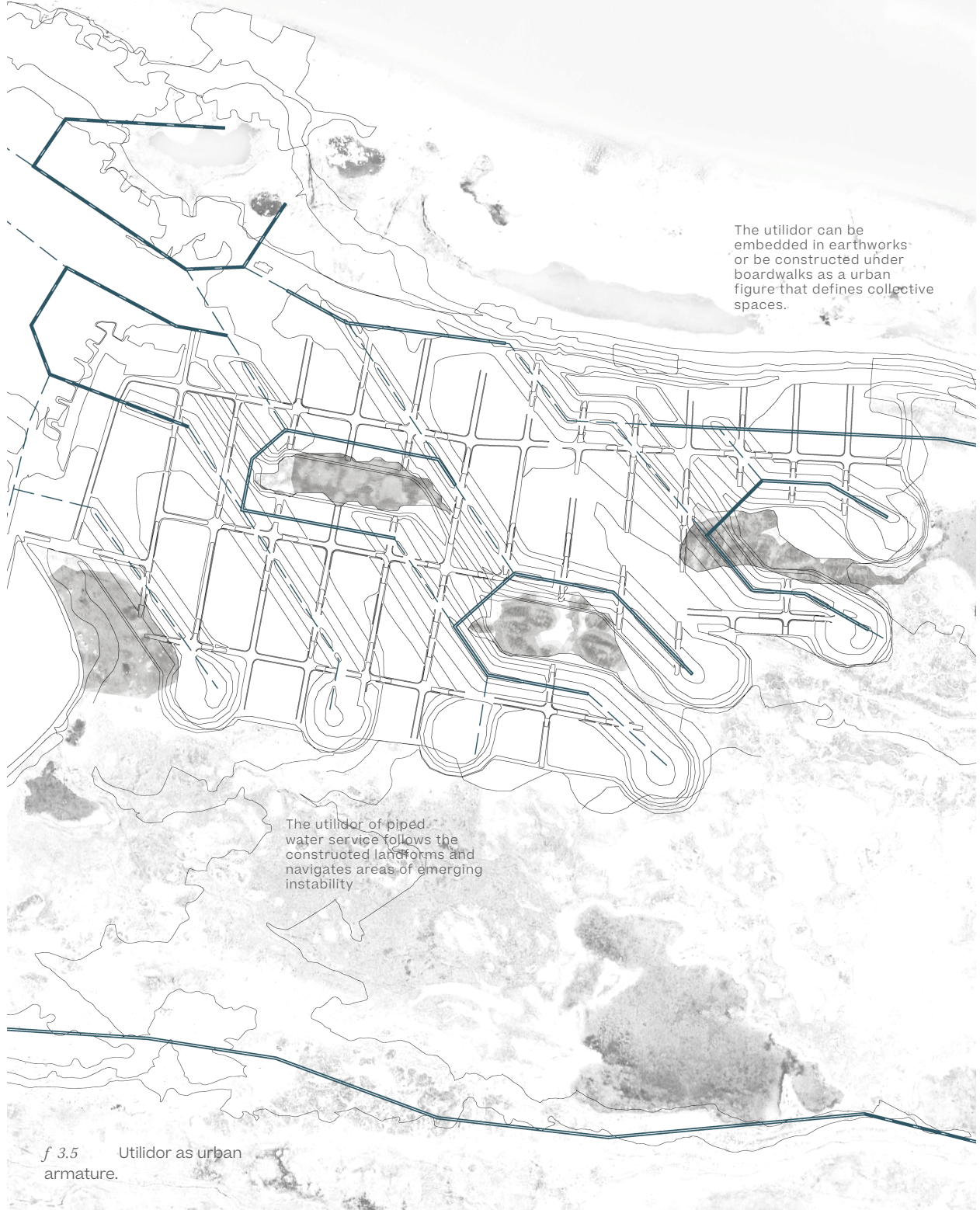
f 3.4 Constructing the ground, negotiating the changing ground, infrastructure and drainage (right).

1.2 / Filling the Land
New Ridges



Earthworks and infrastructure can be redirected around emerging instabilities and important landscapes as the plan is built.

1.3 / Utilidor Armature



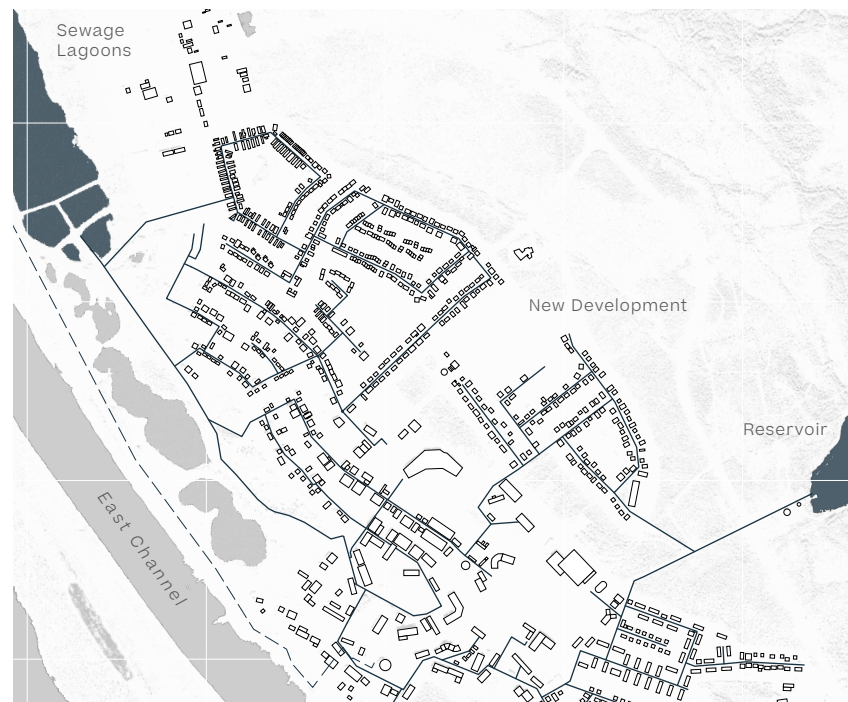
The utilidor can be embedded in earthworks or be constructed under boardwalks as a urban figure that defines collective spaces.

The utilidor of piped water service follows the constructed landforms and navigates areas of emerging instability

f 3.5 Utilidor as urban armature.

The third tactic in this proposal introduces a *utilidor* as an infrastructural armature that can to re-orient urban growth around unstable geology. The utilidor is a uniquely northern adaptation of how water and waste are circulated on permafrost landscapes. Elevated pipes that would otherwise be buried underground protect the thermally active permafrost from the heat of the infrastructure itself, and conversely protect the infrastructure from the shifting ground. The corridors of insulated pipes then become an urban figure in communities. In communities such as Iqaluit and in particular Inuvik, Northwest Territories, the utilidor defines areas of greater density while transforming the character of open spaces.

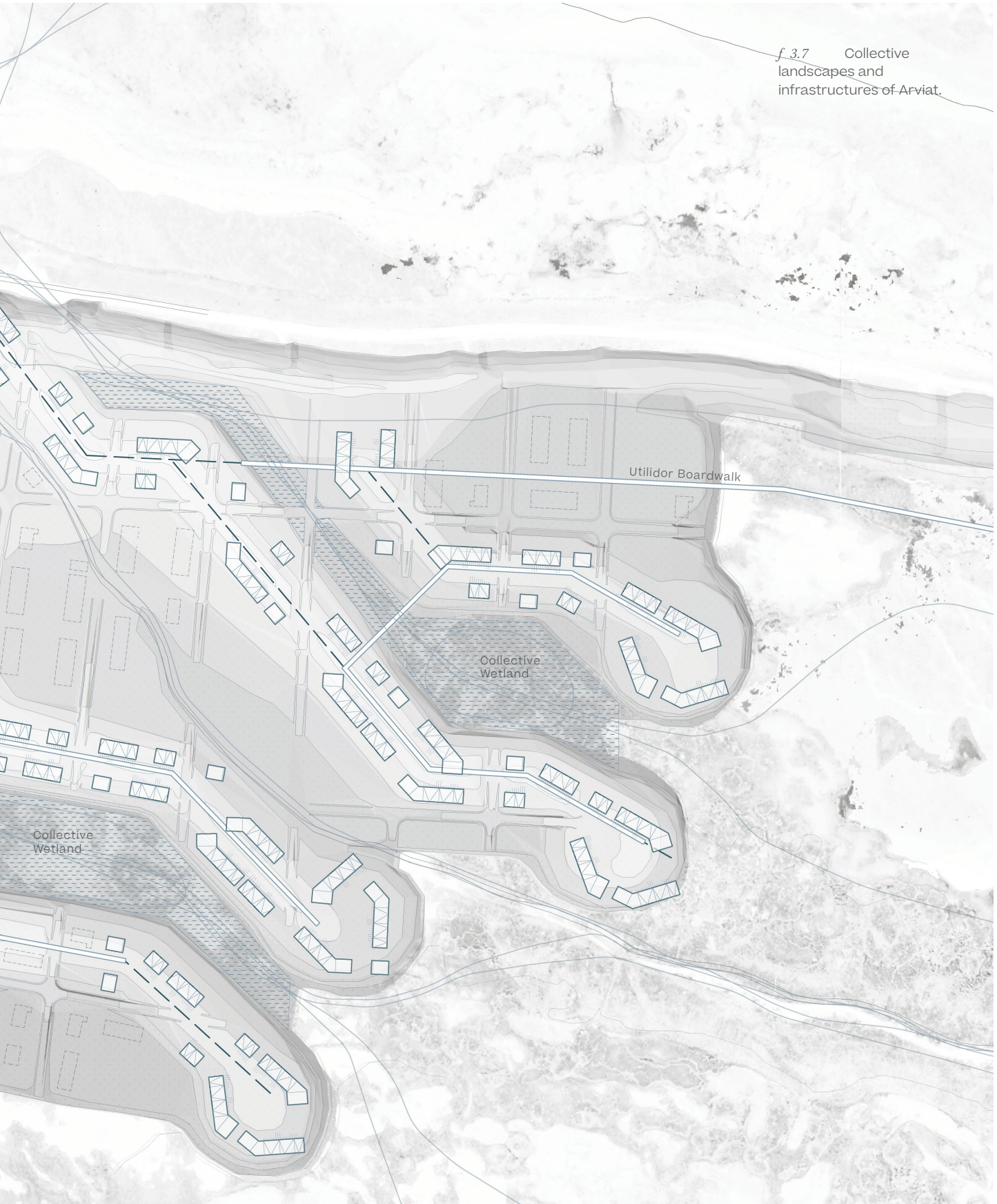
The growth of Arviat continues to stress the system of trucks currently in place, and an existing project connecting the town core by a utilidor has been discussed in the community. Within the proposed residential expansions of the town, the utilidor forms spines of higher density through the urban fabric of the town. Building from the geological spine of the esker, the armature of a utilidor can begin to direct development tactically around important landscapes and unstable, ice rich soils below



f 3.6 Inuvik, NWT
utilidor plan, 2016.

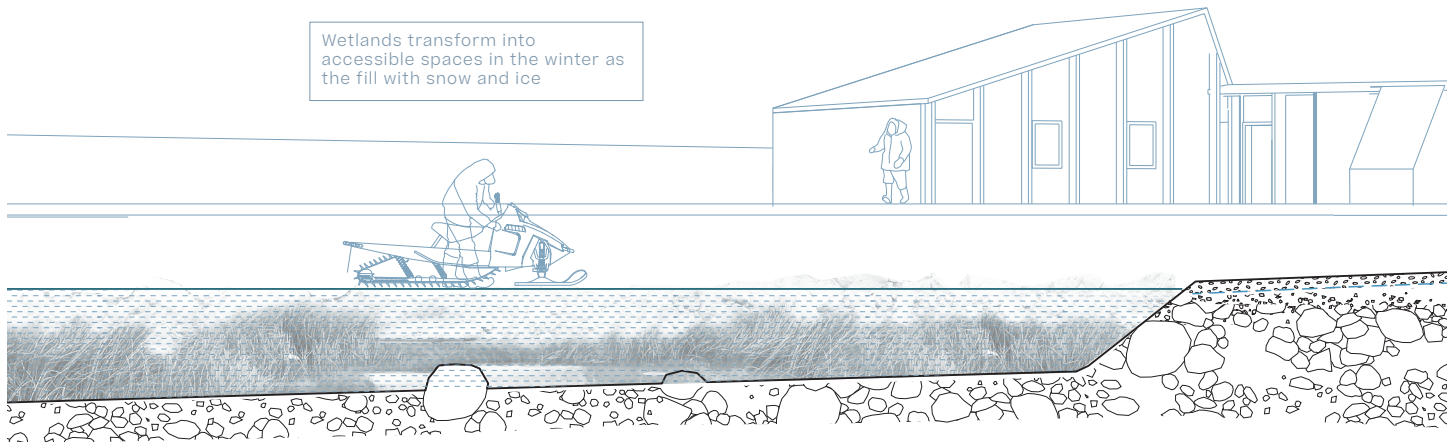


f.3.7 Collective landscapes and infrastructures of Arviat.

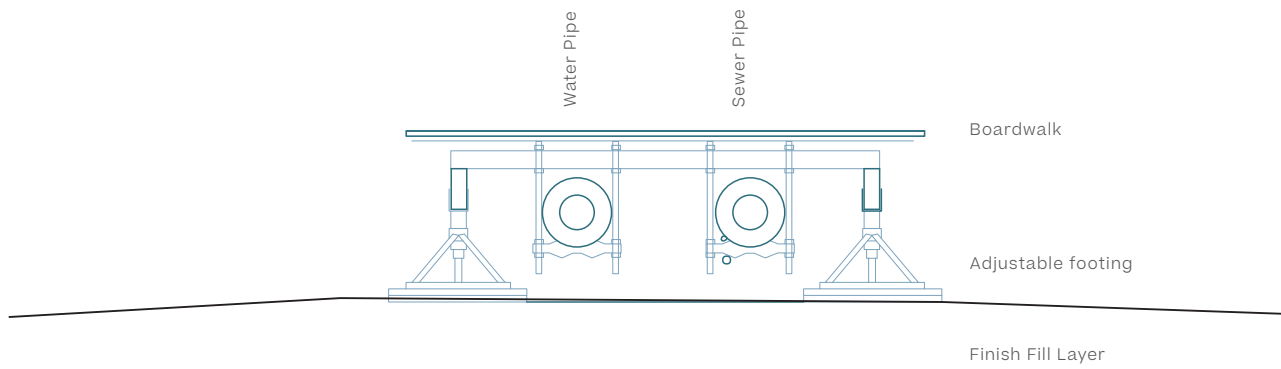


the surface. Corridors can be bent, terminated or circled around melting and shifting ground, or in response to different building patterns. The urban armature of the utilidor can act as trail markers, a boardwalk or a parking area, carving collective space out of the urban grid.

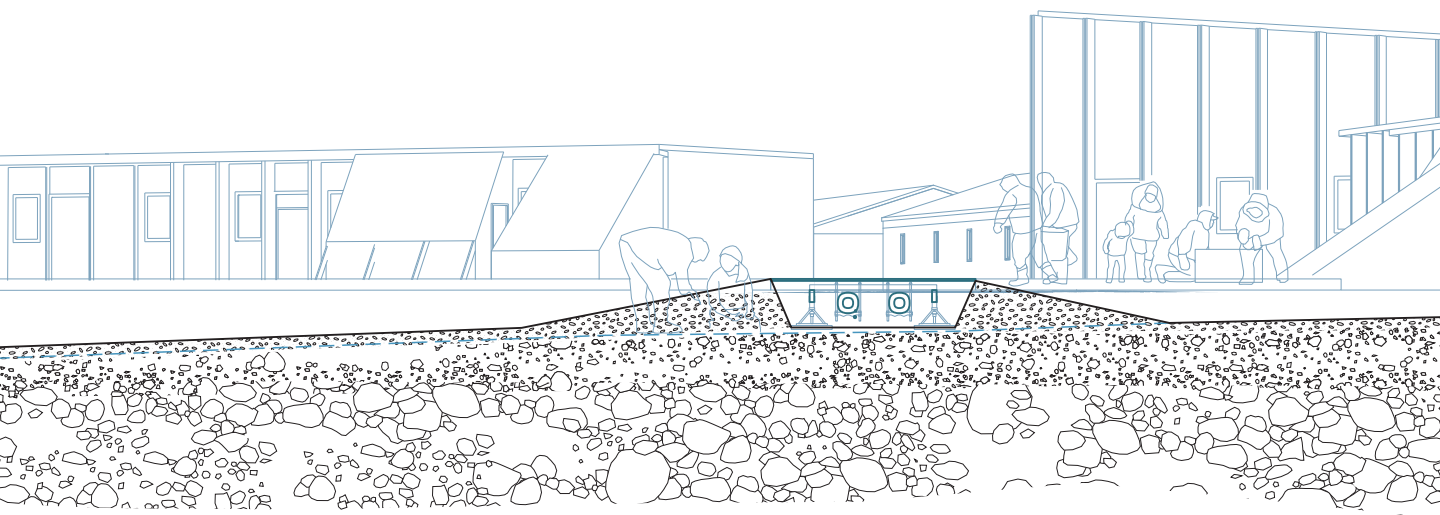
The investment in new infrastructure in the town can re-value land being developed, focusing filling and housing density on stable ground. The proposed utilidor, as it is expanded, allows the plan to respond to development pressure, climatic changes and glacial rebound that continue to reshape the ground.



f 3.8 Section detail of the utilidor, revised for the unique grounds of arviat



The utilidor brings services to the houses around the wetland, but also outbuildings and new development.



f 3.9 Collective urban landscapes and infrastructures.

In Arviat, landscapes of hunting grounds, trails or camp sites are culturally and economically important for the community. The value of these spaces is not their pristine natural state, but in their relationship to living on the land. Open spaces adjacent to the utilidor have access to municipal services without requiring another stop for water trucks in the community. Already, sites such as the scrap metal dump, known as 'Canadian Tire', are sites that challenge ideas of economic production for the community.

Construction in the north begins with the arrival of materials from the south onto the ground. Following the construction of the **utilidor**, new housing can be constructed.

Substructures built from the utilidor can protect the land from construction and activity. It serves as a stable platform for storage and parking until houses are built.



f 3.10 Infrastructure as collective space.

Infrastructure becomes new collective spaces for the community.

The **Sealift** arrives in early September with the construction materials, fuel and equipment for the year.

The spine of new development, the utilidor connects new construction with **water and waste services**.



On the land, infrastructure is functional, but also has become a landmark for navigation. On points of stable geology, large elements such as cell phone towers, wind turbines or old radar stations are embedded into the collective knowledge of travelling across the land. As the landscape deforms under the effects of climatic changes, stable navigational markers from which the changing ground can be monitored are important elements to community life on the land.

Productive infrastructures
in the community generate
investment in the community



f 3.11 Infrastructure has engages in the collective landscape beyond the generation of energy. Large structures become markers for navigation, guiding hunters back to town.

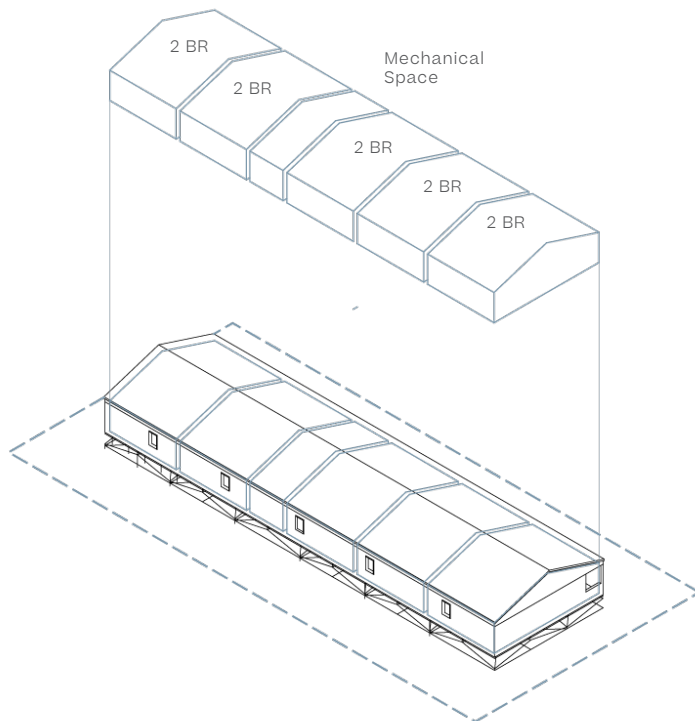
Infrastructures become elements in collective memory for navigating the land.



New Grounds 2 / Housing on Collective Ground

The *housing unit* has become the driving architectural element of development in the town. Within the existing gridded plan, detached and row houses are oriented to the street and limited in their relationships to each other by the wide fire separations necessary in Northern climates. This proposal studies how housing form might shape collective spaces in the urban form and within the walls a housing block. As infrastructure might be an instrument to negotiate instability in fluid geology at the scale of the town plan, reconsidering the relationships of housing types between changing seasons and community uses can renegotiate the grid of property that currently defines residential space, and the regulations coded into zoning in the town plan.

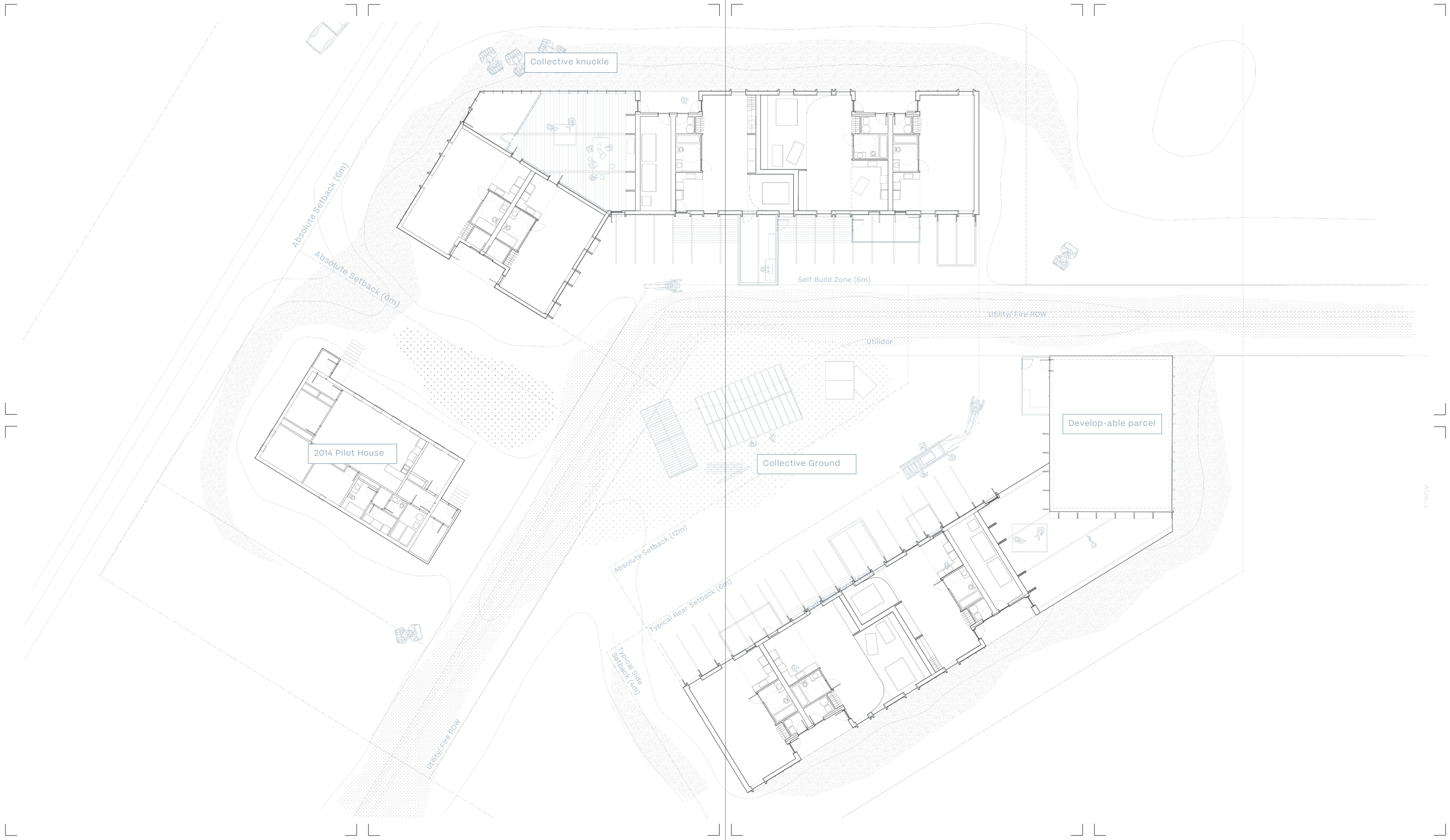
In the community, spaces and landscapes are given value through collective activities, whether those be travel, recreation, repairing tools, or gathering spaces. Renegotiating the private housing unit around collective spaces, expanding the myopic view of public and private, constructs new relationships between domestic spaces and the material culture and economies of the land.



The **existing 5-plex** types are a simple shed architecture filled with 5 units and mechanical spaces which are immediately allocated to families.

f 3.13 Bending the plex. Breaking apart building forms on the north is problematic for the integrity of building envelope.

f 3.12 Housing on collective grounds (see foldout).



Collective knuckle

Absolute Setback (6m)

Absolute Setback (6m)

Self Build Zone (6m)

Utility Fire RDW

Utilidor

2014 Pilot House

Collective Ground

Develop-able parcel

Absolute Setback (12m)

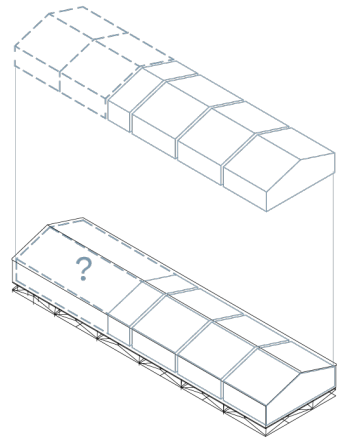
Typical Rear Setback (6m)

Typical Side Setback (4m)

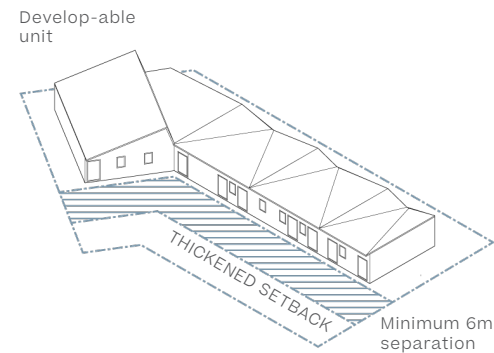
Utility Fire RDW

2.1 / Bending the Plex

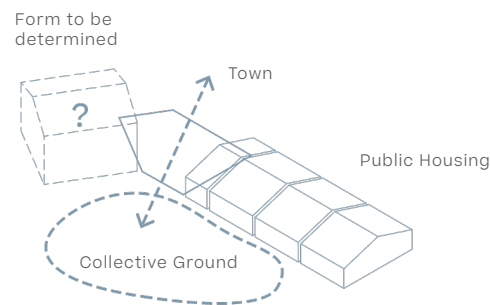
The population of spaces by a uniquely northern domesticity is a question of agency. Ownership of surface, and of space is at the heart of the public housing model.



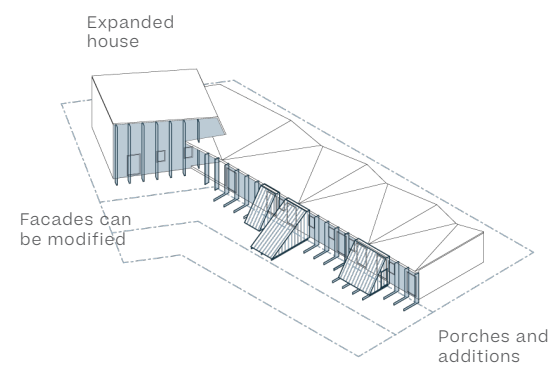
However, if shed is only partially filled by dwelling units, and **40% is left unfinished**, interiors can be built out over time to suit the specific needs of the community.



Every construction in the town defines the ground immediately around it by the **Fire Setbacks** in the zoning plan. Walls claim territory from open spaces.



The barrack/shed type house does not address the two unique collective grounds in the community: the functional services and street addresses of **the town**, and the social-cultural spaces of **collective ground**.

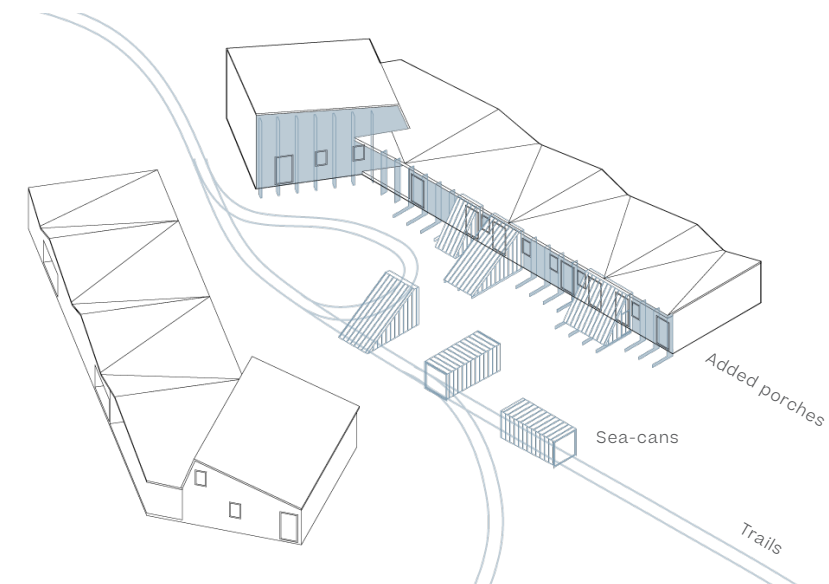


By extending the setback, the building envelope can be extended according to the needs of residents. Extra **porches, studios and storage** attached to the building are accommodated in the thickened setback.

The existing housing types are hybrids of urban row-housing and the military barracks that defined the militarization of the north in the 1950s. The relationships of front and back 'yards' that define the ground condition of southern suburbia cease to function in Arviat and elsewhere in Nunavut. Front and back might better be classified by the formal services provided by the Hamlet government (street addresses, emergency services and utility hook-ups) and the collective and traditional networks of sharing (processing country food and skins, repairing equipment, small construction projects and storage).

By bending the rigid form of the typical NHC Five-plex, the simple bar building addresses the two ground conditions differently, opening towards the public spaces of the town while partially enclosing the collective block interior. In the urban plan, the necessary fire setbacks and vehicle rights-of-way are often appropriated as seasonal travel routes, storage and parking.

The proposal references setbacks and separations from the constructed walls of buildings, rather than the property lines. The irregular form of the Bent-plex can be arranged into new collective clusters while maintaining necessary separations for the fire code and opening new opportunities for the informal architecture of the community can define the open spaces of the town.

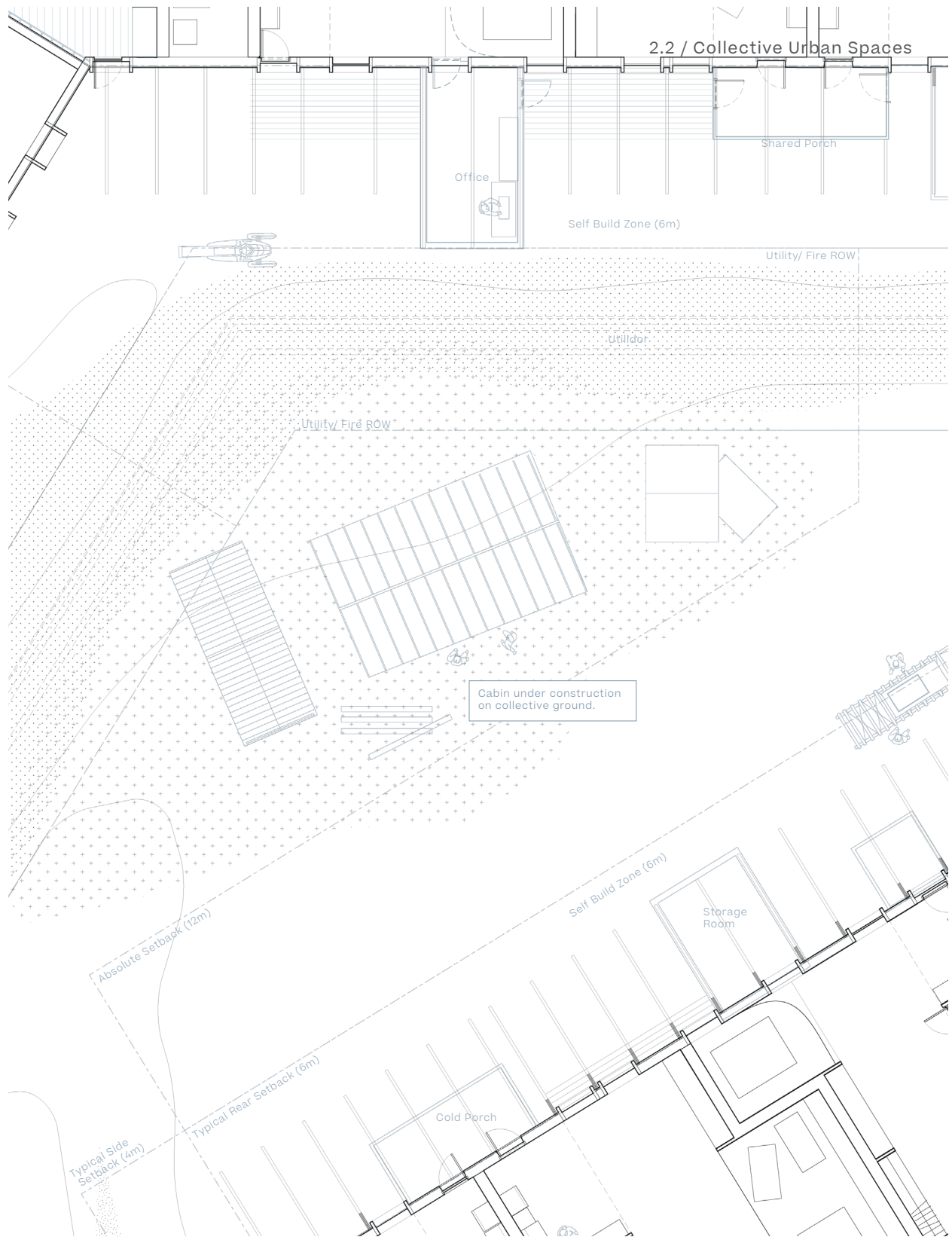


In the urban block, the **Bent Plex** generates shared collective spaces that connect the domestic interiors of housing to the wider territory and landscape.

f 3.14 Bending the plex. Breaking apart building forms on the north is problematic for the integrity of building envelope.

f 3.15 Collective spaces at the centre building clusters creates space for work, recreation and storage.

2.2 / Collective Urban Spaces



On the carpet of gravel fill, where lot separations are blurred by travel routes in the town, *walls* are the primary architectural element that separate public and private space in the town. The independence of the nuclear family household is marked by its walls. However, the sharing economy of extended families and kinships through the town treat public and private space differently. Walls need to be both impermeable to the harsh environment without breaking the shared connections to community and the land. Large corrugations on the cladding and doors on the exterior provide anchors for shared porches, additions and storage without modifying the structure, insulation or water barrier owned by the NHC.

Residents are then able to determine and expand spaces over time according to specific needs. Each house responds to hundreds of square kilometres charted through hunting and travelling on the land. The façade receives qamutik, cabins and tent frames that are pulled out to the Maguse Lake through the winter.

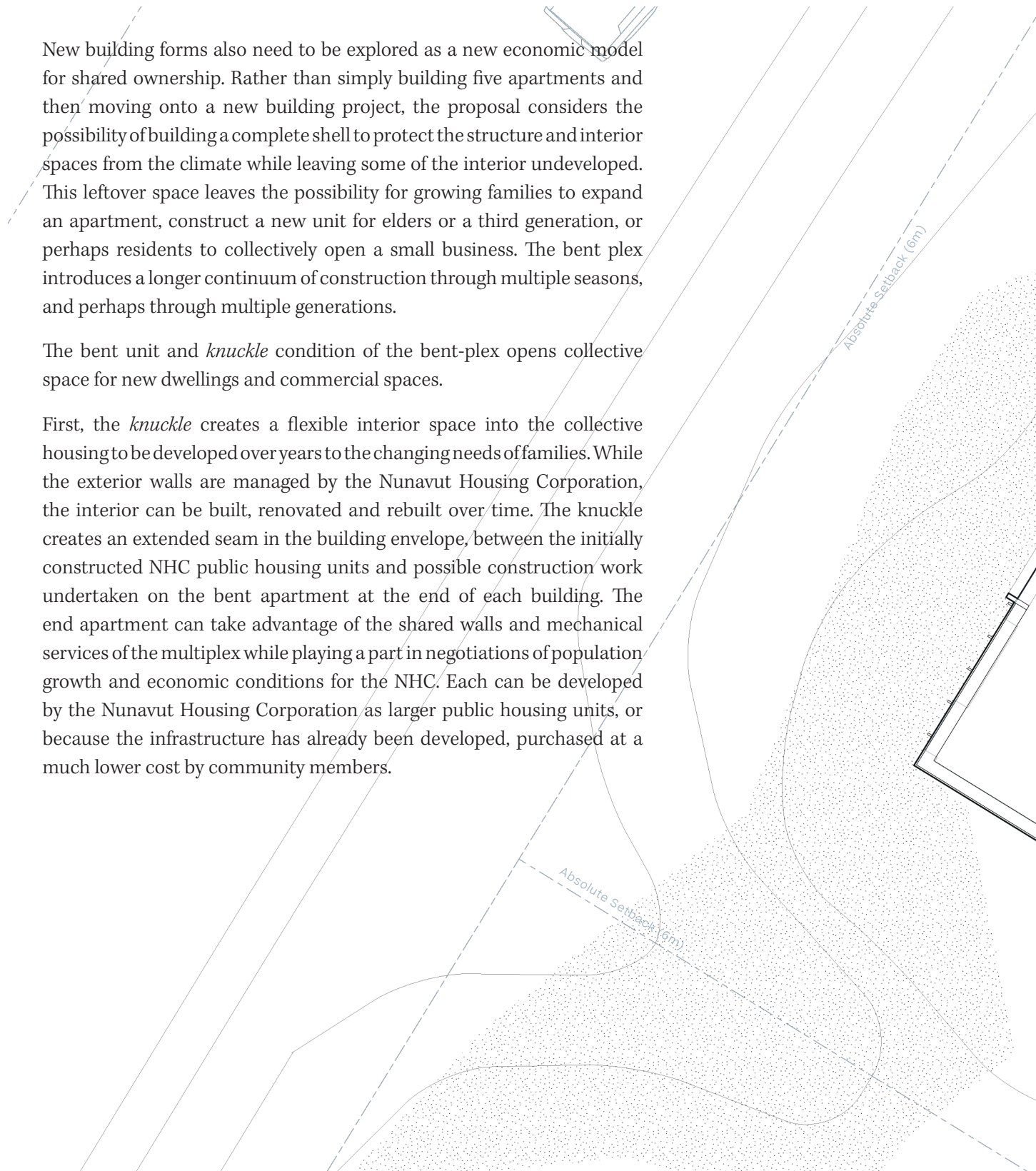


f 3.16 The sheds and cabins constructed and stored on the facade are pulled out onto the land to camp sites.

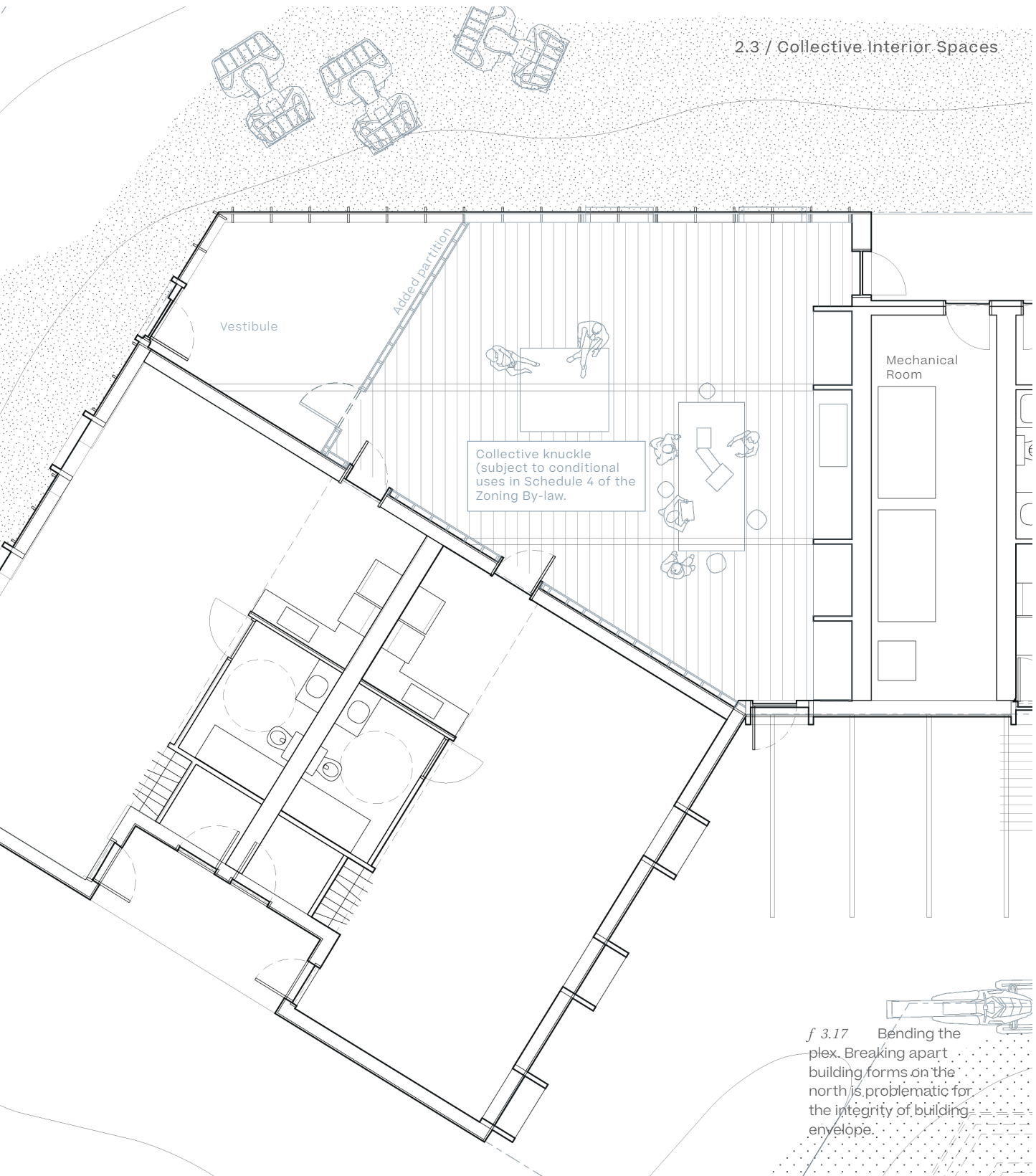
New building forms also need to be explored as a new economic model for shared ownership. Rather than simply building five apartments and then moving onto a new building project, the proposal considers the possibility of building a complete shell to protect the structure and interior spaces from the climate while leaving some of the interior undeveloped. This leftover space leaves the possibility for growing families to expand an apartment, construct a new unit for elders or a third generation, or perhaps residents to collectively open a small business. The bent plex introduces a longer continuum of construction through multiple seasons, and perhaps through multiple generations.

The bent unit and *knuckle* condition of the bent-plex opens collective space for new dwellings and commercial spaces.

First, the *knuckle* creates a flexible interior space into the collective housing to be developed over years to the changing needs of families. While the exterior walls are managed by the Nunavut Housing Corporation, the interior can be built, renovated and rebuilt over time. The knuckle creates an extended seam in the building envelope, between the initially constructed NHC public housing units and possible construction work undertaken on the bent apartment at the end of each building. The end apartment can take advantage of the shared walls and mechanical services of the multiplex while playing a part in negotiations of population growth and economic conditions for the NHC. Each can be developed by the Nunavut Housing Corporation as larger public housing units, or because the infrastructure has already been developed, purchased at a much lower cost by community members.



2.3 / Collective Interior Spaces



In the interior, a hierarchy of fixed and adaptable walls, from the fixed structural party walls between apartments to the partition stud walls that can be removed, expanded or modified. The large shear walls which stabilize the structure on the shifting land are collective armatures that organize sleeping alcoves from the large common spaces without carving up the bright interiors with partition walls. Within the large spaces, separations can be made according to the needs of residents.





Develop-able parcel for changing social / economic conditions of residents

Collective interior space

Typical Front Setback (6m)

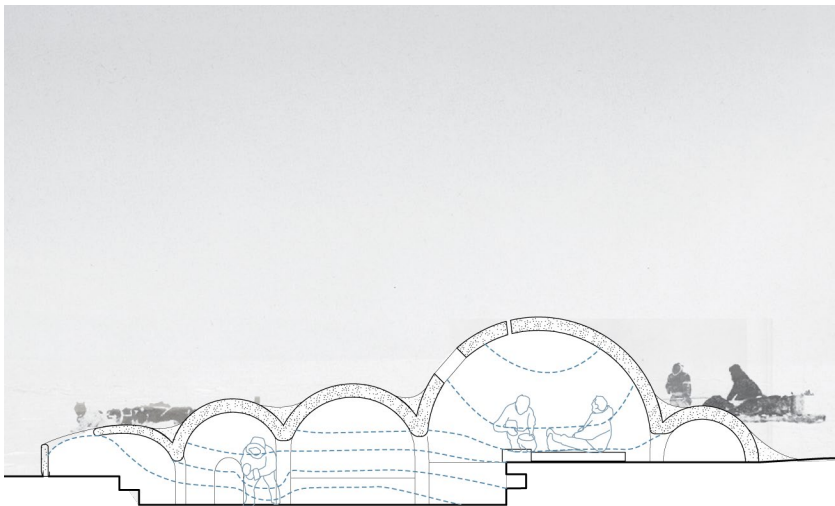
f 3.18 Both facade and party walls are collective armatures of space, framing different spaces and anchoring modifications.

New Grounds 3 / Housing on Thermal Ground

The line drawn across the geological section, demarcating stable, frozen permafrost from the changing environment in the arctic is continuously shifting. The weather and climate collude in the depths of geological formations to generate a landscape of unprecedented fluidity. Buildings need to be constructed in a loose relationship to the shifting ground, able to respond to the dramatic thermal changes through the seasons.

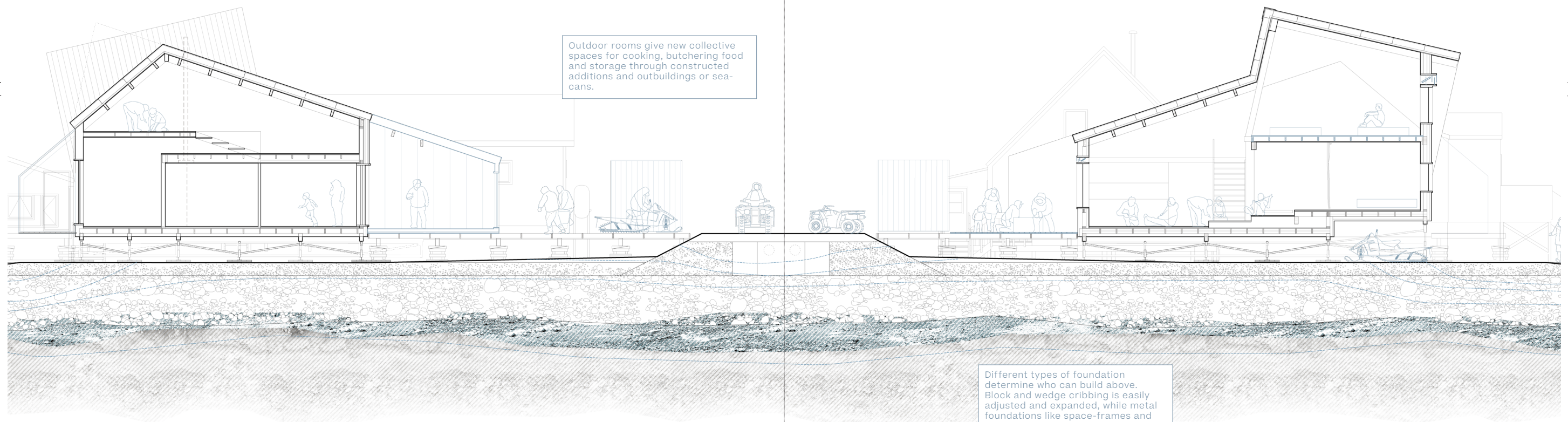
Thermal gradients ultimately organize life in the north, and from *iglu* to skin tents, the traditional architecture of Inuit used a variety of envelope types, foundation systems and the building section to generate micro-climates. For example, micro-climates were produced in the interiors of iglu through the entry tunnel to the sleeping platform by excavating a cold trap around storage spaces and then elevating the sleeping platform in order to survive the extreme temperatures of the arctic winter.

New houses need to address the warming air of impacting the ground in the community. Substructure is the architectural element that insulates the fixed form of the multi-plex houses above from the continuously changing ground below. The spaceframes, screw jacks or block and wedge foundations are continuously adjusted for differential settlement of the ground. The proposal explores substructures might be seen as an extension of the thermal ground.



f 3.20 Inuit constructed interior micro-climates in iglu with excavations and domes.

f 3.19 Thermal ground block section (see foldout).



Outdoor rooms give new collective spaces for cooking, butchering food and storage through constructed additions and outbuildings or sea-cans.

Stepped platforms and mezzanines allow domestic and work spaces to respond to the changing thermal gradients through seasons.

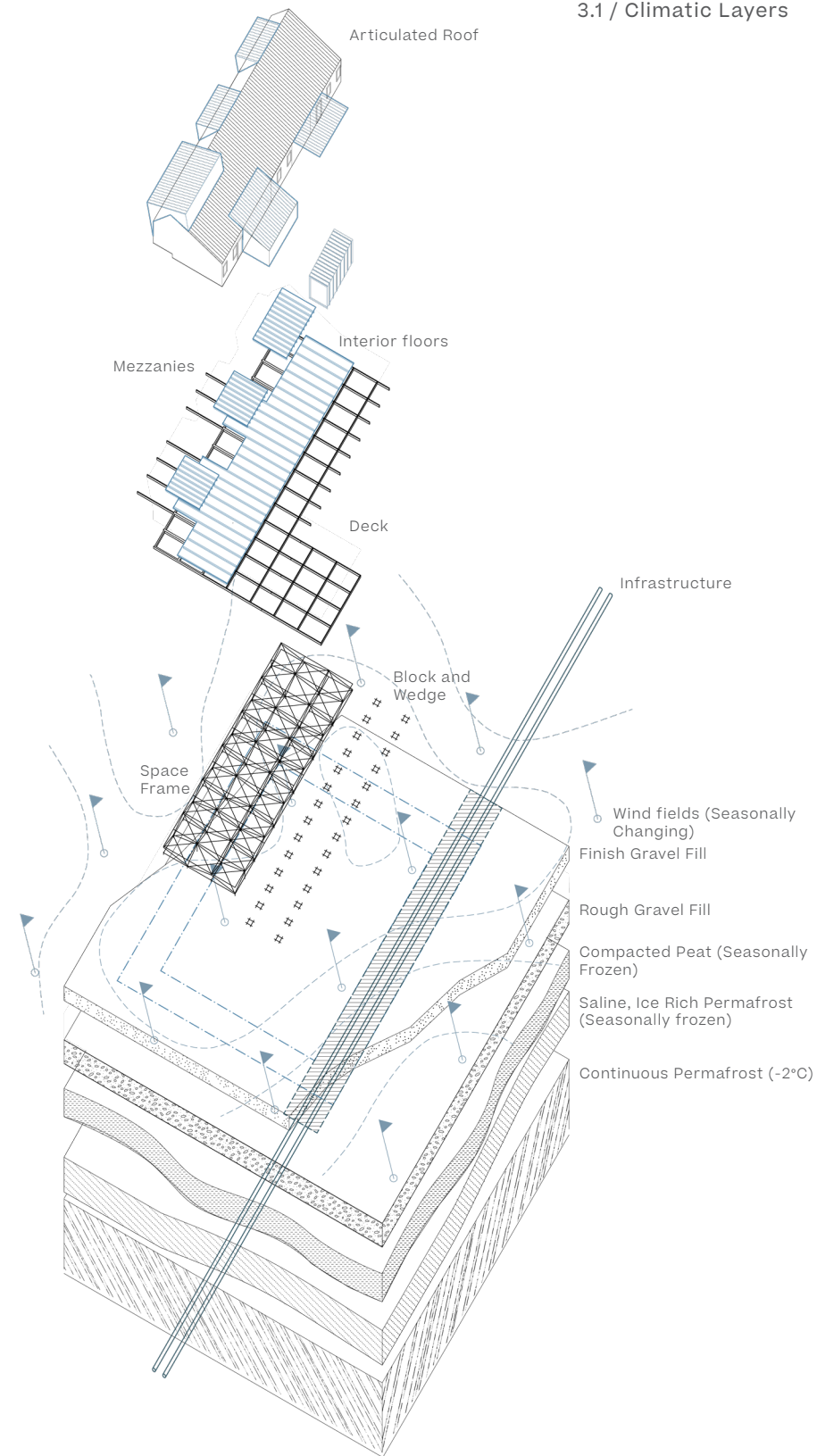
Different types of foundation determine who can build above. Block and wedge cribbing is easily adjusted and expanded, while metal foundations like space-frames and screw-jacks require an engineer's stamp.

3.1 / Climatic Layers

The barrack/shed type house does not address the two unique collective grounds in the community: the functional services and street addresses of the town, and the social-cultural spaces of collective ground.

The barrack/shed type house does not address the two unique collective grounds in the community: the functional services and street addresses of the town, and the social-cultural spaces of collective ground.

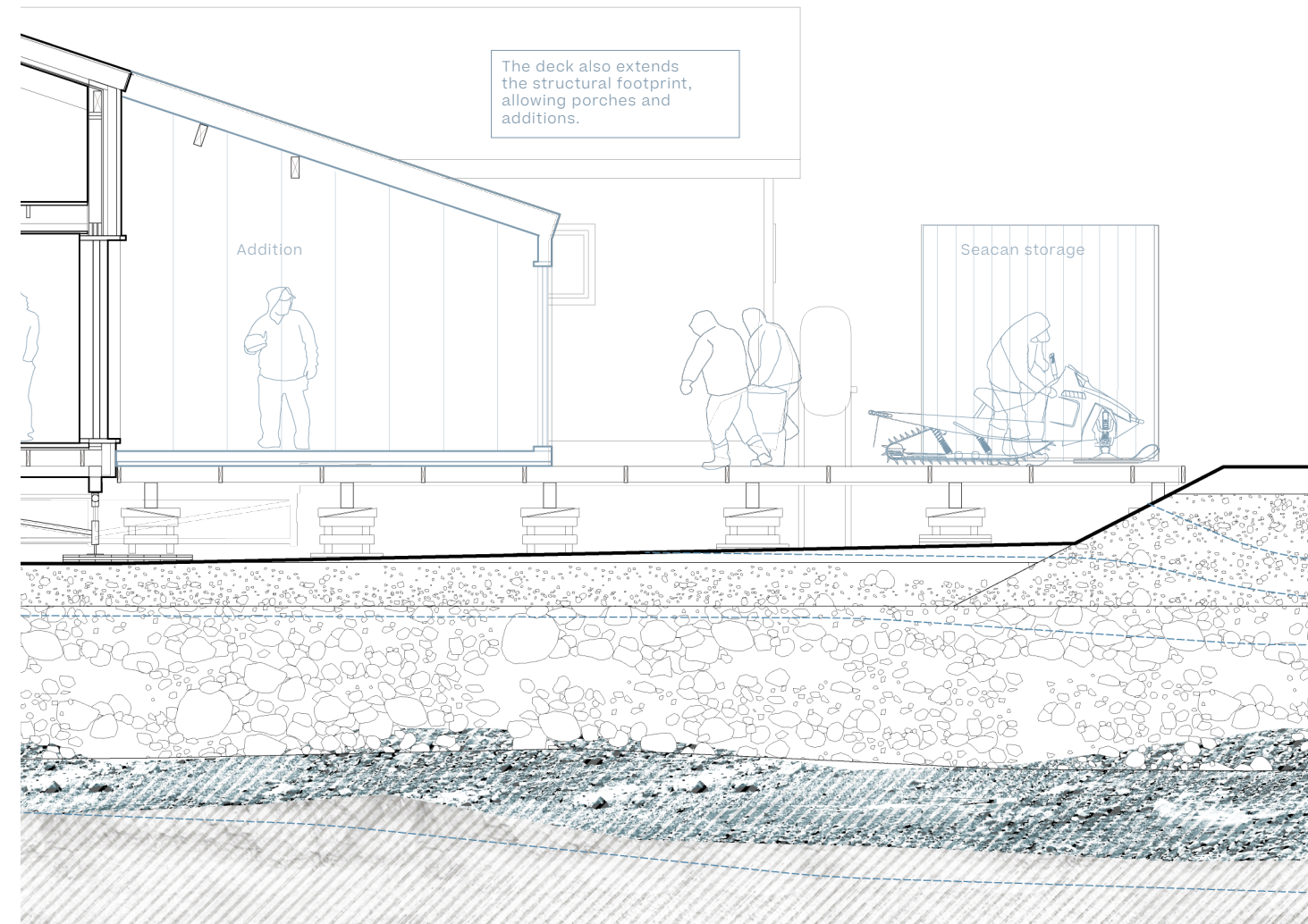
The barrack/shed type house does not address the two unique collective grounds in the community: the functional services and street addresses of the town, and the social-cultural spaces of collective ground.



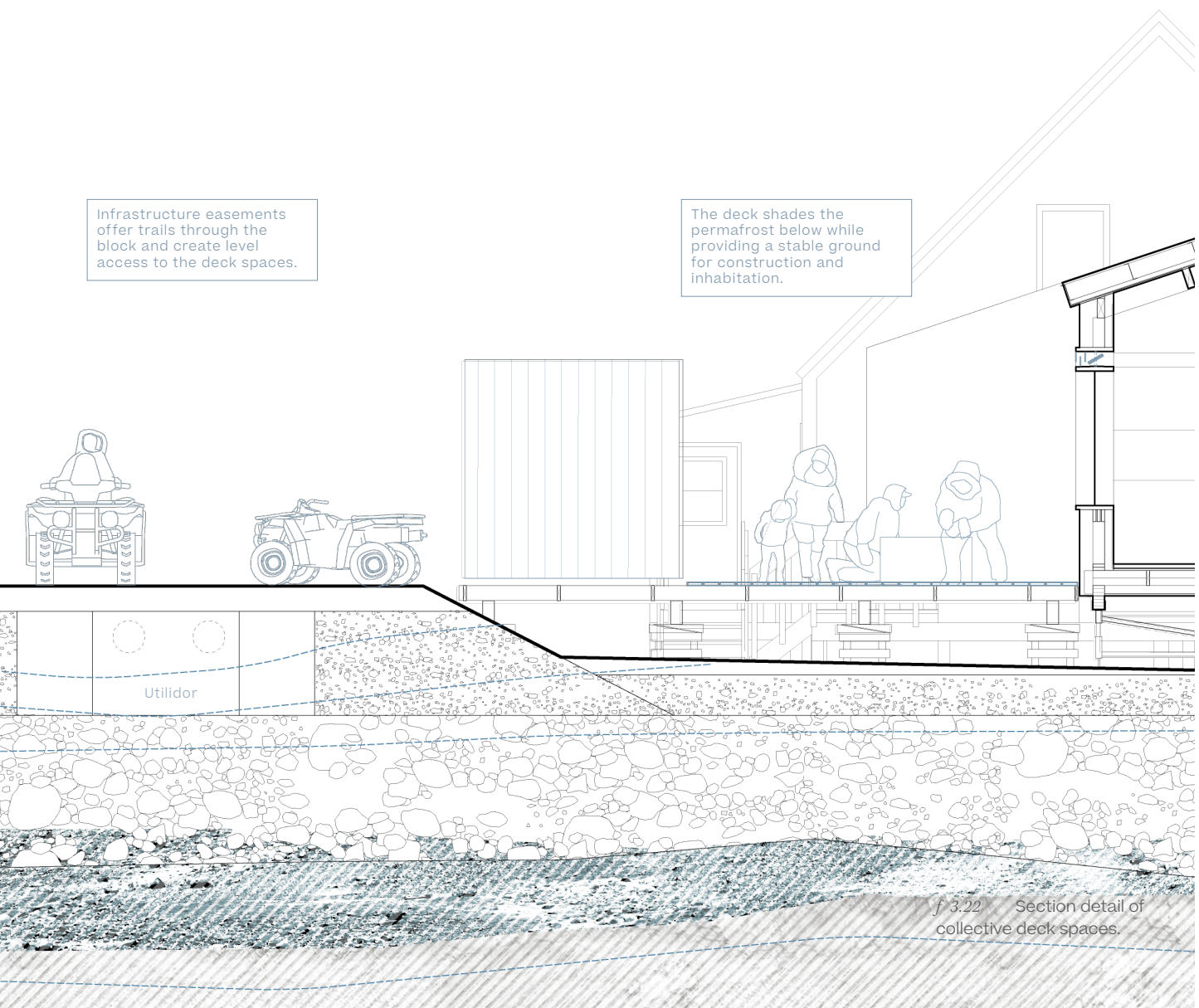
f 3.21 Layers of thermal ground.

On the thin layer of fill, the deck, and its adjustable foundations create a stable building platform on the changing geological economic and social grounds of the land. Presently, publicly managed ground ends on the surface of the finished fill layer, where dimension lumber footings are set, and on which the substructure will be constructed, and then soon a new five plex above.

Presently, substructures are only constructed if completed domestic spaces will be built above. Construction projects by the Nunavut Housing Corporation, within the context of a housing crisis, are limited to spaces that will immediately be occupied. By building extra deck, the possibility for new construction in the town becomes possible. When the platform and foundations, which exist in all northern housing, are separated from the determined building envelope of a Five-plex is an incredibly flexible construction system. The platform, as building site, establishes the possibility for residents to expand, modify and inhabit new ground, while still adapting to shifting ground below.

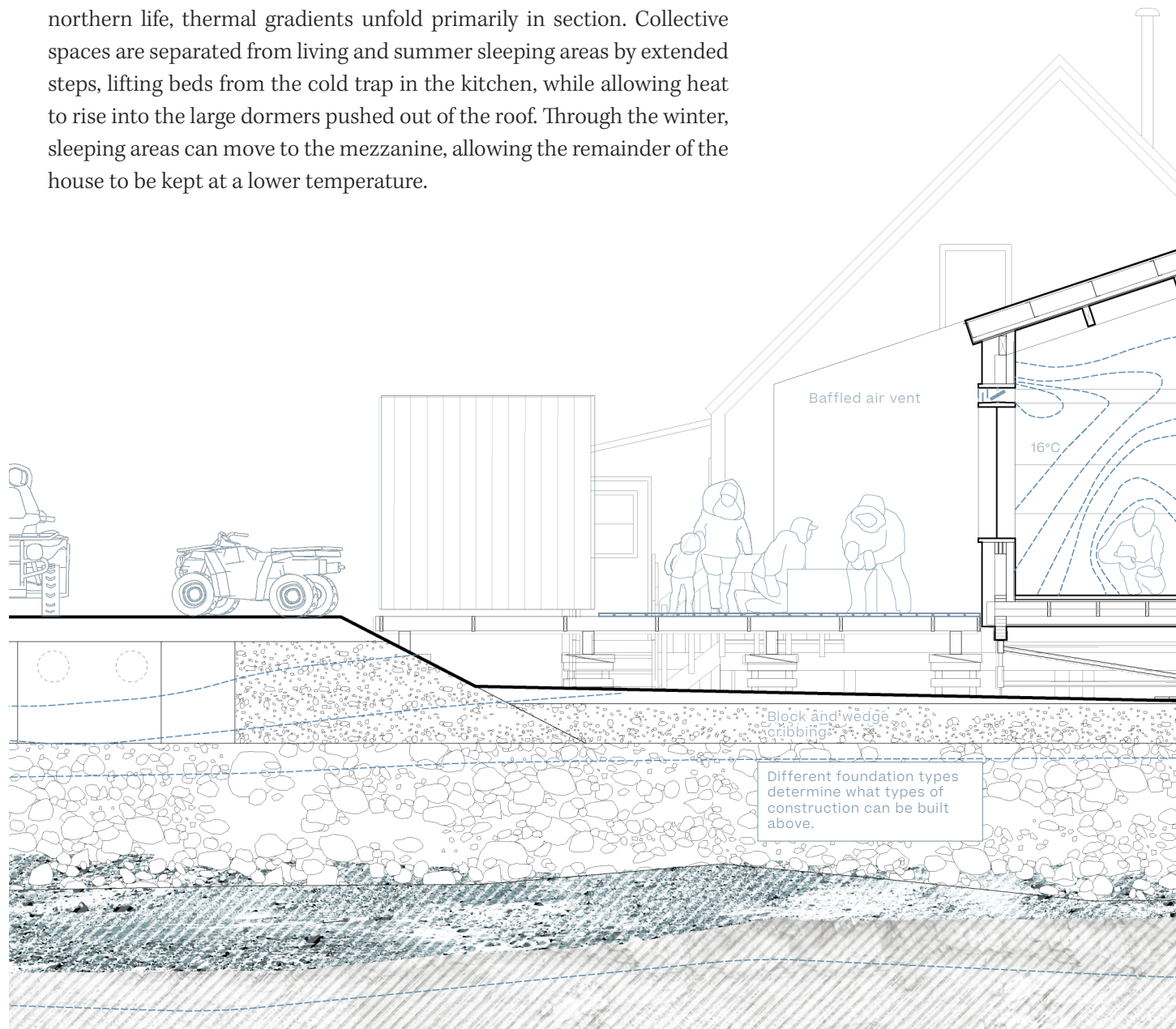


3.1 / Adaptable Substructures



The modern buildings of the town insulate the thermal flux of the environment for a mechanically controlled interior temperature of 22°C. In multi-story construction, large temperature gradients can form through stack effect between the ground floor and the roof. While seasonal cycles define life across the land, the seasonal changes also create different thermal environments and uses in interior spaces. The proposal fragments the single floor level of the NHC Five-plex into collective areas for work, elevated living and summer sleeping areas and elevated mezzanines for winter sleeping.

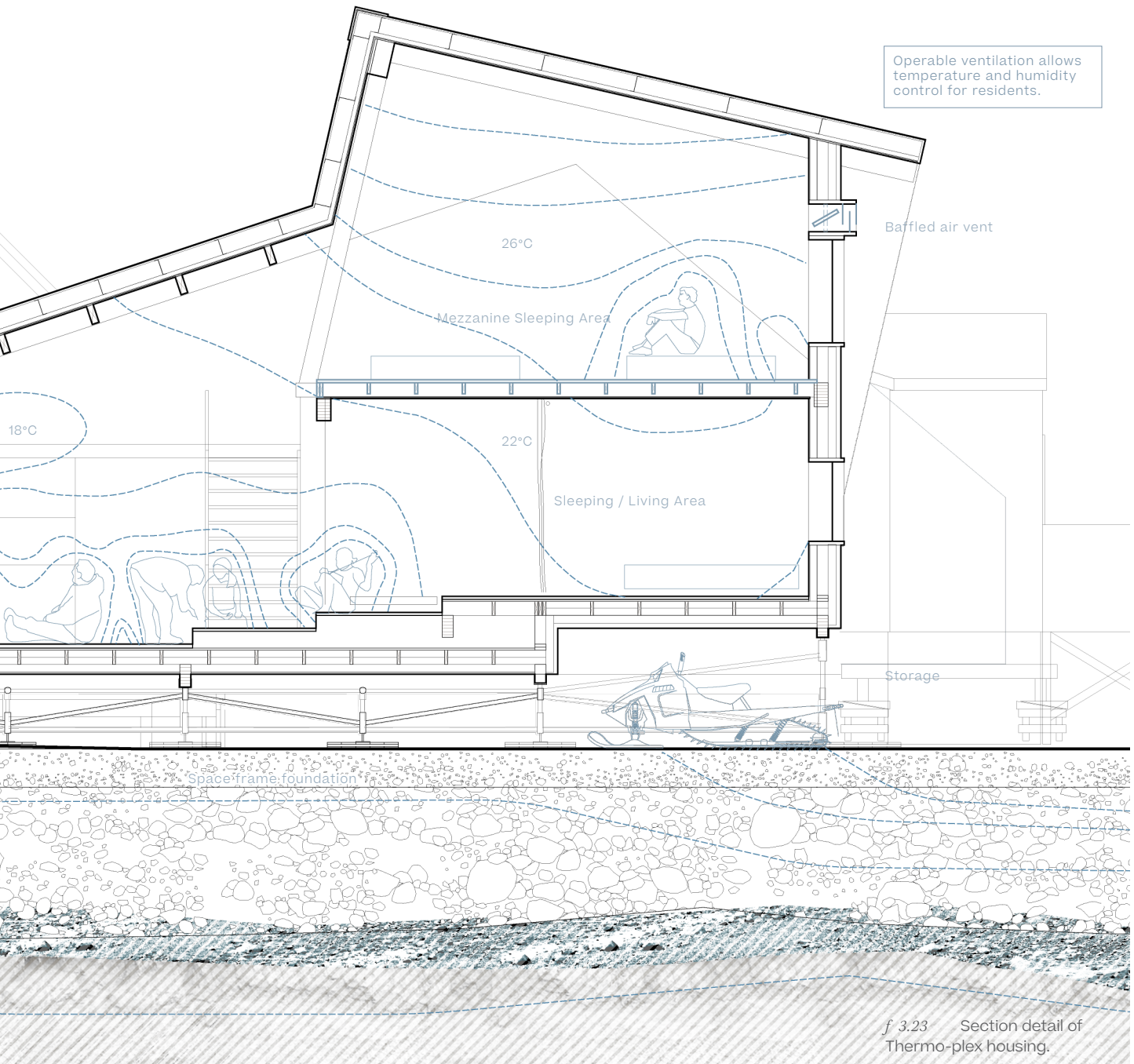
While housing research in the north has largely focused on reconfiguring the plan of housing to better suit the functional requirements of the northern life, thermal gradients unfold primarily in section. Collective spaces are separated from living and summer sleeping areas by extended steps, lifting beds from the cold trap in the kitchen, while allowing heat to rise into the large dormers pushed out of the roof. Through the winter, sleeping areas can move to the mezzanine, allowing the remainder of the house to be kept at a lower temperature.



3.3 / Thermal Gradients

Large dormers take advantage of stack effect to create a warmer mezzanine in the interior.

Operable ventilation allows temperature and humidity control for residents.



The design tactics presented above are a series of negotiations between infrastructure, urban form and the economic uncertainty, changing climate and lived landscape of communities. They represent only the beginning of a necessary reimagination planning and building practices in Arviat in order to work with the concerns and needs of the community.

Amongst other things, this project questions the role design practice can play in reconciliation and self-determination for northern communities. The vast distances across geography and cultures have created a contradictory image of Northern landscapes: held within Canadian cultural identity as a Northern nation but administered as a distant frontier. Inuit communities who call the land home are navigating the imposed territories, social structures and economies in the planned communities across the arctic, revitalizing connections to land, language and culture. The close attunement of Inuit to vibrant relationships between vast ecological and cultural landscapes, dramatically transformed by the changing environment is a unique experience in the North.

To build with the changing Northern ground, the initial endeavour of the thesis, cannot only be an exercise of structural stability and building science. Rather it is a process to be undertaken with Northern communities that balances the urgent technical design work with the authority of communities over the land and spaces they inhabit. On the ground, questioning the tools of design that view, draw and then build on indigenous land is a long process for designers to re-negotiate their responsibilities to Northern ground.

To close the distance between the cultural assumptions that shaped the Northern Vision of the 1950's and 1960's with the legal negotiations of the Nunavut Land Claims Agreement, the obligation of all Canadians to support the Inuit authority needs to be considered through the legacy of buildings and policies impacting the Arctic ground. Anna Tsing's idea of gaps as sites of cultural friction is a useful way for outsiders to understand the physical impacts of sometimes abstract political and cultural projects imposed on the land. Conversations with community members, local housing experts and authorities and government officials revealed a series of sites where residents and local housing authorities attune generic ownership models, foundation types and building envelopes to the environmental, cultural and geological change on the land.

The three design schemes study on one hand the current building practices in the Community Plan and the standard Five-Plex row house while on the other documenting the community driven adaptations to seasonal

rhythms of the land. As architectural negotiations on the ground, the design proposals open established design conventions to three emerging instabilities between buildings and the social-natural land inhabited by communities: the freezing and thawing permafrost, the lived extents and relationships of Northern life and economic uncertainty of property.

The challenge within the thesis is establishing the *scale* and *form* of design schemes that best address the multiple and often contesting rates of change in the community and environment. Scales such as the *masterplan* or the *house* commonly employed by designers have a history of imposing totalizing visions in the Territory. They translate the building codes and zoning schedules developed in the urban forms of Southern Canada that do not address the uniquely unstable ground conditions in the North.

The idea of *unplanning*, or a series of design tactics, was inspired by the building projects undertaken by individuals and family groups to construct camps on the land, adapt buildings to the environment and maintain traditional trail infrastructures in the marginal spaces of the Community Plan. A series of common tactics shared throughout the community individually responded to specific ground conditions, material limitations and environmental factors. Where the scope of informal projects in the community were limited by regulated setbacks, area limitations and ownership on the ground, the design proposals look back to renegotiate the strictures themselves to begin unplanning the ground.

The design studies remain as theoretical proposals, or possible architectural negotiations with the community, limited by the reality that much of the design work was undertaken in Waterloo, away from Arviat. Despite the extensive site research, and two periods of community-based work, there remains in this project the tension between the authority of designers and researchers and Northern communities. The ways of working on, building models of and designing for the collective ground in Arviat sought to re-negotiate how the site of a project is constructed on the ground, but the sites of design practice themselves need to be returned to the north.

The principle of *aajiiqatigiingniq*, collective work to address challenges, is the principle used by Inuit to adapt as a community to their environment. Arviat elder Rhoda Karetak describes the principle as an important part of healing the brutal history of colonization by all who work and research in Inuit Nunangat.¹ Sustained and committed participation

of designers, community members and policy makers is necessary to address the questions raised through this project. It is my responsibility to the community to continue this project, back to Arviat to continue the conversations of the preceding semesters and chapters.

Architects have long been fascinated by building in the remote, frozen landscapes of the Canadian Arctic as a landscape for speculation: housing prototypes, new town plans and utopian visions have often been at the expense of indigenous Northerners. The process of *unsettling ground* is necessarily difficult because it challenges architecture and planning practices, motivations and attitudes towards the land, but is a significant and necessary step towards reconciliation and supporting self-determination of Inuit communities and individuals.

The discourse around architectural practice on indigenous land is indeed changing within Canada, but abstract and larger scale material procurement methods, housing policies and land ownership across Nunavut continue to shape the form of housing at the territorial scale. Moreover, the National Building Code, written to generalize the vast and varied territory of Canada regulates construction in the extreme weather and unique culture of the North. Even as the community of Arviat researches more culturally attuned housing at the scale of individual units, new houses are subject to current funding, ownership and construction models as the housing crisis in Nunavut worsens. Opportunities for further research on the part of qallunaat is to continue deconstructing the institutional and regulatory grounding of design practice and building in the North

It is not the expectation that the design studies presented in this project are applied to all communities in Nunavut. The studies emerged from work specifically with the community of Arviat, informed by specific relationships with community members over the course of the project. The concerns of communities across the Canadian North are as diverse as the land each calls home. Certainly, challenges around housing shortages, climatic change and economic development are shared by many communities, but the responses to these challenges need to be developed specifically on the ground, perhaps in individual communities, across a region, or around specific landscapes (see Tallurutiup Imanga example on page xxvi).

While this thesis begins a process of questioning architectural practice by focusing on Nuna and territory, it is important to remember that Inuit spaces are the concern of Inuit alone. The responsibilities of designers

needs to be grounded in a conscious understanding of the wants and needs of communities specifically in order to ally themselves with Inuit authority on the land. While design disciplines are not directly named by Qikiqtani Truth Commission nor the Truth and Reconciliation Commission of Canada, the history of architecture and planning on Indigenous lands compels designers to reimagine how design is practiced. As southern architects and planners open their practices to the intimate knowledge and stories of place in the north, the new awareness of the land needs to create opportunities and space for indigenous voices in design practice.²

The authority on what, why, and how a building is sited in the community is gaining volume. All of this adds up to a counter-map to the default tools, codes and conventions of making space in the Canadian North. The knowledge already presents in the community to build, to read and to travel across the ground anchors the otherwise anonymous spaces to a sense of place on the land. The work indigenous designers such as Harriet Burdett-Moulton in Iqaluit are among many who are re-centering the canon of Euro-Canadian architecture in design practices that focus on traditional and contemporary notions of vernacular and community-building.

It is incumbent on contemporary architectural practices in Canada to reconsider the theoretical grounding they share with territory, community and land. Local housing associations and community members are engaged in the ongoing project retrofitting the anonymously designed and constructed buildings of government housing through the past 50 years on Inuit Nunangat. When so many of the modern spaces of the North are engaged in this tension, the challenge to designers and researchers are to question how community agency can drive building on the land, such that design practice can be an ally to indigenous self-determination.

Endnotes - Epilogue

¹ Rhoda Akpalaliapik Karetak, 'Healing Unresolved Issues,' *Inuit Qaujimagatuqangit: What Inuit Have Always Known to Be True* (Halifax and Winnipeg: Fernwood Publishing: 2017), 200-201.

² Sandra Inuitiq, *Dear Qallunaat: Racism, Public Government and Inuit Nunanga* Yellowhead Institute, February 2019, accessed: <https://yellowheadinstitute.org/2019/02/07/dear-qallunaat/> (March 1, 2019).

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