

Reclaiming Material, Space, and Agency:
Developing a Circular Construction Framework
for Housing in Iqaluit, Nunavut

by

Tyler MacDonald

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Architecture (M.Arch)

The Faculty of Graduate Studies
Laurentian University
Sudbury, Ontario, Canada

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THESIS DEFENCE COMMITTEE/COMITÉ DE SOUTENANCE DE THÈSE
Laurentian University/Université Laurentienne
Office of Graduate Studies/Bureau des études supérieures

Title of Thesis Titre de la thèse	Reclaiming Material, Space, and Agency: Developing a Circular Construction Framework for Housing in Iqaluit, Nunavut		
Name of Candidate Nom du candidat	MacDonald, Tyler		
Degree Diplôme	Master of Architecture (M.Arch)		
Department/Program Département/Programme	Architecture	Date of Defence Date de la soutenance	April 11, 2022

APPROVED/APPROUVÉ

Thesis Examiners/Examineurs de thèse:

Terrance Galvin
(Thesis Advisor / Directeur(trice) de thèse)

Roch Bélair
(Thesis Second Reader / Deuxième lecteur(trice) de thèse)

Menna Agha
(External Examiner / Examineur(trice) externe)

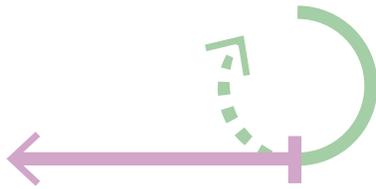
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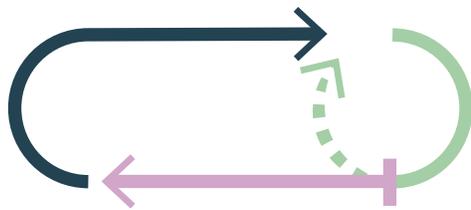
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Traditional



Colonial



Circular



Decolonize

Abstract

Figure 1: A series of circular concept diagrams which represent stages of circularity previously practiced by Inuit culture, currently colonial practices and circular practices proposed in this thesis.

Prior to the introduction of a settler-colonial structure, Inuit moved lightly across the land. The Inuit seasonal, semi-nomadic dwellings and traditional knowledge: *Inuit Qaujimagatuqangit (IQ)* allowed their culture to live in harmony with the land. The current identity, housing and climate crises are causing social and physical states of vulnerability across the Territory of Nunavut. The growing obsolescence of the housing stock and remote location represents a potential opportunity to create a deconstruction economy that can generate a cyclical construction framework to reclaim the material, space and agency occupied by the current colonial housing system. A ReStore/Redesign program will be proposed in the capital city of Iqaluit that will facilitate the use of reclaimed material with the community in an effort to move towards a decolonized housing system that places more agency on the local community.

Keywords:

circular economy, deconstruction, spatial agency, Inuit, housing.

Acknowledgments

I would first like to take this opportunity to thank all of my family, friends, past and present colleagues for their support and guidance prior to the beginnings of this thesis project. I would not have been able to get to this point personally or professionally without the encouragement of everyone along the way.

The completion of this thesis project has hinged on the love and support of my wife, Jessamyn and our young family. It goes without saying that I would not be here if it wasn't for their patience and timely words of encouragement. I would also like to thank my examining board, advisor Dr. Terrance Galvin, second reader Roch Belair and external examiner Dr. Menna Agha for their guidance in shaping and reshaping my thesis tackling this sensitive topic. I would also like to thank Tim Brown from Nunavut Tunngavik Incorporated for taking the time to discuss the challenges involved in providing and advocating for housing in Nunavut as well as the folks at Habitat Restore for their time and information regarding their operations. I would also like to thank all of my current and former classmates at McEwen, especially Braeden Martel and Andrei Nemes, for their support and much needed banter over the years.

Thank-you!

Land Acknowledgment

Nunavut, meaning 'Our Land' is an acknowledgement in itself; The creation of the Territory of Nunavut in 1999 is also a political acknowledgement that Inuit have always been, and always will be the caretakers of their vast land.¹

I would like to acknowledge that the following research and proposal was conducted as a settler scholar and takes place on the land traditionally inhabited by Inuit, currently known as Nunavut. The proposed framework and accompanying interventions are located in the Qikiqtaaluk Region and the capital of Nunavut, Iqaluit meaning place of many fish.

¹ *Nunavut Land Acknowledgement*, Christine TooToo. <https://www.youtube.com/watch?v=z7a45ZDACm4>.

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Preface

In January of 2015 after completing the Architectural Engineering Technician program at the Nova Scotia Community College in the spring of 2014 I had the opportunity to move to Iqaluit, Nunavut to accept a job at a local architectural firm. I flew into Iqaluit on a cold January day with no sense of the place or the people yet I found myself sitting in front of a computer 30mins after landing, drafting a housing project for the Nunavut Housing Corporation. During my time living and working in Iqaluit, I started to see apparent disconnects between the local, Inuit population and the built-environment. Our design process was very internalized as the majority of our clients were residential and commercial developers. My experience in Iqaluit, which has been an integral part of the person I am today led me to pursue my Master of Architecture degree at the McEwen School of Architecture in Sudbury. McEwen's tricultural mandate and focus on community was an important aspect of my decision to study in Sudbury and led to a series of projects and research throughout my six years that were grounded in my experience in Iqaluit.

Beginning my thesis year, I felt it was necessary to continue my work in the arctic context and circle back to that first day working in Iqaluit and allocate the knowledge and skills I've gained at McEwen to think about the Nunavut Housing Crisis with a new perspective. There have been many adjustments and deviations from my early intentions of my thesis project but the main goal was to rethink the role of designers and architects providing housing in the arctic. I initially intended to survey and include a panel of community members to develop a set of design principles for housing but I was unable to overcome the requirements to include community members in my thesis. I ended up having to adjust my approach and began thinking about the lack of local construction materials in the far north. Sustainable design practices as well as traditional practices are developed using local materials but what if there are next to no local materials that can be utilized? This led me to look at the existing built environment as a potential to provide affordable, 'local' material that already has carbon imbedded from being shipped so far north. The direction taken towards reclaimed material led to a series of program developments and a system that not only proposes to reclaim materials through a restore and deconstruction economy but to cautiously select materials being sent to the arctic to ensure that materials can sustain multiple lifecycles. Another key aspect that slowly developed and, in the end, completely shaped my thesis project was spatial agency. This was a new yet immediately understood term for me following my mid-review which allowed me to clearly connect the dots between my research and the proposed system. The various levels of spatial agency found in traditional and current informal and formal dwelling practices

led to the resulting systematic structure and supporting housing potentials. The proposed circular construction framework is intended to address the growing concerns surrounding the current housing stock by incrementally reclaiming the current colonial housing system in an effort to empower the local community to generate their own decolonized housing system.

“The challenge of equitable and affordable housing access will not be addressed through bricks and mortar alone, but will be systems based. Until we recognize that current conditions are an intentional outcome of policies and programs, we will never be able to truly address these challenges. But this is the good part, as designers the built environment is our tool to make these invisible systems visible; it’s the platform in which we could imagine internal potential futures.”

-Rural Studio



Introduction

At one point in time, the Inuit of the Canadian Arctic lived lightly on the land.¹ The Inuit lifestyle and nomadic dwellings were a representation of their connection and harmony with the land and all living things. The light and sensitive dwellings used local materials such as snow, rock, and various animal bones and skins; these dwellings were crafted from generations of traditional knowledge, known as *Inuit Qaujimagatuqangit* or IQ, which was passed down by elders. This knowledge not only allowed the semi-nomadic culture to live off the land and survive but to thrive in the harsh Arctic environment.² This sustainable and sensitive lifestyle began to shift after European contact; one of the earliest contacts being a whaling industry followed by a series of trading posts, missionaries, and federal government programs that were the beginnings of a settler-colonial structure. This series of foreign social and physical structures introduced a cash economy, altering forms of education, dwelling permanence and in turn altering the identity of the now vulnerable Inuit population.³

Along with an identity crisis, the settler-colonial structure altered the Inuit dwelling process, which has generated a severe housing crisis across the Territory of Nunavut. The permanent settlements were the result of the trading posts influencing a shift away from subsistence hunting towards more cash dependent goods and services. Due to this influence of foreign goods and materials, Inuit started to cluster around trading posts and construction sites by constructing hybrid, make-shift dwellings from reclaimed material. The federal government responded by permanently relocating Inuit into settlements and implemented several government housing initiatives that had no regard for the environment or culture and depended on the user to pay for and heat these minimally insulated boxes without any prior concept of dwelling permanence or home ownership. The current government housing initiatives have drastically improved but have yet to restore the integral connection between dwelling and user. The identity shift along with the current housing crisis is currently being exacerbated by the climate crisis. The Canadian Arctic has already experienced a temperature increase of at least 1.5°C, which the International Panel on Climate Change (IPCC)

1 Wade Davis, *The Wayfinders: Why Ancient Wisdom Matters in the Modern World* (House of Anansi Press Inc., 2009), 206.

2 Joe Karetak, Frank Tester, and Shirley Tagalik, eds., *Inuit Qaujimagatuqangit: What Inuit Have Always Known To Be True* (Halifax; Winnipeg: Fernwood Publishing, 2017). Introduction.

3 Joe Karetak, Frank Tester, and Shirley Tagalik, eds., *Inuit Qaujimagatuqangit: What Inuit Have Always Known To Be True* (Halifax; Winnipeg: Fernwood Publishing, 2017). Chapter 1, Getting an education.

states will cause drastic effects on natural and human systems.⁴ In *The Right To Be Cold*, Sheila Watt-Cloutier acknowledges that the effects of climate change have and will continue to impact Inuit culture and way of life stating that the culture “is as threatened as the ice itself.”⁵

This thesis is intended to respond to the various crises in Nunavut by capturing the ingenuity of the currently informal dwelling and material agency found in various communities across the Arctic despite the barriers in place. In the thesis, *Building with IQ (Inuit Qaujimagatuqangit): the Rise of a Hybrid Design Tradition in Canada’s Eastern Arctic*, the author Susan Havelka explores the agency of building cold porches, outbuildings, and cabins using a mix of traditional and introduced building practices which has created “a continuous transformative building process.”⁶ Havelka continued this work with Bhatt and Harlander in the book *Blueprint for a Hack: Leveraging Informal Building Practice*, which uncovers these building practices and spatial agency in, around, and between elements of the built environment. This form of occupying space is present in Iqaluit, Nunavut where residents slowly add on to their small single-family dwellings or build a small cabin on the river or down the bay as a second dwelling out on the land, removed from the rigidity of the community. Encouraging this form of building, which brought the family of Sheila Watt-Cloutier “a sense of pride and accomplishment,” requires an increased access to affordable building materials. Due to limited local natural resources, building materials are shipped in seasonally, which increases costs and makes design and construction a challenge. How do you access and source building material in such a remote location? You look internally at the depleted and increasingly obsolete housing stock.

Research Question:

‘
-

How can the agency of informal building practices and material re-sourcing be transferred to more formal housing solutions to provide an alternative housing delivery system?

4 “Climate Change in Nunavut.” Climate Change in Nunavut | Nunavut Climate Change Centre. Accessed March 24, 2022. <https://climatechangenunavut.ca/en/understanding-climate-change/climate-change-nunavut>.

5 Watt-Cloutier, Sheila. *The Right To Be Cold: One Woman’s Story of Protecting Her Culture, the Arctic and the Whole Planet*. Toronto, Ontario, Canada: Allen Lane, 2015. xvi.

6 Havelka. (2018). *Building with IQ (Inuit Qaujimagatuqangit): the Rise of a Hybrid Design Tradition in Canada’s Eastern Arctic*. ProQuest Dissertations Publishing. 237.



The Nunavut Housing Corporation (NHC) provides housing to over 50% of Nunavummiut and relies heavily on federal funding to build, operate, and maintain housing across the territory. The housing shortage has caused severe overcrowding and overuse, leaving much of the housing stock in need of repair and nearing its end of life. Rather than demolishing or completing major renovations on the depleted housing, there is a potential opportunity to reclaim the building material through a deconstruction economy to divert waste and provide access to affordable materials by introducing a Habitat Restore program in Iqaluit, Nunavut. The Restore program will not only provide access to material but help facilitate the creation of space using recycled material with the community to reclaim the space occupied by the deconstructed government housing and in turn reclaim human agency throughout the design, construction, and dwelling processes.

The proposed circular construction framework will include a purpose-built Restore Centre which will manage and restore donated items from the community as well as material from the proposed deconstruction economy. The reclaimed material will be reintroduced into the built environment incrementally; initially through the existing spatial agency in the community and then progressing into small scale reclaimed housing projects which will be facilitated by a Community Collaboration Studio (Co.Studio). The intention of the proposed framework is to incrementally shift the current colonial housing system away from the singular, social housing approach towards a diverse, decolonized housing system designed and built by the community. For the purposes of this thesis, the circular construction framework is demonstrated on an underutilized housing site at the core of the city of Iqaluit. The high-level demonstration represents a series of varying outcomes focus on affordability from this process including an incremental, semi-detached grow home which has been developed in further detail as a potential output of the collaborative, cyclical process. The grow home is not tabled as a housing solution but as a series of potentials to address, affordability, sustainability and spatial agency. The proposed framework is focused on developing local solutions to the housing crisis through capacity building and community involvement via material, space and agency.

Chapter 1:

An Identity Shift: From the Land to Settlements

- 1.1 Nomadic Traditions
- 1.2 Inuit Qaujimajatuqangit (IQ)
- 1.3 An Identity Shift

This chapter summarizes the pre-contact Inuit lifestyle and dwelling practices followed by a detailed description of Inuit epistemology and guiding principles based on the introduction to the book *Inuit Qaujimagatuqangit: What Inuit Have Always Known To Be True*. The post-contact identity shift will be covered and the resulting challenges Inuit continue to suffer living in a settler-colonial structure.





1.1 - Nomadic Traditions

The Inuit of the Canadian Arctic began settling in the Eastern Arctic in 1250 and lived a semi-nomadic lifestyle up until the early 1900s.⁷ During this time period, Inuit responded to their harsh environment through oral teachings of survival from their elders. Traditional knowledge of the land was critical because they relied heavily on seasonal game and subsistence hunting was essential to continue to eat, dwell, stay warm, and keep their hunting and gathering practices. This detailed knowledge of the land, animals, and weather patterns was not the only knowledge passed down by elders through generations; Inuit social order was also a form of traditional knowledge. The Inuit social order provided by elders was key to remaining balanced in all aspects of life including family hardships and was crucial to teaching and guiding in the present and for the future. This traditional knowledge of the physical and social environment and the ingenuity of the traditional practices are the reasons Inuit were able to survive and thrive sustainably in such harsh Arctic conditions.⁸

For Inuit to live a sustainable nomadic lifestyle, their dwellings needed to respond to the same level of permanence as their seasonal practices. The seasonal nomadic structures varied across the Arctic but the most common structures were the *illiq/igliq* (igloo), *qarmaq* (semi-subterranean house), and *tupiq* (tent). Igloos were quickly constructed in clusters on the winter hunting grounds allowing occupants to gather and socialize during the long, dark winters.⁹ The most important aspect of igloo construction beyond its nomadic capabilities was its ability to hold heat and passively keep occupants warm by capturing their body heat inside the thick snow-block walls. The *qarmaq* and *tupiq* were constructed similarly, using a bone or wood structure with seal and/or caribou hides lashed together and draped over the structural frame. The *qarmaq*, is a subterranean structure that was used in transitional seasons and the *tupiq* used large rocks around the perimeter to secure the light structure to the land. These transitional and summer dwellings were purposely light and transportable; in contrast to the winter months, families split up for the hunting season and “moved lightly across the land.”¹⁰ All of the seasonal structures came directly from their environ-

7 Sheppard, Lola, and Mason White, eds. *Many Norths: Spatial Practice in a Polar Territory*. New York: Actar Publishers, 2017. 20-21.

8 Wade Davis, *The Wayfinders: Why Ancient Wisdom Matters in the Modern World* (House of Anansi Press Inc., 2009). 205

9 Sheppard, Lola, and Mason White, eds. *Many Norths: Spatial Practice in a Polar Territory*. New York: Actar Publishers, 2017.144.

10 Wade Davis, *The Wayfinders: Why Ancient Wisdom Matters in the Modern World* (House of Anansi Press Inc., 2009), 206.

ment and from a zero-waste mentality and are examples of the Inuit's harmonious lifestyle with all living things.¹¹

The harmony and balance that Inuit have developed with their environment is due to the respect and love they have for the ecology and animals of the place. American author of *This Cold Heaven*, Gretel Ehrlich states that for Inuit to live “they must kill the things they most love. Blood on the ice is not a sign of death but an affirmation of life.”¹² This quote represents a world-view that immensely values what is used and consumed; when Inuit harvest an animal, “nothing is ever wasted.”¹³ In addition to not wasting any portion of a seal or caribou, including skins to make clothing or bones to make tools, the harvest is also shared among others in the community to ensure that such a valuable resource provides for multiple families. This worldview in which resources and materials are highly valued is a lesson for the current wasteful and consumer-driven lifestyle present in the south and in modern Inuit communities today.

1.2 - Inuit Qaujimajatuqangit (IQ)

The harmonious lifestyle that the Inuit lived for generations was guided by their elders and an “ethical framework”¹⁴ known today as *Inuit Qaujimajatuqangit* or IQ. This set of principles and overall outlook on living an interconnected life is based on the four *maligarjuat* (big things that must be followed):¹⁵

1. Working for the common good and not being motivated by personal interest or gain.
2. Living in respectful relationships with every person and thing that one encounters.
3. Maintaining harmony and balance.
4. Planning and preparing for the future.

11 Joe Karetak, Frank Tester, and Shirley Tagalik, eds., *Inuit Qaujimajatuqangit: What Inuit Have Always Known to Be True* (Halifax; Winnipeg: Fernwood Publishing, 2017). Introduction.

12 Wade Davis, *The Wayfinders: Why Ancient Wisdom Matters in the Modern World* (House of Anansi Press Inc., 2009), 210.

13 Joe Karetak, Frank Tester, and Shirley Tagalik, eds., *Inuit Qaujimajatuqangit: What Inuit Have Always Known to Be True* (Halifax; Winnipeg: Fernwood Publishing, 2017). Harvesting and Preparing Meat.

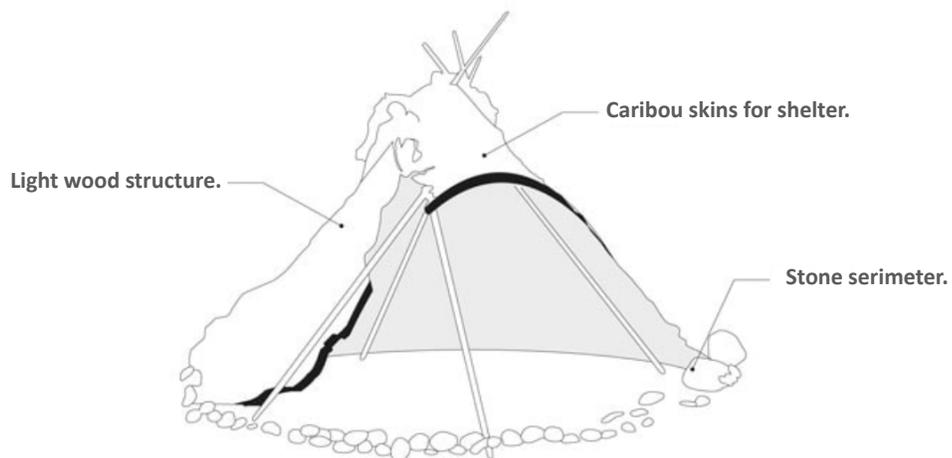
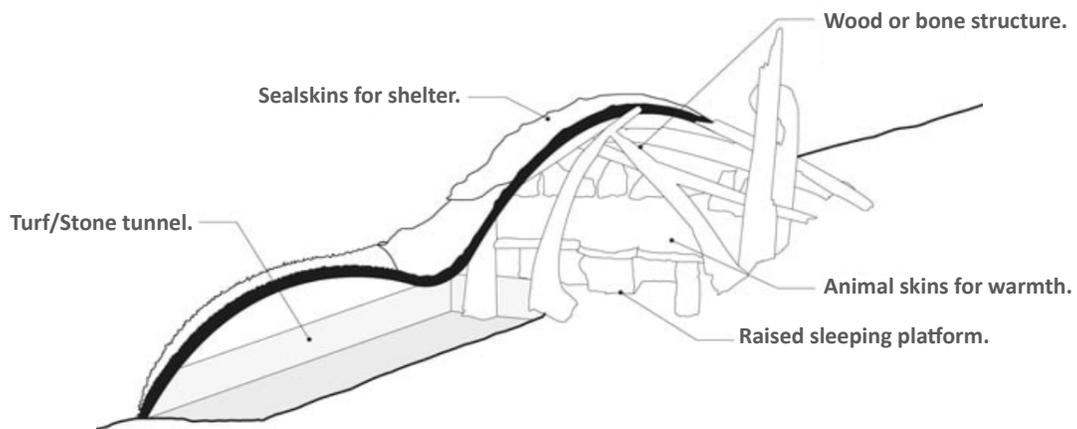
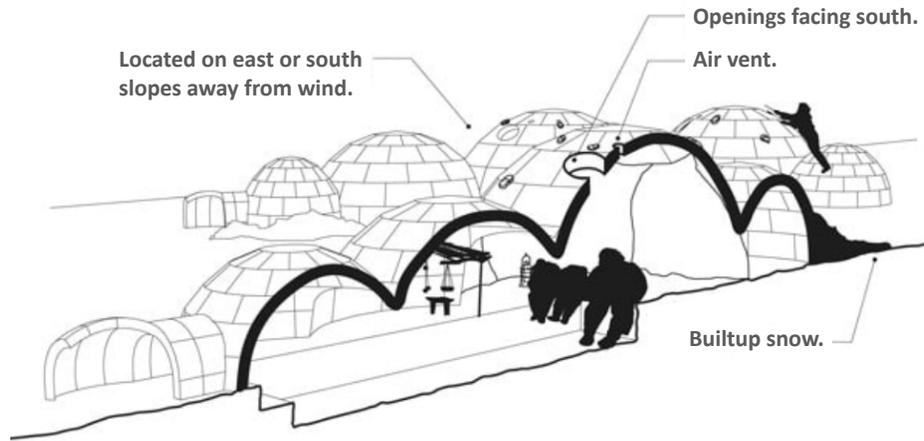
14 Joe Karetak, Frank Tester, and Shirley Tagalik, eds., *Inuit Qaujimajatuqangit: What Inuit Have Always Known to Be True* (Halifax; Winnipeg: Fernwood Publishing, 2017). Introduction.

15 Ibid.

Figure 2: (top) Diagram of an igloo; traditional winter dwelling. *Many Norths* (Sheppard and White).

Figure 3: (middle) Diagram of a qarmaq; traditional dwelling for transitional seasons. *Many Norths* (Sheppard and White).

Figure 4: (bottom) Diagram of a tupiq; traditional summer dwelling. *Many Norths* (Sheppard and White).



Maligarjuat can be compared to *inuksuit* (inukshuks), which are navigational guides for traversing the land;¹⁶ in other words, *maligarjuat* guide people through life.¹⁷ Joe Karetak, one of the authors/editors of *Inuit Qaujimaqatuqangit: What Inuit Have Always Known To Be True*, shares examples of the four *maligarjuat* in practice as described in the following paragraphs.

During challenging times such as a lack of food or dangerous weather conditions, Inuit rely heavily on one another to thrive as a group. *Tunnaganarniq* (being kind-hearted and caring) is a technique used to ensure people are in harmony with one another during difficult times and to avoid any sort of inequalities within society.¹⁸ If inequalities do surface, the population in need may become spiteful of those who were unwilling to help, which may cause tension within the group. Working for the common good was key to survival not only on an individual basis but also more importantly as a group.

Inuit use respect as a give and take practice. When the killing of an animal as a living spirit is done respectfully, the hunter will be respected by all living things in return. The opposite applies if living things and the environment are treated with disrespect; an act of disrespect is considered a debt.¹⁹ Inuit consider an act of respect to be a “symbolic, emotional and meaningful payment.”²⁰ An example of this ultimate respect for the animals’ spirits can be seen in this story shared by Karetak about an elder coming across an animal bone as he was walking over the tundra. The elder bends down to pick up the bone and flips it over and says: “it must get tired of lying in the same place.”²¹

To Inuit, harmony is more than togetherness, it’s a state of mind.²² Karetak explains that as a young man, he used to think elders were unable to comprehend or understand certain situations due to their calm demeanor. He would later learn that the elders were simply able to maintain a calm and harmonious state of mind during challenging discussions, a very valuable leadership asset.²³ A practice known as *ajjiqa-*

Figure 5: Sealskin Tent in Pangnirtung, Nunavut (1934).

Figure 6: Building Snow houses, Bernard Harbour (1915).

16 Dorais and Koperqualuk, *Words of the Inuit: A Semantic Stroll through a Northern Culture*. Winnipeg. University of Manitoba Press, 2020.

17 Joe Karetak, Frank Tester, and Shirley Tagalik, eds., *Inuit Qaujimaqatuqangit: What Inuit Have Always Known to Be True* (Halifax; Winnipeg: Fernwood Publishing, 2017). Introduction.

18 Ibid.

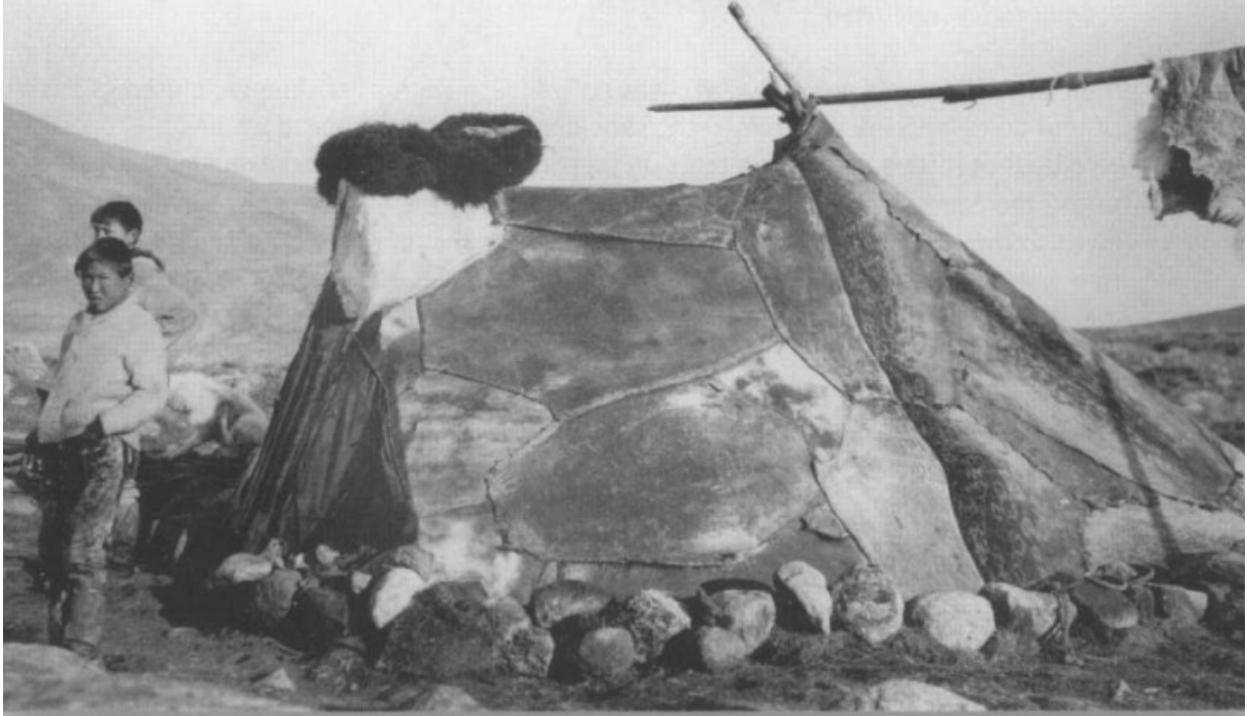
19 Ibid.

20 Ibid.

21 Ibid.

22 Ibid.

23 Ibid.

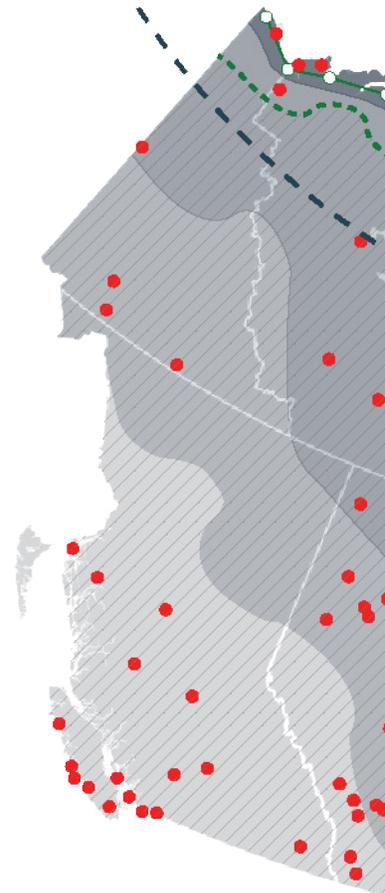


tigiingniq (working together to deal with threats to social harmony)²⁴ is used to ensure that harmony within groups is maintained so that people feel safe and calm under distress. This learned harmonious state of mind was passed on from elders to the next generations to become calm leaders of the future.

Inuit needed to plan and be prepared for their survival because hunting and gathering was all about timing and anticipating the immediate future. Caribou herds needed to be caught in vulnerable situations for it to be a successful hunt, which required immense planning and preparation. The long-term future was also a concern for Inuit because they realized passing on traditional knowledge would be key for future generations. Inuit youth were influenced directly by traditional teachings and from being present on the land during traditional practices, all key aspects of “making a human”²⁵ and Inuit epistemology.

The youth, the future carriers of Inuit traditional knowledge, were the subjects of developing the *maligarjuat* principles, a process Inuit refer to as *inunnguiniq* (the process of making a human being).²⁶ A significant portion of this process consists of oral teachings and repetitive storytelling.²⁷ The stories often straddled truth and fiction to ensure the teachings provoked the youth and instilled the teachings beyond the story.²⁸ The stories were repeated over and over so the words of the teachings would live on in the child’s memory and could be implemented in times of need.²⁹ The youth living in Inuit camps were influenced directly by their surroundings, their family, the environment, traditions, and elder leadership; all of which carried weight in the process. The influences on Inuit youth have drastically shifted due to the arrival of a settler structure and way of thinking, which had an immediate impact on Inuit traditions and their nomadic way of life.

Figure 7: Historical and Environmental Mapping.



24 Joe Karetak, Frank Tester, and Shirley Tagalik, eds., *Inuit Qaujimaqatuqangit: What Inuit Have Always Known to Be True* (Halifax; Winnipeg: Fernwood Publishing, 2017). Introduction.

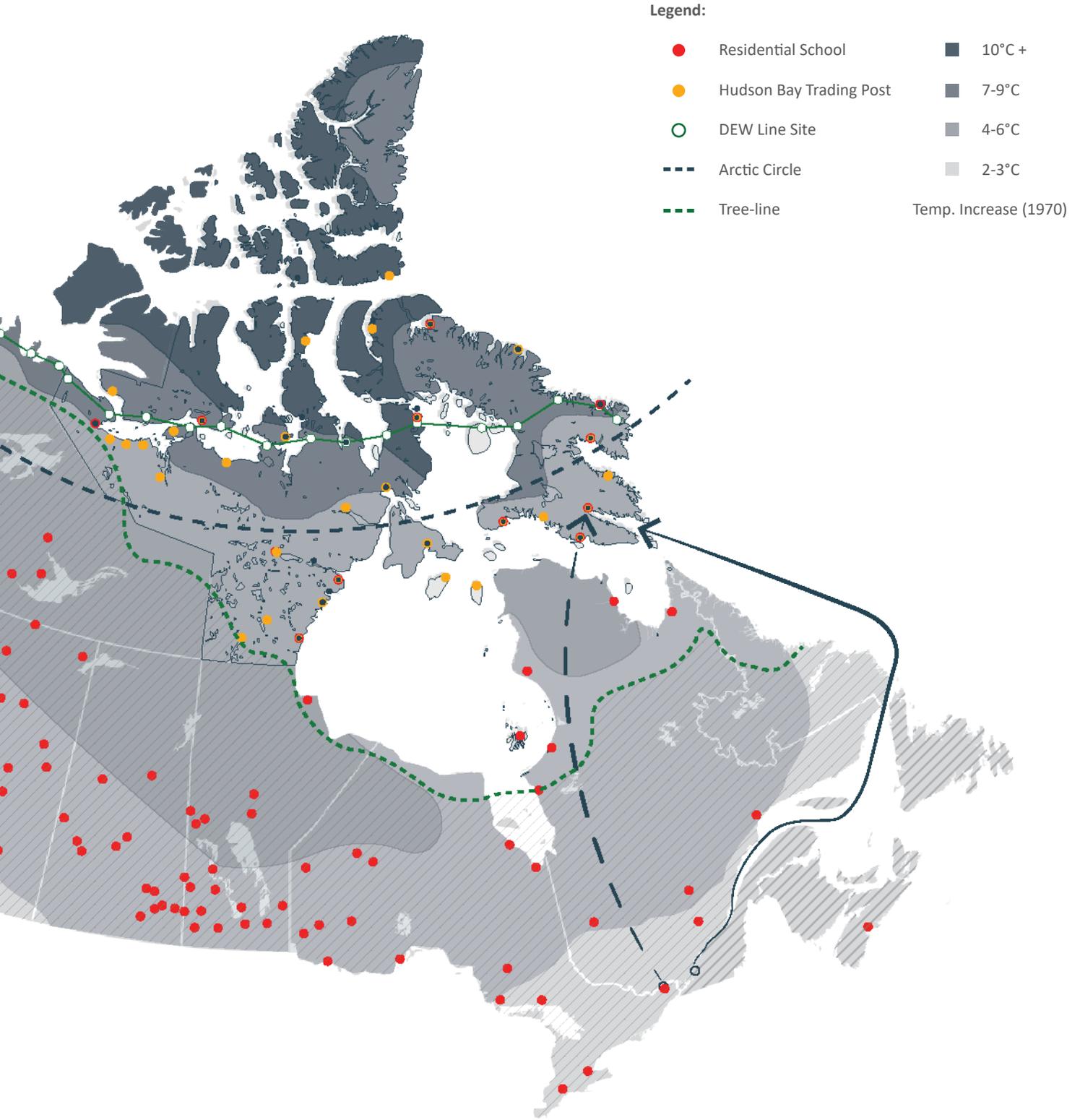
25 Ibid. Making a human.

26 Ibid.

27 Ibid. Laws and principles.

28 Ibid.

29 Ibid. Introduction.



1.3 - An Identity Shift

The modern world arrived in the Canadian Arctic over a single generation.³⁰ Sheila Watt-Cloutier states in her book, *The Right To Be Cold*, that witnessing the loss of traditions and close-knit communities to settler norms and policies has “left its scars” and now her generation is witnessing the loss of their environment as well.³¹ The cultural shift over one generation was generated through a series of economic, diplomatic, and educational ploys to modernize the Inuit way of life.

Beginning in the 1700s, a European whaling industry developed in the Canadian Arctic, which was one of the earliest contacts made with Inuit. The whaling industry exposed the vulnerable population to disease and introduced their society to a cash economy; the whaling industry eventually dwindled in the mid to late 1800s.³² As the whaling industry subsided, the fur trade began moving north and Hudson’s Bay Trading Posts replaced the whaling stations, arriving in the Arctic in the 1900s. During this time, Inuit began to rely on Euro-Canadian goods and started to cluster around trading posts, which eventually lead to a shift away from subsistence hunting because the hunting and trapping skills of the Inuit became an asset as they traded the valuable and unique furs and skins from the Arctic regions.

As more and more trading posts were constructed, more foreign construction materials began to arrive in the Arctic. The new materials were slowly adopted by Inuit. This was especially evident at the Distance Early Warning (DEW) Line stations, which were built in the 1950s during the Cold War by the American Government to detect Russian aircraft entering Arctic airspace.³³ The construction waste from the DEW Line stations was used for building makeshift shelters, which, although well-built, lacked the environmental responsiveness of Inuit nomadic dwellings. This was also evident in the early government housing solutions, which were basic single-rooms shelters that lacked any regard for the occupants’ culture or their environment.³⁴ The annual mass import of foreign material to generate the built environment began with the DEW-line sites but continues today because there are very few local or viable construction materials.

Figure 8: Group of Inuit from San-ikiluaq, Nunavut (Belcher Islands) standing outside a nearby Hudson Bay Trading Post in 1946.

30 Watt-Cloutier, Sheila. *The Right to Be Cold: One Woman’s Story of Protecting Her Culture, the Arctic and the Whole Planet*. Toronto, Ontario, Canada: Allen Lane, 2015. Xiv.

31 Watt-Cloutier, Sheila. *The Right to Be Cold: One Woman’s Story of Protecting Her Culture, the Arctic and the Whole Planet*. Toronto, Ontario, Canada: Allen Lane, 2015.

32 Sheppard, Lola, and Mason White, eds. *Many Norths: Spatial Practice in a Polar Territory*. New York: Actar Publishers, 2017. 22.

33 Ibid. 23.

34 Ibid. 115.



Into the 1950s and 60s the Government of Canada began to have more of a presence in the Arctic by relocating Inuit into settlements. Some of the methods used to ensure families would stay in communities included killing their dogs, which in turn resulted to turning to a cash dependent snowmobile. This economic dependence was further exacerbated by holding back government allowance cheques unless Inuit children attended school. The residential school program was an initiative originally intended to educate Inuit youth with high potential in the south, so they would be able to return to the Arctic and become leaders of their communities.³⁵ Sheila Watt-Cloutier, a survivor of residential schools' states that this transition "turned out to be the end of my arctic childhood of ice and snow."³⁶ The residential school system completely altered the *inunnguiniq* process because children were forbidden to speak their language, and many children experienced abuse and even died while attending these schools.³⁷ Inuit children who survived residential schools now had settler influences such as educators, authorities, religion, and an overall altered social structure rather than the harmonious social order that was established by Inuit elders over generations.³⁸ The settler influences and the turmoil caused within the settler school system played a significant role in "destroying the fabric that held Inuit society together."³⁹

Figure 9: A trade between Hudson Bay Trading Post store manager and Inuit Hunter in Kugluktuk, Nunavut in 1949.

35 Watt-Cloutier, Sheila. *The Right to Be Cold: One Woman's Story of Protecting Her Culture, the Arctic and the Whole Planet*. Toronto, Ontario, Canada: Allen Lane, 2015. 22.

36 Ibid.

37 Wade Davis, *The Wayfinders: Why Ancient Wisdom Matters in the Modern World* (House of Anansi Press Inc., 2009), 211; Holly Honderich, "Why Canada Is Mourning the Deaths of Hundreds of Children," BBC News (BBC, July 15, 2021), <https://www.bbc.com/news/world-us-canada-57325653>.

38 Joe Karetak, Frank Tester, and Shirley Tagalik, eds., *Inuit Qaujimaqatugangit: What Inuit Have Always Known to Be True* (Halifax ; Winnipeg: Fernwood Publishing, 2017). Introduction.

39 Ibid. Chapter 1, Getting an education.



Chapter 2:

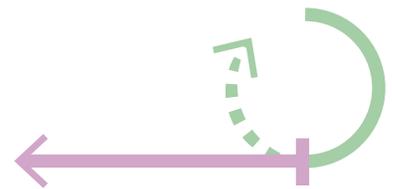
The Crises: Housing, Climate and Identity

2.1 Housing Crisis

2.2 Climate Crisis

2.3 Identity Crisis

This chapter will outline the three critical crises that have been unfolding in Nunavut since the arrival of the settler-colonial structure. Housing, climate change, and Inuit identity and health are interrelated and have created a complex set of issues that need to be addressed not only individually but also holistically.





2.1 - Housing Crisis

The forced transition into settler communities was an extremely challenging process for Inuit because not only was their sense of place completely altered but also their dwelling practices. The housing crisis began immediately when Inuit were relocated into communities permanently due to the amount of insensitive housing that was deployed to the Arctic. One example of the early housing was the matchbox, a 240 sq. ft flat roof structure with minimal insulation. The floor of the home was so cold that parents would lift their children up near the ceiling to keep them warm.⁴⁰ The living conditions were extremely unhealthy for the occupants because infectious diseases became rampant due not only to the unhealthy environment but also because upwards of eight people would share a single dwelling.

The unhealthy living conditions were not the only issue Inuit were forced to contend with; a key to the early housing program was the “ability to pay.”⁴¹ A mortgage, owning a home, and earning a wage were common practices in the south but not for Inuit in the mid 1960s. A house such as the matchbox would cost \$1500 with a portion of the costs being subtracted because the owner was involved in the construction. The mortgages given at the time were for 10 years, not a lengthy period of time it seems but when you had next-to-no income and now had the added burden of paying a mortgage and heating an uninsulated plywood box. The early government housing system was a complete failure and the current government housing continues to be plagued with similar - but perhaps less extreme - issues today.

Significant investment and advancement in housing types have been made when compared to the early government housing in the 1960s, yet the housing crisis continues. Today, over 50% of Nunavummiut live in social housing, which is in part due to a continued lack of income as well as an inaccessible housing market. Over 38% of those same dwellings are considered to be overcrowded, which causes units to be overused, creating health concerns and increased domestic violence rates as well. Nunavummiut are also living in poorly maintained housing units, as 30% of the entire housing continuum need repairs.⁴² The lack of maintenance is in large part due to the cost of material, labour, overuse, and because funding is focused on providing more units rather than maintaining the existing housing stock. Housing continues to be inaccessible for many

40 Ibid. Housing Settlement Dwellers.

41 Ibid.

42 Canada and Crown-Indigenous Relations and Northern Affairs. Inuit Nunangat Housing Strategy., 2019; Lillian Dyck and Glen Patterson, “We Can Do Better: Housing in Inuit Nunangat,” 2017; Nunavut Housing Corporation. “The Blueprint for Action on Housing: Implementation Plan for the GN Long-Term Comprehensive Housing and Homelessness Strategy,” September 2016.

Inuit because the housing stock has very few viable alternatives.

The housing market in Nunavut is very narrow and, as previously stated, the vast majority of Nunavummiut live in subsidized housing. The Nunavut Housing Corporation (NHC) manages the majority of subsidized housing for both the Government of Nunavut staff housing and rent geared to income social housing. The federal government also subsidizes housing for their own staff. The catch basin of subsidized housing is huge, leaving a small portion of the population interacting with home ownership and rental markets. This housing system creates a severe disconnect between occupant and dwelling in which the users have no input on the delivery of housing. There are many factors that have resulted in such a narrow housing market including land development, capital planning, construction costs, project planning, and high transient population (more specific to Iqaluit). The reliance on subsidized housing, using the NHC existing funding structure, along with a lack of viable ownership and market rent options will continue the disconnect between occupant and dwelling and leave the government as the primary source of housing in Nunavut for the foreseeable future. This critique remains as an integral part of the development of this thesis project.

2.2 - Climate Crisis

The effects of the climate change crisis are being experienced around the world and from coast to coast to coast in Canada. The International Panel on Climate Change (IPCC), in their latest reports, has stated that an increase of more than 1.5°C will cause drastic effects on natural and human systems.⁴³ Nunavut and other regions across the Arctic have already seen temperature increases of 1.5°C and in certain regions up to 3°C.⁴⁴ This significant temperature increase to date will only continue to rise, drastically affecting the Arctic environment. Inuit elders and climate change scientists have already witnessed and studied environmental changes including thinning of sea and lake ice, thawing of permafrost, unpredictable and increased severity of weather events, as well as changes in wildlife and vegetation. The built environment will most definitely feel the effects of climate change; permafrost thaw will directly impact building foundations, roads, water, and sewer infrastructure.⁴⁵

43 Portner, Hans-Otto. *Climate Change 2022 Impacts, Adaptation and Vulnerability*. Vol. 6. Assessment Report, 2022.

44 "Climate Change in Nunavut." Climate Change in Nunavut | Nunavut Climate Change Centre. Accessed March 22, 2022. <https://climatechangenunavut.ca/en/understanding-climate-change/climate-change-nunavut>.

45 Ibid.

Figure 10: (top) Nunavut Housing crisis info graphics. (left to right) % of social housing, overcrowding, need repairs, age of units, new units required, annual Operations & Maintenance per unit.

Figure 11: (middle left) NHC 10-unit stacked row dwelling in Iqaluit, Nunavut.

Figure 12: (middle right) NHC 5-unit row dwelling used in various Nunavut communities.

Figure 13: (bottom left) Early government housing; Matchbook House 1987.

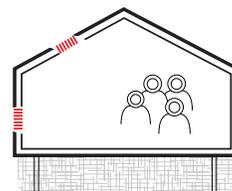
Figure 14: (bottom right) Early Inuit settlement near Frobisher Bay (Iqaluit) in 1956.



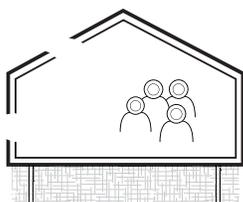
52%



38%



34%



60%
20-30 YR



\$ 1.7 B
3500 UNITS



O+M
\$25,000/yr



Although the impacts on the built environment will be challenging to overcome, the effects on Inuit traditional practices will also be drastically affected by the changing climate as Inuit have been ‘one with their environment’ for generations.

Inuit culture and their traditional teachings rely heavily on the environment to survive and to also pass down these teachings to the next generation. The land that Inuit have relied on for millennia is becoming an “unpredictable and precarious place” to practice their traditional way of life.⁴⁶ From a very young age, Inuit youth are taught how to read the land and predict the weather; elders today find it very challenging as stated by an Iqaluit resident: “It is getting more unpredictable as to what will happen; because the signs are so misleading.”⁴⁷ The land and the hunt are how the *maligarjuat*, *inunnguiniq*,⁴⁸ and elder harmonious state of mind are developed and without them the Inuit culture “is as threatened as the ice itself.”⁴⁹

As the climate and culture continue to shift, so too are the building foundations across Nunavut due to seasonal changes in the permafrost. Typical design practices for permafrost foundations include lifting structures off the ground to keep the active layer cold, eliminate heat transfer between the structure and the land, and also reduce snow accumulation around buildings.⁵⁰ Foundations have changed drastically over the years and continue to do so today to combat the thawing permafrost. The majority of the modern-day structures in Nunavut use pile foundations, which bear on deep permafrost or bedrock. Prior to pile foundations, wooden pad foundations were common with either wood cribbing or screw jacks. The most recent advancements in permafrost foundations include multipoint surface foundations, which use a shallow steel space frame that can respond to the shifting ground, and the thermosyphon systems, which allow the building to sit at grade and keeps the ground

Figure 15: Graphic of the existing funding and organizational structure for the delivery of social housing by the Nunavut Housing Corporation.

46 Watt-Cloutier, Sheila. *The Right To Be Cold: One Woman’s Story of Protecting Her Culture, the Arctic and the Whole Planet*. Toronto, Ontario, Canada: Allen Lane, 2015. Xv.

47 “Climate Change in Nunavut.” Climate Change in Nunavut | Nunavut Climate Change Centre. Accessed March 22, 2022. <https://climatechangenunavut.ca/en/understanding-climate-change/climate-change-nunavut>.

48 Joe Karetak, Frank Tester, and Shirley Tagalik, eds., *Inuit Qaujimaqatuqangit: What Inuit Have Always Known to Be True* (Halifax; Winnipeg: Fernwood Publishing, 2017). Laws and principles.

49 Watt-Cloutier, Sheila. *The Right To Be Cold: One Woman’s Story of Protecting Her Culture, the Arctic and the Whole Planet*. Toronto, Ontario, Canada: Allen Lane, 2015. Xvi.

50 Government of Nunavut. “A Homeowner’s Guide to Permafrost in Nunavut,” 2013; Kovalcik, Katherine. “An Index of Groundworks and Bearings: Architectural Lessons on Foundation Building in Vuntut Gwitchin Traditional Territory,” 2018. 164-173.

cold underneath the structure by maintaining a balance between the atmospheric temperature and the ground below by adding or removing air depending on the season.⁵¹ Structures built on permafrost using these foundation types all have their challenges when responding to the shifting ground. The housing in Nunavut is already in a vulnerable state without foundation failures. As the already depleted housing stock continues to experience foundation failures, there is a potential to see further housing shortages across the territory into the future. City planners are now avoiding areas that have permafrost with a high ice content and are attempting to shift any new developments to areas with bedrock, which has its own set of challenges for land development.⁵²

2.3 - Identity Crisis

Colonization, the climate crisis and the housing crisis have all played a role in the ongoing identity crisis across Inuit Nunangat. The identity shift previously captured in Chapter 1, saw Inuit going from the land to settlements but also completely altering Inuit lifestyle as described by Sheila Watt-Cloutier in the Introduction of her book:

“Our people still hunt and fish, sew and bead, but are also nurses, lawyers, teachers, business people and politicians. The arctic is a different place than it was when I was a child. And while many of the changes are positive, the journey into the modern world was not an easy one.”

This journey is ongoing as these challenges continue today and continue to impact the Inuit population. Intergenerational trauma, various forms of abuse, the changing climate, overcrowded housing, food insecurity and the overall shift in identity has caused alarming statistics including nine times the number of suicides compared to Southern Canada, high domestic violence rates and tuberculous cases compared to Southern Canada. The path through this cultural and environmental shift “have left its scars” but has generated incredibly strong, resilient people that have fought and adapted to become leaders of their community and advocates for their culture and identity. Inuit artists, musicians, authors, designers, athletes as well traditional livelihoods are generating hope, promise and change for future generations.

51 Kovalcik, Katherine. “An Index of Groundworks and Bearings: Architectural Lessons on Foundation Building in Vuntut Gwitchin Traditional Territory,” 2018. 176-199.

52 Government of Nunavut. “A Homeowner’s Guide to Permafrost in Nunavut,” 2013.

Figure 16: Photo of Iqaluit housing over looking Frobisher Bay.





Chapter 3:

Access and Agency: Iqaluit Housing

- 3.1 Housing Delivery
- 3.2 Iqaluit, Nunavut
- 3.3 Access: *Land, Services and Material*
- 3.4 Agency: *Tradition, Community and The Land*
- 3.5 Framework and Method

This chapter will describe the current Nunavut housing delivery system including the remoteness of the place and the Nunavut Housing Corporation followed by a detailed description of Iqaluit's history and existing housing typologies. The former and current access and agency of housing will then be discussed through case studies including *A Blueprint for a Hack* in Kuujjuaq, Quebec and a self-build cabin outside Iqaluit, Nunavut.





3.1 - Housing Delivery

Nunavut makes up most of the Arctic Archipelago with many of its communities on islands with no road access. The remoteness of these communities, including the capital of Nunavut, Iqaluit, makes the delivery of goods and services challenging and costly. There are very few local material resources⁵³ so the majority of materials are shipped up during the summer months from Montreal to Iqaluit. The items need to be purchased and packaged up months before the ship leaves the port in Montreal. When the sealift items arrive in the community, they are taken ashore by barge and distributed to the customers. This process is not only expensive⁵⁴ but takes a significant amount of time, and construction delivery can often take up to two years. The remoteness also creates extremely high labour costs because many construction crews are flown in due to a lack of local skilled labourers.⁵⁵ The transient construction crews require room and board during their stay, which adds to the overall cost of the projects. The extended construction schedule and high labour costs create severe challenges especially when housing is currently being underfunded annually without any long-term funding in place for future planning.⁵⁶

The Nunavut Housing Corporation (NHC), which provides the majority of the subsidized housing in Nunavut, currently uses a housing needs percentage for each community as their method of responding to the housing demands of Nunavummiut.⁵⁷ The NHC also uses a housing model method; their primary housing model currently being deployed is a single story five-unit row house. The NHC housing models have evolved over the years using single family dwellings, duplexes, ten-unit stacked row dwellings, and walk-up apartment types making up the remainder of the housing stock. The NHC has the very challenging task of providing housing to over 50% of Nunavummiut with extremely high construction costs at over \$500,000 per unit, high operations and maintenance costs at \$25,000 per unit with very little rental returns.⁵⁸ The vast majority of Nunavummiut have very little agency in the current housing delivery system and still rely heavily on government funded solutions with very few alternatives to access land or housing to generate their own housing solutions.

53 Local material research and development is required.

54 Neas. "Nunavut Sealift Rates." NEAS. Accessed December 23, 2021. <https://neas.ca/rates/>.

55 Remote construction crews are very common across the territory on a per project basis but also seasonal for local contractors.

56 Canada and Crown-Indigenous Relations and Northern Affairs. *Inuit Nunangat Housing Strategy*, 2019.

57 Nunavut Housing Corporation. "NHC's Planned Builds and Public Housing Construction Allocation and Methodology," February 2020. <http://www.nunavuthousing.ca/Publications?limit=8>.

58 Nunavut Housing Corporation, "2019-2020 Annual Report," 2020.

3.2 - Iqaluit, Nunavut

Iqaluit has a population of over 7,700⁵⁹, nearly triple the population of the second most populated community. Formally known as Frobisher Bay, Iqaluit was a former whaling station and home to a Hudson's Bay Trading Post in 1914⁶⁰ followed by a large U.S. military presence. The U.S. military established a base in the community during the Cold War by building an airport in 1944⁶¹ and creating a construction hub for the DEW Line stations in 1955-57.⁶² Since Iqaluit was designated a city in 2001 and capital of the newly named territory of Nunavut in 1995, it has seen a steady population increase as the centre of the Government of Nunavut operations. The high population growth is in part due to the rapid population growth of Inuit but mainly due to job opportunities for both Inuit and non-Inuit moving to Iqaluit. Currently in Iqaluit, 55% of the population identify as Inuit, which is significantly lower than other communities.⁶³ Much of the non-Inuit population in Iqaluit are considered transient;⁶⁴ young adults from Southern Canada move to Iqaluit to jump start their careers and make considerably more than comparable jobs in the south.⁶⁵ This settler presence in the community and government creates a series of social and spatial tensions.⁶⁶ Housing has been at the forefront of the spatial tension occurring in Iqaluit because many *qallunaat*⁶⁷ (settlers) have the means to pay for market rentals or purchase a home because they often earn a higher salary than most Inuit.⁶⁸ It is concerning that settlers continue to occupy Inuit space especially since space is already so limited and few Inuit community members receive any of the financial benefits that developers receive from this transient population.

Figure 17: Map of Nunavut representing regions and communities.

Figure 18: Range of community info-graphics showing community population, Inuit population and housing need.

59 Government of Canada, Statistics Canada. "Census Profile, 2016 Census Iqaluit, Nunavut Census Profile, October 27, 2021.

60 Sheppard, Lola, and Mason White, eds. *Many Norths: Spatial Practice in a Polar Territory*. New York: Actar Publishers, 2017. 78.

61 Ibid.

62 Ibid.

63 Most communities are over 90% Inuit.

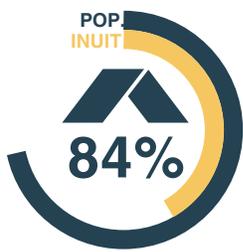
64 Transient southerners often stay for 2-5 years with some becoming 'lifers.'

65 Inutiq, Sandra. "Dear Qallunaat (White People) | CBC News." CBCnews. CBC/Radio Canada, February 17, 2019. <https://www.cbc.ca/news/canada/north/dear-qallunaat-white-people-inuit-sandra-inutiq-1.5020210>.

66 Kassam, Ashifa "The Struggle in Iqaluit: North and South Collide in Canada's Arctic Capital." The Guardian. Guardian News and Media, July 5, 2016. <https://www.theguardian.com/cities/2016/jul/05/struggle-igaluit-north-south-tensions-canada-arctic-capital-inuit>.

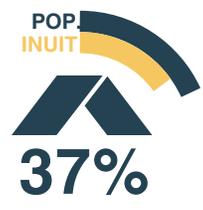
67 Dorais and Koperqualuk, *Words of the Inuit: A Semantic Stroll through a Northern Culture*. Winnipeg. University of Manitoba Press, 2020.

68 Government of Canada, Statistics Canada. "Census Profile, 2016 Census Iqaluit, Nunavut Census Profile, October 27, 2021.



POP. INUIT
84%

Iqaluit



POP. INUIT
37%

Igloolik



POP. INUIT
5%

Grise Fiord

The steady growth of Iqaluit has caused an urban response that has created a series of subdivision pockets scattered across the sprawling community. The subdivisions rest within valleys and atop plateaus occupying land that can be developed as efficiently as possible.⁶⁹ The unit density varies throughout the residential pockets; the low-density areas are mostly single-family dwellings whereas the high-density areas comprise row housing and low-rise apartment blocks. It is important to distinguish that the low-density areas have trucked water and sewer services, which require water and sewer tanks below their houses that are attended to weekly.⁷⁰ All the dense areas have buried water and sewer lines, which are a growing concern for the city due to permafrost melt.⁷¹ With regards to an energy source, nearly every unit is heated by an oil-fired furnace and the community power is also generated via a diesel generator plant.⁷² The reliance on fossil fuels for power and heat is of great concern as is the car culture that is developing in Iqaluit; there are over 6,000 vehicles in Iqaluit with a mere 30 km of road to travel on...⁷³ The climate, urban sprawl, and lack of public transportation make it challenging to live in Iqaluit without a vehicle.⁷⁴ The expanding population and associated challenges are of concern and require long-term, sensitive solutions that will prioritize cultural and sustainable practices.

3.3 - Access: Land, Services and Material

Land ownership is a foreign concept to Inuit and was never a part of their worldview. The alternative to land ownership currently being used is leasing the land. Lots can be leased for an annual fee that is separate from the property tax or mortgage fee. More recently, banks operating in Nunavut are allowing buyers to include the land lease with their mortgage through an equity lease.⁷⁵ The equity lease also has stipulations that the leasee needs to develop something before the lease can

69 Sheppard, Lola, and Mason White, eds. *Many Norths: Spatial Practice in a Polar Territory*. New York: Actar Publishers, 2017. 78.

70 Nunavut Tunngavik, "Nunavut's Infrastructure Gap October 2020," 2020.

71 Ibid; Government of Nunavut. "A Homeowner's Guide to Permafrost in Nunavut," 2013.

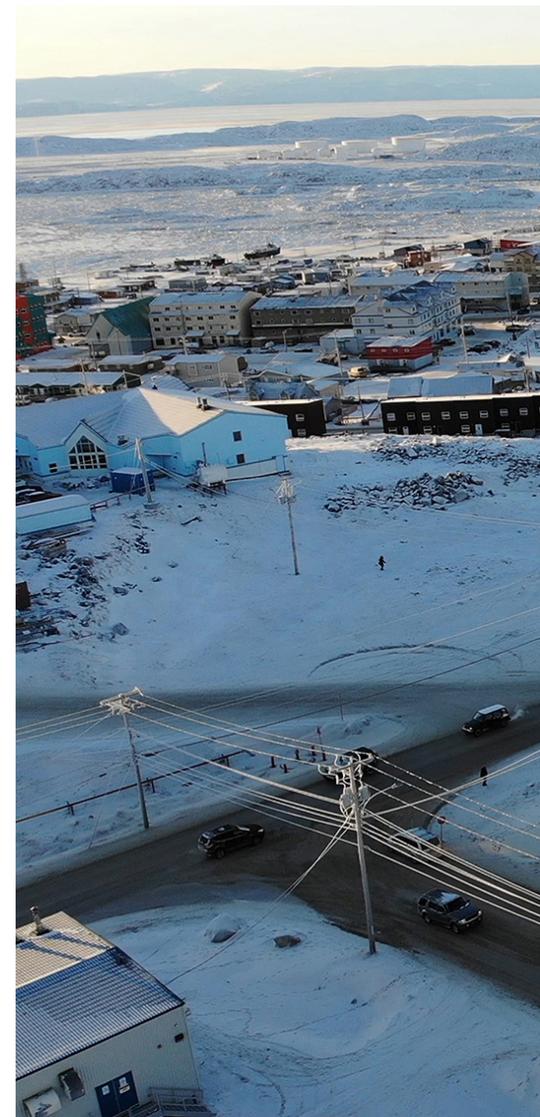
72 Nunavut Tunngavik, "Nunavut's Infrastructure Gap October 2020," 2020.

73 Oudshoorn, Kieran. "Car Overload: Iqaluit Has 6,000 Vehicles, Only 8,000 Residents | CBC News." CBCnews. CBC/Radio Canada, September 1, 2015. <https://www.cbc.ca/news/canada/north/nunavut-communities-struggle-with-junked-vehicles-1.3209984>.

74 Sheppard, Lola, and Mason White, eds. *Many Norths: Spatial Practice in a Polar Territory*. New York: Actar Publishers, 2017. 78

75 Mathisen, Herb, and Katharine Sandiford. "The Title Holders." Up Here Publishing. Up Here, December 23, 2021. <https://www.uphere.ca/articles/title-holders>.

Figure 19: Aerial photo of the new addition at the Nunavut Arctic College by Teeple Architects.

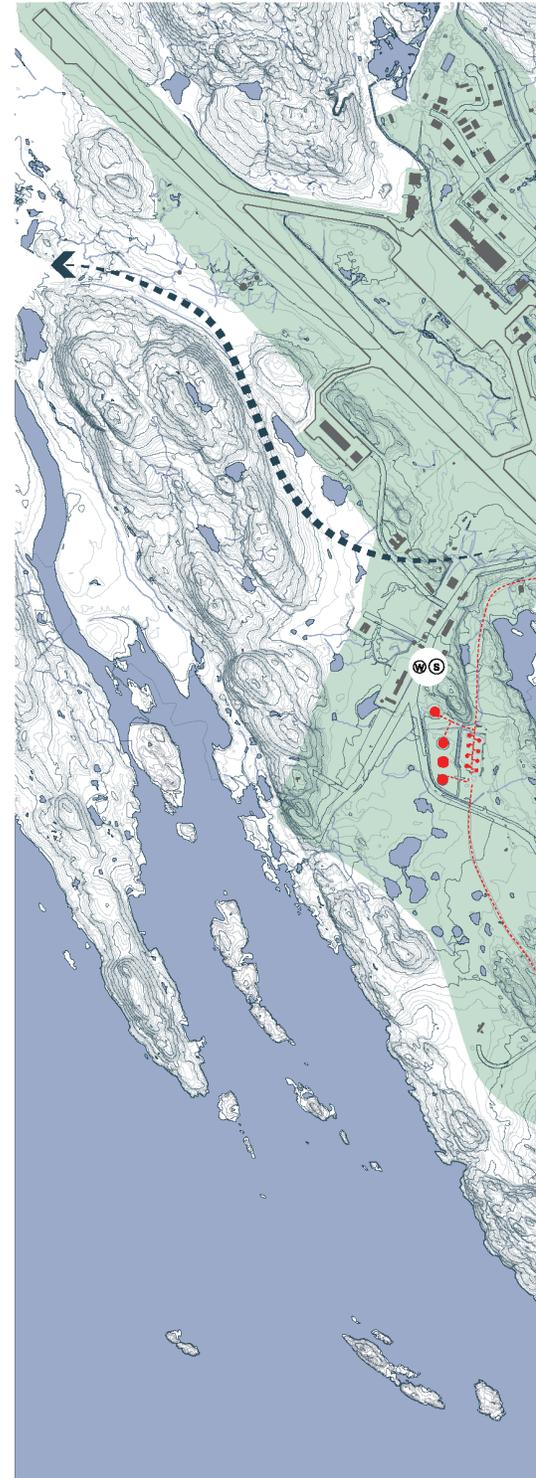




be transferred, a problem that has occurred in the past.⁷⁶ The process of accessing a lot to lease has also been a concern in the past. The city currently uses a ballot system in which residents enter a draw and if they win, they pay the lot development fees and associated lease.⁷⁷ In the past, the draw gave preference to first time home owners but recently has been changed to provide greater access to Inuit than non-Inuit.⁷⁸ Although this is moving in the right direction, lots are developed as custom homes, which is good for creating more home ownership in the community but also fails to mitigate the housing shortage in the community due to the lack of density and the inaccessible cost of ownership for a large portion of the population.⁷⁹

Due to the lack of home ownership and the overall housing agency in the community, there is no presence of small-scale design/build services. The architects currently practicing in Iqaluit are focused on large-scale government and developer projects with very little interaction with housing besides a few custom homes. I believe there is a gap in the architectural service industry in Iqaluit that can bridge the gap between the formal and informal building practices of the place. If architectural services were more accessible to a larger portion of the population, then there could be alternative housing solutions or practices that surface through a greater mutual relationship. Material access is also concerning because there are no hardware stores and the remoteness makes it challenging to get construction materials to the community even for small projects, which often arise sporadically when owning a home. The disconnect between inaccessible construction materials and resourceful craftspeople also deserves bridging along with a supportive design/build service. These relationships have the potential to foster the informal housing agency and evolve into more formal housing solutions.

Figure 20: Mapping analysis of Iqaluit, Nunavut.

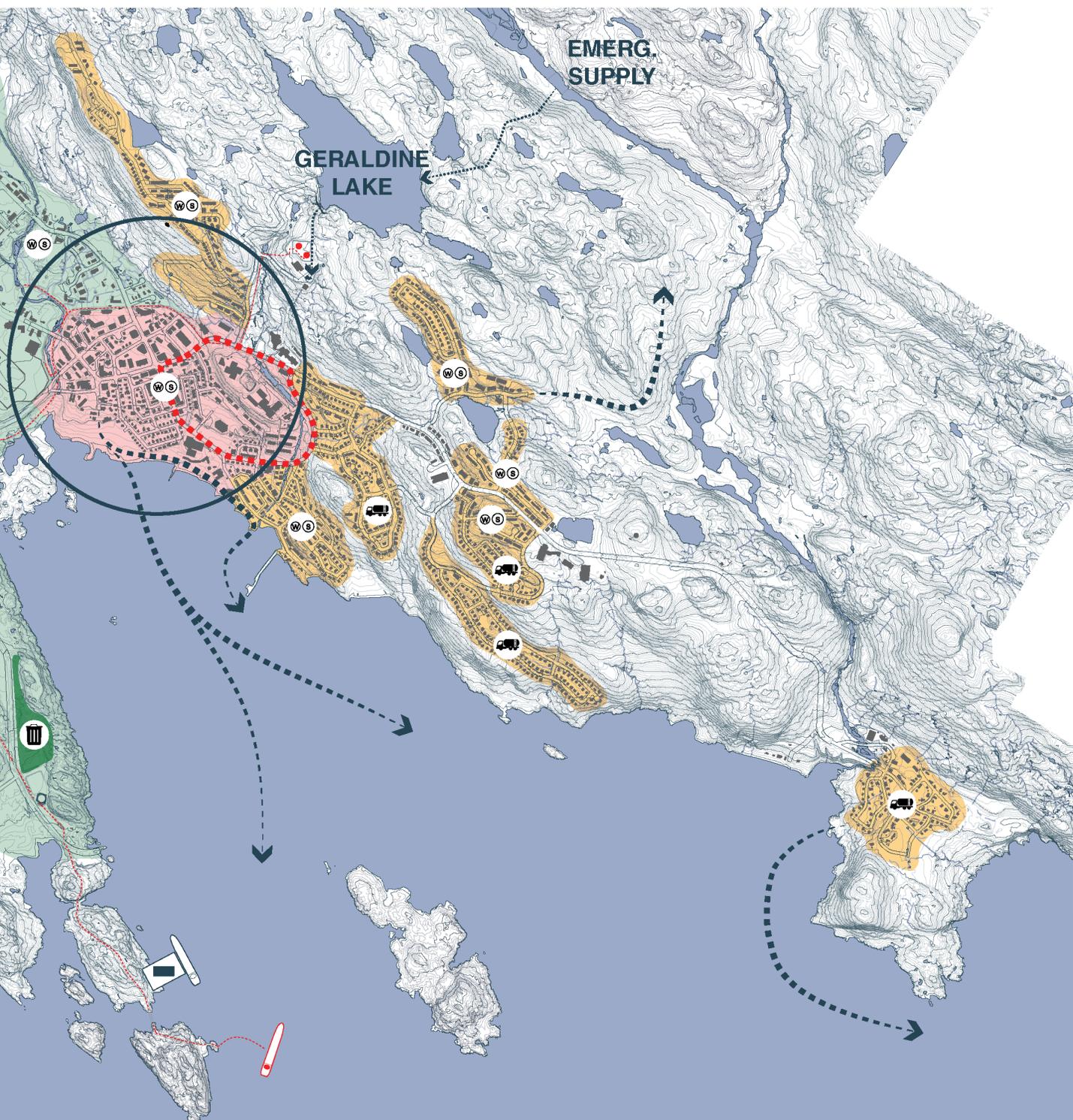


76 Developers purchase the rights to lots off of ballot winners prior to any development occurs.

77 Mathisen, Herb, and Katharine Sandiford. "The Title Holders." Up Here Publishing. Up Here, December 23, 2021. <https://www.uphere.ca/articles/title-holders>.

78 Murray, Nick. "City Revamps Iqaluit's Land Bylaw to Help Inuit Secure Lots | CBC News." CBC news. CBC/Radio Canada, September 22, 2020. <https://www.cbc.ca/news/canada/north/igaluit-land-administration-bylaw-1.5732422>.

79 Ibid.



3.4 - Agency: Tradition, Community and The Land

Inuit had full autonomy over their housing prior to the arrival of the settler housing structure as described in Chapter 1; these seasonal dwellings and other self-built structures such as the *qamutiik* (sled) were very well-built and crafted using local materials.⁸⁰ As new material began arriving to their environment, Inuit started to adapt and reclaim this new material and use their resourcefulness as a means to self-build using traditional practices and contemporary materials.⁸¹ The previous informal building practices evolved and now include cold porches, outbuildings, cabins, wind screens, and various other furniture and equipment items.⁸² The agency present in these informal building practices is a way to reoccupy government housing space by reconfiguring reclaimed material⁸³ which is what requires fostering. Materials that are commonly used in informal projects include pallets, sealift boxes, seacans, and found materials from construction sites and the local landfill.⁸⁴ This practice is captured in the book *Blueprint for a Hack: Leveraging Informal Building Practices*. The book outlines how we can learn from these informal building practices and spatial justice of the in-between spaces in the north.⁸⁵ The book concludes with a 'Hacking Trash Hackathon',⁸⁶ in which a design team from the south and community members from Kuujuaq team up to provide a skating shelter for the local outdoor rink.⁸⁷ Although this built project did provide a functional, semi-sheltered outdoor public space that has been well-used, it should be considered a starting point for fostering informal building practices and material resourcing.

Communities across the Arctic have been also developing a cabin culture in which community members who have the means to do so⁸⁸ build their own cabins outside of the community structure as a form of reclaiming space on the land. Building a cabin on Inuit owned land outside of Iqaluit does require a permit from the Qikiqtani Inuit Association

Figure 21: (left-1) Lindell Cabin during construction south of Iqaluit.

Figure 22: (left-2) Lindell Cabin off-grid solar power generation system.

Figure 23: (left-3) Lindell Cabin interior view looking out onto Burton Bay.

Figure 24: (left-4) Lindell Cabin exterior view showing solar panels and window configuration.

Figure 25: (right-1) Qamutiik with small shelter for sleeping and storage during trips on the land.

Figure 26: (right-2) Cabin adaptation by the river using a boat hull and canvas tent.

Figure 27: (right-3) Cold porch adaptation on government housing used for additional shelter.

Figure 28: (right-4) Resulting shelter from *Blueprint for a Hack* in Kuujuaq, Quebec

80 Watt-Cloutier, Sheila. *The Right To Be Cold: One Woman's Story of Protecting Her Culture, the Arctic and the Whole Planet*. Toronto, Ontario, Canada: Allen Lane, 2015. 15.

81 Havelka. (2018). *Building with IQ (Inuit Qaujimajatuqangit): the Rise of a Hybrid Design Tradition in Canada's Eastern Arctic*. ProQuest Dissertations Publishing. 207-213.

82 Ibid.

83 Ibid.

84 Ibid.

85 Susane Havelka, Vikram Bhatt, and Dave Harlander, *Blueprint for a Hack: Leveraging Informal Building Practices*, ed. Jeff Cossette (New York: Actar, 2020).

86 Ibid.

87 Ibid.

88 A small percentage of Iqaluit residents have cabins because it requires disposable income or co-ops to be able to afford a second 'home' on the land.



(QIA) but comes at no cost to Inuit.⁸⁹ This process was captured through an informal interview with an Iqaluit resident who recently built a cabin for his family.

It's my own little affordable housing project; a 20 ft x 24 ft story dwelling with a loft made of mostly new material and is located south of Iqaluit in a small inlet in Burton Bay. It's powered by 6–100-watt solar panels with a backup generator and is insulated as we plan to use it year-round. I'm still setting up the sewer and water system but planning on having a functional toilet and running water. We're excited for it to be completed and to be able to have a place to stay out on the land.

This type of self-build is uncommon within community limits because there are too many regulations in place for residents to be able to build on their own if they had the access to materials and the skills required. In *The Right To Be Cold*, Watt-Cloutier states that her mother decided to build her own home with the help of her son and uncle who had experience working on construction crews within their community.⁹⁰ The materials were partially sourced from a dismantled power generator building while the materials required to finish the house were sourced from the south. The house was completed in their own way with help from the community and gave the family “a sense of pride and accomplishment.” This story of housing agency should be encouraged within Arctic communities because pride and accomplishment aren't present in the current single source settler-housing system.

89 Hopkins, William. “Public Notice: Qia Inspection of Cabins on Inuit Owned Land near Iqaluit.” Qikiqtani Inuit Association. Qikiqtani Inuit Association, March 30, 2020. <https://www.qia.ca/public-notice-qia-inspection-of-cabins-on-inuit-owned-land-near-iqaluit/>.

90 Watt-Cloutier, Sheila. *The Right To Be Cold: One Woman's Story of Protecting Her Culture, the Arctic and the Whole Planet*. Toronto, Ontario, Canada: Allen Lane, 2015. 7-8.



3.5 - Framework and Method

The framework of this thesis is based heavily on the local sources, *Inuit Qaujimagatuqangit: What Inuit Have Always Known to Be True* and *The Right To Be Cold: One Woman's Story of Protecting Her Culture, the Arctic and the Whole Planet*, which both outline traditional practices, shifts in culture and environment and the challenges that go along with them. Other key sources that latch onto the resulting spatial agency which is currently present in arctic communities today is Susan Havelka's thesis *Building with IQ (Inuit Qaujimagatuqangit): the Rise of a Hybrid Design Tradition in Canada's Eastern Arctic* and the book, *Blueprint for a Hack: Leveraging Informal Building Practices; an extension of Building with IQ*. This thesis project could be considered a third iteration of these sources by systematically leveraging local building practices, solutions and forms of dwelling.

Living, building and designing sustainably in the arctic is extremely challenging due to the lack of local resources and the extreme, shifting environment. There is evidence from the local cabin culture that returning to the land and living more sustainably is possible. My methodology through the development of this thesis was to produce a framework that is focused on the potential of local solutions and resources. The approach aims to be multi-faceted and address various challenges faced living in the arctic that is based on my short yet formative lived experience in Iqaluit, Nunavut.

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Chapter 4:

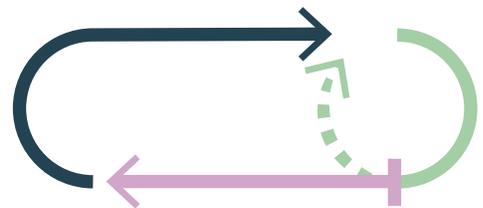
Circular Construction: *Material, Waste and Design*

4.1 Material Lifecycles

4.2 Waste Diversion

4.3 Proposed Circular Construction Framework

This chapter will discuss the existing material lifecycles and waste management practices in Iqaluit, Nunavut followed by suggested waste diversion practices including a ReStore centre and the introduction of a deconstruction economy. The challenges and barriers of deconstruction and reuse will then be covered to understand what is required to overcome the current wasteful systems in an effort to generate a new decolonized and cyclical housing system.





4.1 - Material Lifecycles

As noted in the Housing Delivery section of Chapter 3, all goods and materials are shipped to Iqaluit via ship or plane. All perishable goods are flown in on a frequent basis whereas non-perishable goods, construction materials, and other large items are shipped in by cargo ship, which makes up 90% of the tonnage of material shipped to Nunavut.⁹¹ The southern hubs used for transferring material to Iqaluit are mostly Ottawa and Montreal; the distances traveled by plane and ship add a significant amount of embodied carbon to the material produced and manufactured in the south. Because there are very few local resources for building material, the items used to move material: shipping containers, sealift boxes, and pallets, which aren't of the highest grade, are often reused with ingenuity in various ways to improve and occupy space.

Discarded construction material makes up nearly 40% of the waste going into landfills and over 75% of that waste is considered to have value and has the potential to be recirculated.⁹² This is due to in part to how we define waste but also to how we design with and select materials. Waste is most often defined in terms of no longer holding value to the producer; as zero waste initiatives increase, waste is being redefined to include its value outside of the producer by diverting waste from the producer into various recycling and reuse streams rather than landfills.⁹³ The key reason why the construction industry produces so much waste is due to the materials it uses and how it puts them together; buildings today and in the past are not designed or constructed to be taken apart again. The numerous and co-dependent layers of material in typical assemblies are generously fastened together using nails, staples, and adhesives that make salvageability challenging both in terms of cost, time, and the value of the resulting salvaged material.⁹⁴ When spaces become obsolete due to building fatigue, change of use, change in the market, or new development, demolition is the result because of its economic efficiency compared to deconstruction.⁹⁵ The lifecycle of construction materials is simply not being considered beyond their first use.

91 Sustainable Development Working Group. "Zero Arctic: Concepts for Carbon-Neutral Arctic Construction Based on Tradition." Arctic Council. Accessed March 20, 2022. <https://arctic-council.org/projects/zero-arctic/>. 23.

92 Mark Gorgolewski, *Resource Salvation: The Architecture of Reuse*, 1st edition (Hoboken, NJ: Wiley-Blackwell, 2017). 11.

93 Ibid.

94 Ibid. 51.

95 Aging, weathering, lack of maintenance.

The low quality of materials and poor construction techniques used in public housing across the Territory of Nunavut are evidence of the cost/effect approach taken and are exacerbated by the harsh environment, overuse caused by the housing shortage and the misuse due to a disconnection with Inuit culture.⁹⁶ Interior finish materials such as drywall, flooring, and work surfaces are not fit for the desired usage, which quickly makes the spaces obsolete, creating a costly maintenance problem due to the un-salvageable material, construction techniques and lack of local resources. One successful aspect of reuse in Iqaluit and across the territory is the resale value of various items including furniture, appliances, tools, equipment, and vehicles. There is a significant sell/swap community in Iqaluit because of the transient nature of the city as well as the cost and accessibility of new items. This current culture of resale along with the reuse of found material (shipping containers, sealift boxes, pallets, construction waste) is proof that construction material has the potential to hold its value beyond its first usage.

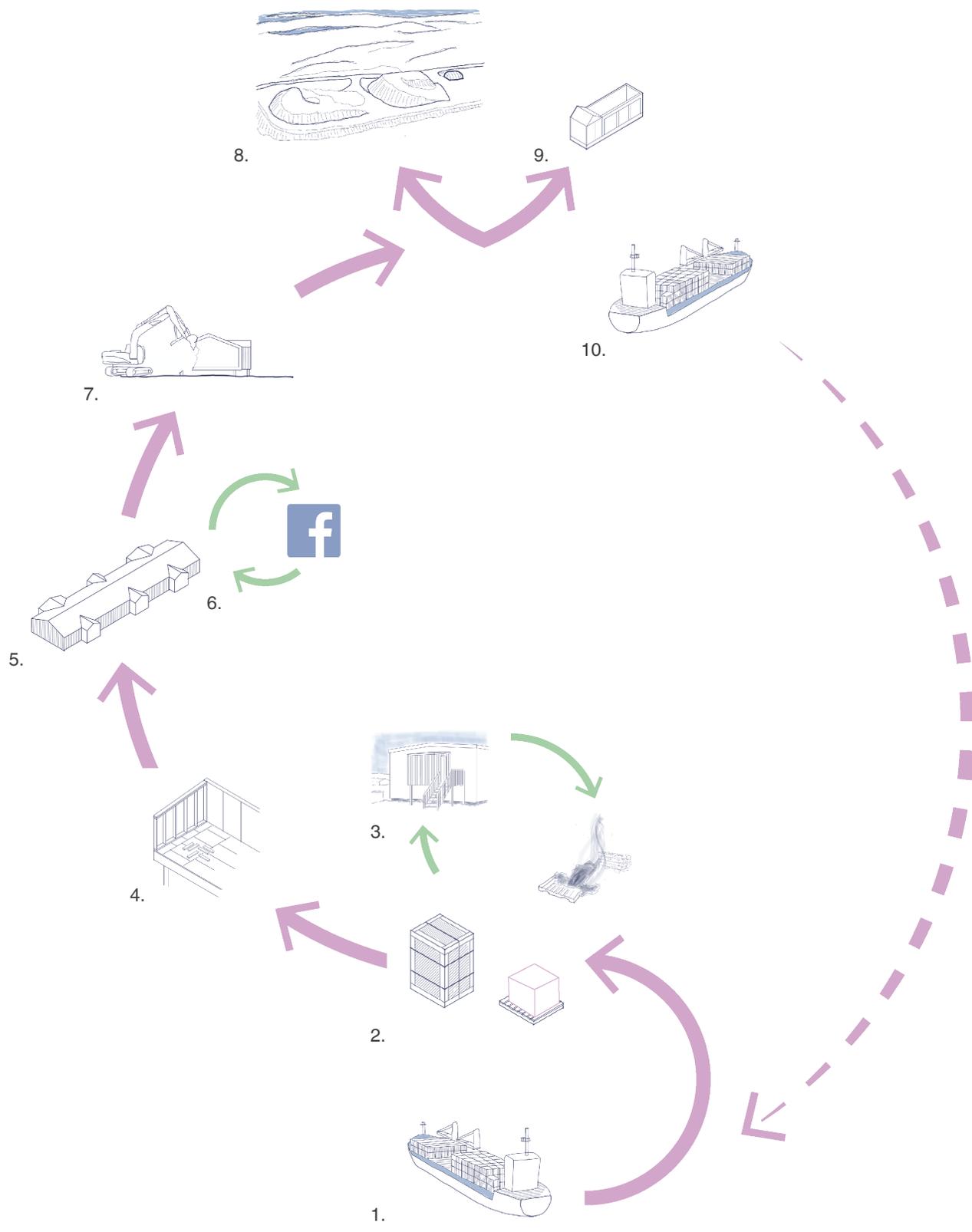
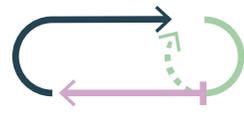
Communities across Nunavut, including Iqaluit, are facing severe waste management issues. The waste associated with the abundance of goods and materials that are being shipped north to support the communities is rapidly filling the local landfills. There is next to no recycling or waste diversion infrastructure in the communities; in Iqaluit the only items that are reshipped down south for recycling are beer cans, water bottles, and scrap metal. In recent years, the Iqaluit landfill has improved its waste management practices in response to a dump fire in 2014 that smoldered for months.⁹⁷ The dump fire, deemed ‘Dumpcano,’ saw the heaping landfill internally combust; the city’s response was to divert all combustible material to a new standalone incinerator to avoid another catastrophe that affected the entire community. The new incinerator introduces a previously used waste management practice that fails to actually divert waste while releasing carbon emissions without producing any valuable energy. The reusable combustible material, mostly wood, again has the potential to be restored and reused in a new way.

Figure 29: Material life cycle in the Canadian Arctic.

1. All goods and materials are shipped north from southern city hubs.
2. Seacans, wooden sealift crates and pallets are used to ship items by boat or plane.
3. The shipping items are frequently reused by the community to improve and adapt space as well as use for socializing around a fire.
4. The construction industry produces a lot of solid waste that ends up in arctic landfills.
5. There is a lot of household waste produced due to lack of recycling and compost infrastructure.
6. There is a very strong resell culture in arctic communities due to limited access and high resale values.
7. When various residential and commercial spaces are renovated or demolished all the materials end up in the landfill.
8. Arctic landfills are rapidly growing and are difficult to manage.
9. Combustible materials are incinerated to avoid landfill combustion.
10. Very few items are shipped back down south to be recycled.

96 Qaqqaq, Mumilaaq. “‘Sick of Waiting’ A Report on Nunavut’s Housing Crisis,” 2021.

97 Chris Purdy, “Iqaluit’s Long-Smouldering ‘Dumpcano’ Garbage Fire Finally Out.” *The Globe and Mail*, September 16, 2014. <https://www.theglobeandmail.com/news/national/iqaluits-long-smouldering-dumpcano-garbage-fire-finally-out/article20620273/>.



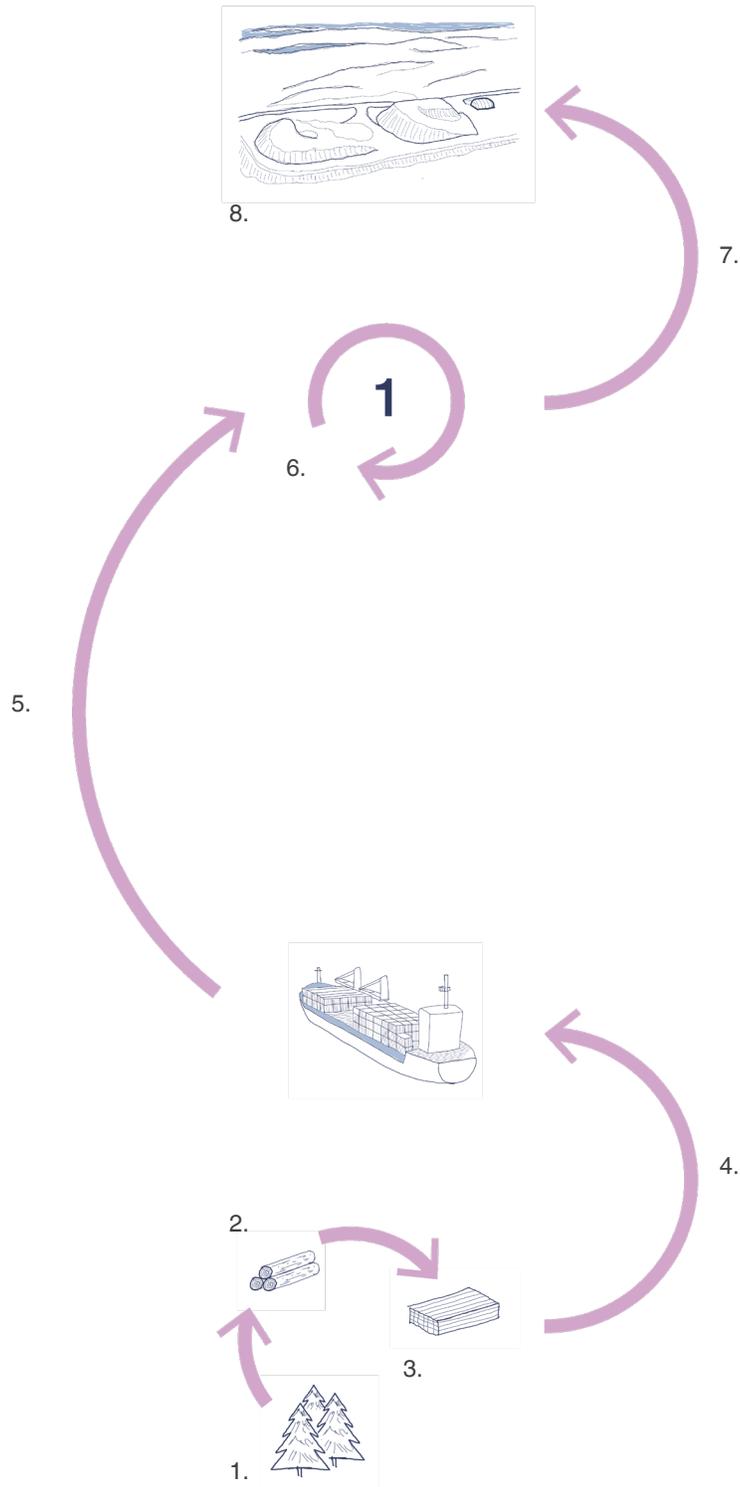
The City of Iqaluit is currently implementing a new solid waste management program that will reduce their solid waste by 44%, including a new landfill site with open windrow composting, bulk recycling, an end-of-life vehicle program, and a reuse or ReStore centre.⁹⁸ Habitat for Humanity manages over 100 ReStore centres across North America; the ReStore centres receive donations from the general public and local businesses and rely heavily on a local volunteer base with a small paid staff. The strong volunteer base reduces the overhead cost of each store, comprised mostly of renting a large space, staffing, and disposal fees. Each ReStore market is unique because the donations received vary significantly in function and scale, but the most consistent donations include furniture, appliances, electronics, and construction materials. The markets that Habitat ReStore currently operates in would be very different from the Iqaluit market. The southern markets need to conduct an assessment of a donation and determine its value based on its quality and on the time it will take to restore the item prior to reselling it.⁹⁹ An Ikea dresser requiring attention that is donated to a store in Toronto may not be worth fixing due to the accessibility and affordability of a similar brand-new Ikea dresser, but in Iqaluit the value of that item may be double or triple compared to a southern market. A restore in Iqaluit would be able to focus its energy on restoring more items than that of its southern counterpart because of the difference in value and accessibility of an item. The same principle would apply to construction material. Construction material is very inaccessible in Iqaluit unless your project is planned months in advanced and shipped up during the summer. If reclaimed and affordable construction materials were made available in Iqaluit, it may encourage reclaimed dwelling projects in Iqaluit and continue the reclamation of space in the community.

Figure 30: Embodied carbon of Arctic material.

1. Raw Material.
2. Transport to processing.
3. Operations of Manufacturing.
4. Transport to sea-lift facility.
5. Transport to Arctic Community.
6. Currently one material life-cycle in remote community, time period dependent on material.
7. Waste operations and processing.
8. Additional waste in expanding arctic landfills.

98 Exp. Services Inc. "City of Iqaluit Solid Waste Management Plan." *City of Iqaluit*, January 2014.

99 Various documents provided by Habitat ReStore.



4.2 - Waste Diversion

Habitat ReStore has solidified itself in the resale market across North America but there are also local initiatives in communities across the continent including Renovators Resource in Halifax, Nova Scotia. Renovators Resource is an architectural salvage and dismantling business that was kickstarted by owner and architect Jennifer Corson's thesis project which also led to a TV series, *The Resourceful Renovator* and an architectural practice, Solterre Design in Halifax.¹⁰⁰ Habitat ReStore, along with small scale business models such as Renovators Resource along with the resourcefulness of local arctic communities makes a strong case for introducing infrastructure to improve the resale culture and generate a local architectural salvage market.

One way to introduce more construction material into a Re-Store is to shift the standard from demolition to deconstruction. As previously mentioned, demolition has become the standard for buildings at the end of their life cycle due to its low cost and short time frame. By contrast, deconstruction does cost approximately 20% more and takes 2-10 times longer than demolition depending on the project;¹⁰¹ it is understandable that demolition has become the standard, yet as we continue to change the definition of waste and shift towards more carbon neutral processes, deconstruction becomes more and more plausible. *Unbuilders* is a deconstruction and salvage company based in Vancouver that plans to be at the forefront of this shift from demolition to deconstruction. Layer by layer *Unbuilders* dismantles homes and commercial buildings on the West Coast and reclaims the wood, doors, windows, appliances, and equipment for reuse and resell. A deconstruction economy has the ability to generate 6 jobs to 1 demolition job; an additional incentive to generate a cyclical approach to construction in Iqaluit.¹⁰²

Figure 31: Existing and proposed system precedents.

1. City of Iqaluit call for Reuse Centre in 2014 Waste Management Plan to divert waste from landfill such as furniture, appliances and construction materials.
2. Habitat for Humanity has been building homes for families in need in Iqaluit for a number of years and hopes to introduce a Restore in the community.
3. Nunavut Arctic College has been developing post secondary education across the territory including programs in health, education, law and trades.
4. Habitat ReStore locations have the ability to be an effective waste diversion tactic as well as provide affordable items for the community.
5. Unbuilders is hoping to grow the deconstruction industry to reduce the waste produced in the construction industry.
6. Rural Studio a small scale design-build program promoting community driven, affordable and sustainable projects.

100 Renovators Resource. <https://www.solterre.com/jen>; <http://www.renovators-resource.com/aboutus.php>

101 Mark Gorgolewski, *Resource Salvation: The Architecture of Reuse*, 1st edition (Hoboken, NJ: Wiley-Blackwell, 2017). 51

102 Corneil, Adam. "How It Works." Unbuilders, October 20, 2020. <https://unbuilders.com/how-it-works/>.



Existing Organizations:

- 1. **City of Iqaluit**
Solid Waste Management Plan
January 2014



Proposed Organizations:

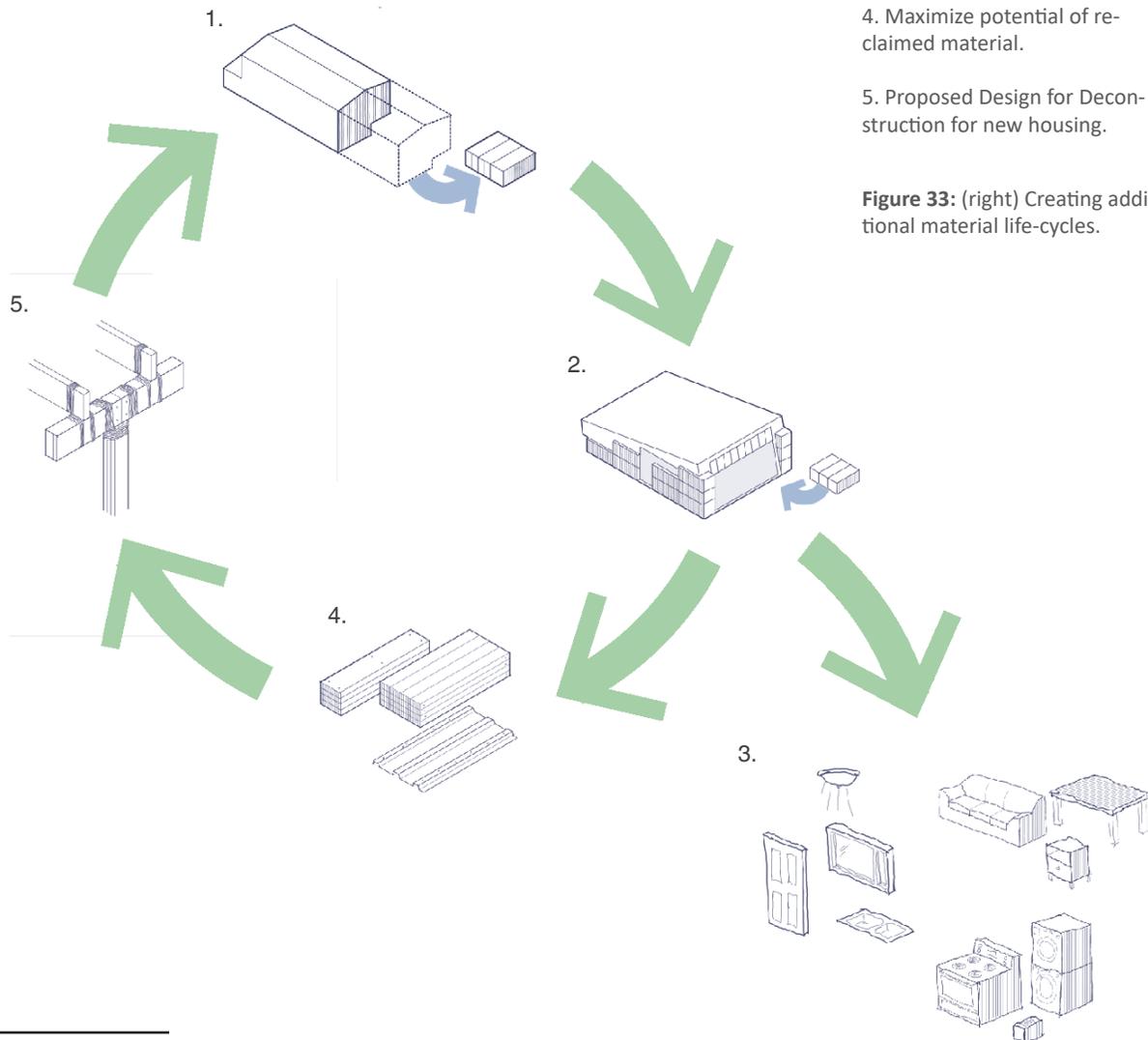


There are numerous barriers to deconstruction and reuse including a lack of policy and incentive, poor perception of reused materials, economic uncertainties as well as the certification, liability, and code restrictions of reused materials.¹⁰³ The minimal regulations and policies in place to encourage building owners to deconstruct rather than demolish are not very well-known, thus demolition seems to be the only viable option. The federal and provincial governments do provide a deconstruction tax credit when this method is used and the material is donated to an organization such as Habitat Re-Store. The initial upfront cost

Figure 32: (left) Proposed Circular Construction Framework.

1. Deconstructing abandoned and depleted housing.
2. Proposed Re-Store to manage material from the deconstruction economy.
3. Proposed Re-Store will aid in the restoration and resale of various household items.
4. Maximize potential of reclaimed material.
5. Proposed Design for Deconstruction for new housing.

Figure 33: (right) Creating additional material life-cycles.



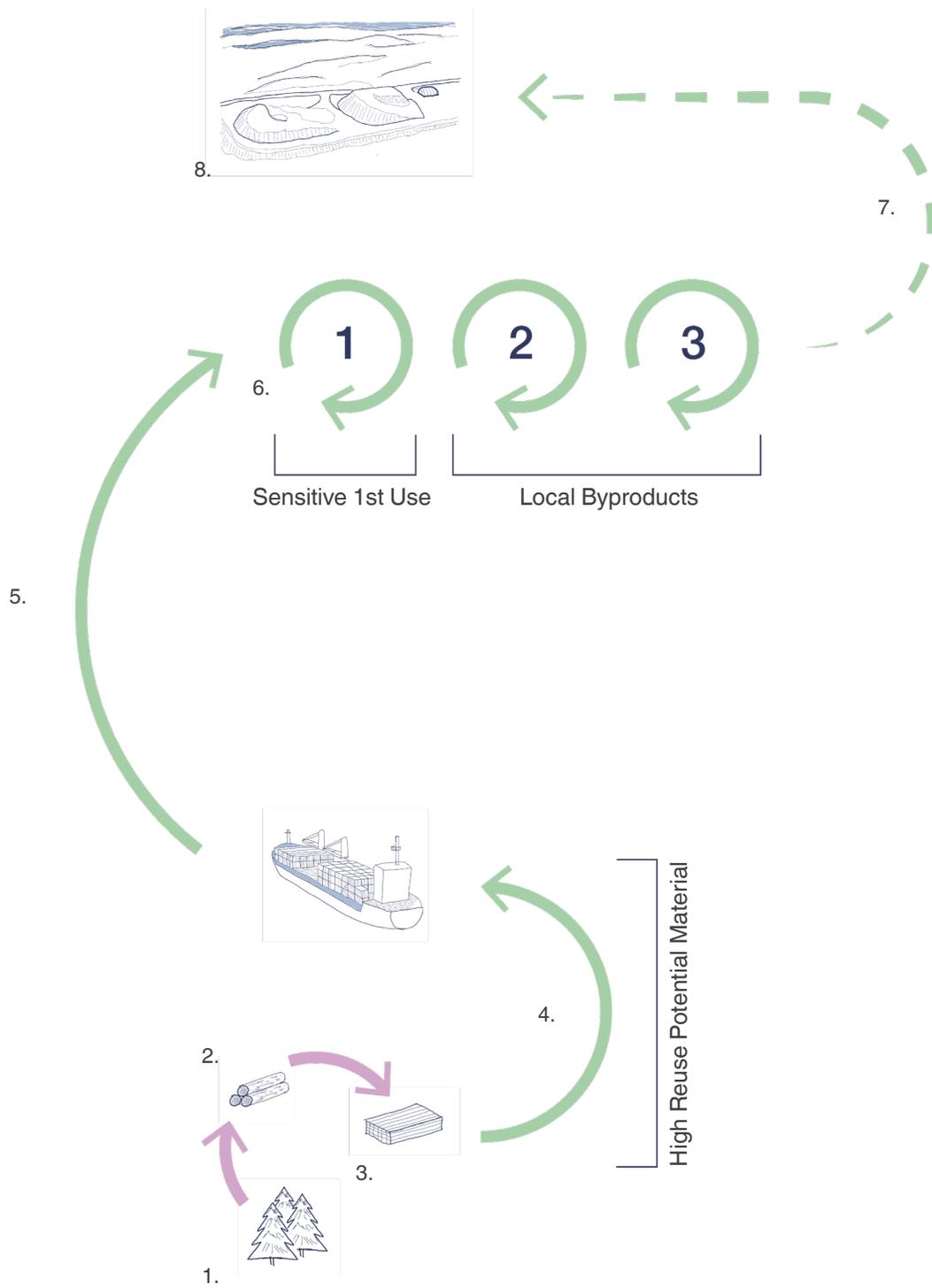
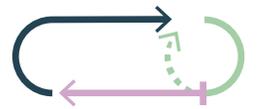
of deconstruction is higher, but the tax credit returns the upfront costs and, in the end, makes demolition more expensive.¹⁰⁴ Reused materials are perceived to be low quality and unable to be aesthetically pleasing. This is due in part to the minimal, yet growing reuse practices in the industry, which result in a lack of precedents as successful examples of reuse. The economics of deconstruction and reuse are also challenging to overcome in terms of cost as previously mentioned, but also because of the many unknowns of the deconstruction and reuse processes. These unknowns include the salvageability and restoration of material, the longevity of buildings, and the time it takes to deconstruct them as well as the design challenges of using reclaimed material successfully. The main design challenges for using reclaimed materials are associated with the risks of material certification and testing, increased insurance rates, and barriers within building codes. These risks are often associated with structural components because engineers are reluctant to sign off on material that may not have the structural integrity it had in its first use. This hurdle starts with educating the regulatory bodies that generate cyclical material lifecycles and implementing systems to reverify material for reuse.¹⁰⁵ Overcoming the barriers of deconstruction and reuse, especially in an Arctic context, will remain challenging but also has the potential to reclaim an obsolete yet dominant housing system to move towards a decolonized housing system.

Figure 34: Carbon benefits of material reuse in an arctic context.

1. Raw Material.
2. Transport to processing.
3. Operations of Manufacturing.
4. Transport material with high reuse potential to sea-lift facility.
5. Transport to Arctic Community.
6. Sensitively design and detail material use in 1st lift-cycle. Generate additional life-cycles by creating local by products.
7. Generate community oriented waste diversion tactics.
8. Minimize material entering Arctic landfills.

104 "Deconstruction." The ReUse People. Accessed March 25, 2022. <http://www.thereusepeople.ca/node/5> ; Pablo , Carlito. "Deconstruction of Homes Reduces Carbon Emissions, Saves Costs, and Preserves Heritage." The Georgia Straight, April 21, 2021. <https://www.straight.com/news/deconstruction-of-homes-reduces-carbon-emissions-saves-costs-and-preserves-heritage#:~:text=Online%2C%20Unbuilders%20explains%20that%20the,comparison%2C%20traditional%20demolition%20costs%20%2426%2C500>.

105 Mark Gorgolewski, Resource Salvation: The Architecture of Reuse, 1st edition (Hoboken, NJ: Wiley-Blackwell, 2017). XX



A supportive element of this thesis project is the development of an artefact for my Fabrication II course. I decided to use my artefact to demonstrate the proposed circular construction framework by deconstructing reclaimed wood pallets, taking an inventory of useable material, reconfiguring the material with minimal alterations and using design for deconstruction (DfD) principles. One of DfD methods used in the 'Reclaimed Bench' artefact is the lashing techniques present in the qamutiik tectonics. A qamutiik is a traditional dog sled and the tectonics have been developed through local craft over generations and has the ability to flex and absorb the relentless arctic terrain. During the process of creating the Reclaimed Bench I discovered many aspects of the proposed framework including the various levels of salvageability of material, methods of 'designing' or reconfiguring reclaimed material, the ingenuity of the qamutiik tectonics, the limitations of lashing and the need to adjust and respond to the material, tectonics and structural integrity of the artefact throughout the process. The 'final' artefact is the result of this demonstration of circularity as the entire structure can be dismantled and prepped for its 3rd life cycle.

(opposite-left to right)

Figure 35: Reclaimed wood pallets.

Figure 36: Pallet deconstruction process.

Figure 37: Deconstructed pallet

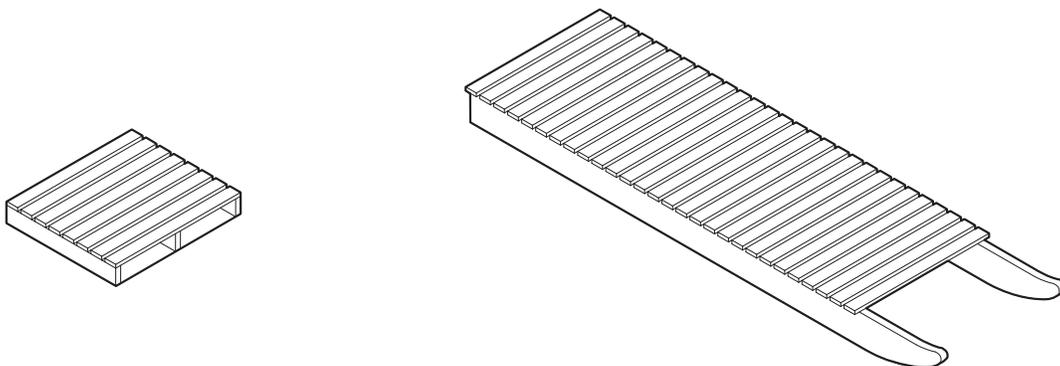
Figure 38: Inventory of reusable material from deconstructed pallet.

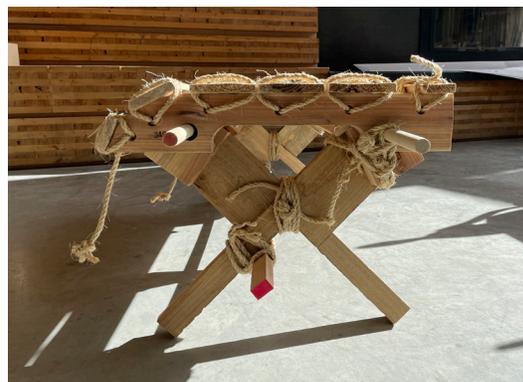
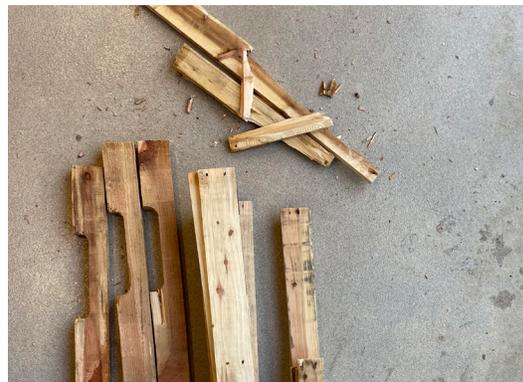
Figure 39: Reconfiguring material with minimal processing for reuse.

Figure 40: Pallet material reconfigured along with other found items.

Figure 41: Material assembled using traditional qamutiik tectonics and design for deconstruction principles.

Figure 42: (Left) Line drawing of wood pallet and qamutiik.





4.3 - Proposed Circular Construction Framework

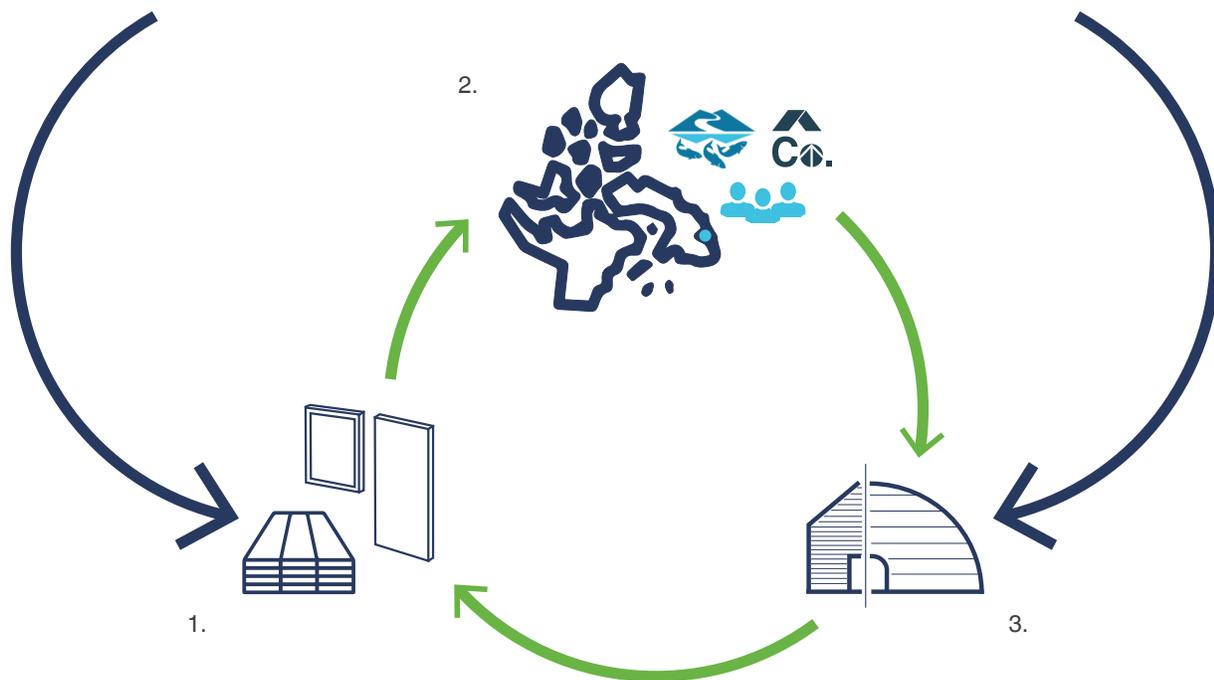
The proposed circular construction framework aims to deconstruct abandoned structures and depleted, unlivable housing stock in a timely and sensitive manner to begin reclaiming construction material in effort to provide affordable material for the local community. The initial intent of the proposed framework is to encourage the existing spatial agency within the community such as the construction of storage sheds, outdoor workshops, small house additions and cabins. This initial phase will be small in scale but will generate local jobs in deconstruction as well as restoration and retail at the proposed Habitat ReStore. As the ReStore solidifies and grows as a part of the local resell/reuse culture; the deconstruction economy can begin to upscale and generate more material for more formal, small-scale housing that is driven by the owner. In order to ensure that deconstructed housing turns over new housing, new owners can be selected pre-deconstruction based on the scale and salvageability of the to be deconstructed housing. This will allow for future planning to take place and time for the arrival of required new material. The design and construction of reclaimed housing will be supported by the proposed Community Collaboration Studio (Co. Studio) which will be a part of the Habitat ReStore program. Co. Studio will be derived from the Rural Studio model which is a design-build studio course at Auburn University. Co. Studio is proposed to be in association with a proposed pre-Bachelor of Architectural Studies, Design-Build course at Nunavut Arctic College. Nunavut Arctic College currently provides professional courses via partnerships with southern universities; The Design-Build course has the potential to be supported by the McEwen School of Architecture which has a similar values and framework based on their curriculum. Co.Studio and the Design-Build students will facilitate the design of reclaimed housing with new home owners; this process aims to generate local design solutions and provide pre-construction agency to homeowners as well as develop local designers and potentially future Inuit architects.

The housing stocking in Iqaluit and across the territory is continuing to degrade under the stress of overuse and the harsh arctic environment. The life span of housing in Nunavut is 20-30 years and determined obsolete by 40 years.¹⁰⁶ Over 60% of the NHC housing stock is over 20 years old meaning their will be a significant amount of turnover in the next 20 years. During this shift the framework's deconstruction economy will reduce waste of demolition while also proposing that any new social housing shall be designed for deconstruction (DfD) to ensure that future housing can be reclaimed and with greater efficiency.

Figure 43: Organizational structure and community oriented collaborative design process of the proposed Circular Construction Framework.

1. Resulting reclaimed material from the proposed deconstruction economy and ReStore.
2. Design collaboration between community, local design-build students and staff of the Co-Studio.
3. Sustainable and local housing solutions developed by the proposed circular construction framework.

106 Brown, Tim. Iqaluit Housing Thesis Discussion . Personal, January 26, 2022.



The DfD principles proposed are as follows:¹⁰⁷

1. Utilize dimensional lumber structures that are kept warm and dry.
2. Create adaptable interiors with no wet trades.
3. Select durable materials with precaution and opportunities for reuse.
4. Install accessible, loose systems and components for ease of maintenance and removal.
5. Avoid entangled, complex details and assemblies; eliminate adhesives while using fewer, stronger mechanical fasteners.

The DfD are proposed to establish the circular construction framework into the future. The Canadian Government and the CMHC are still responsible for mitigating the housing shortage in the short-term using existing models¹⁰⁸ but with the introduction of DfD principles these future units can be reclaimed by the community in the long term. The proposed circular construction framework will also require a new funding model which supports new home owners taking part in the new, community oriented design process at Co.Studio. The proposed, high-level funding model uses a hybrid funding structure with regional Inuit Organizations allocating funds to new homeowners using a model similar to Rent Geared to Income (RGI), where support is determined by current income but also future potential and social impact on the community. Our current society and financial institutions rely on financial status as the primary metric to receive financial support; Inuit Organizations could potentially financially support individuals based on their social impact to reduce their mortgage that would still be provided by financial institutions. This high-level model would move away from the challenges of relying solely on the RGI model and move towards a funding structure that aligns with traditional values through community building as well as finances.

Figure 44: Proposed funding structure for affordable housing.

107 US Environmental Protection Agency; Chartwell School. (2022, March). Design for Deconstruction. Reading.

108 Improvements on the existing model are required but are not a part of this thesis project.



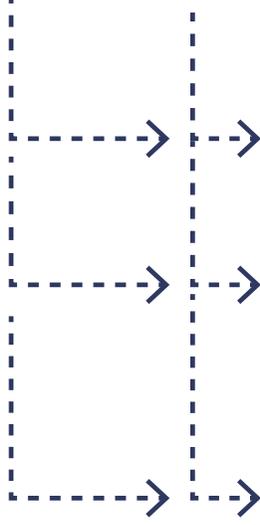
Canada



Standard Income Metric



Standard Income Metric



Social Impact Metric

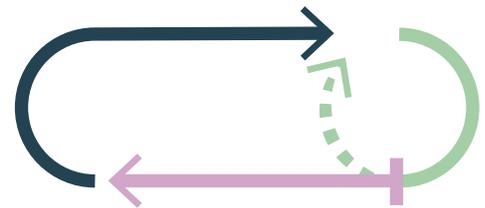


Chapter 5:

Cyclical Housing Framework: *An Incremental Shift*

- 5.1** Proposed Purpose Built Re-Store
- 5.2** Cyclical Housing Demonstration
- 5.3** Potential Housing Outcome

Chapter 5 outlines the design of the proposed ReStore and Co.Studio programs followed by a demonstration of the proposed framework on an underutilized site. One housing demonstration, a semi-detached grow home, is then covered in further detail as a potential housing outcome of the new collaborative design process.





5.1 - Proposed Purposed Built ReStore

Figure 45: City of Iqaluit key plan showing ReStore and Housing sites.

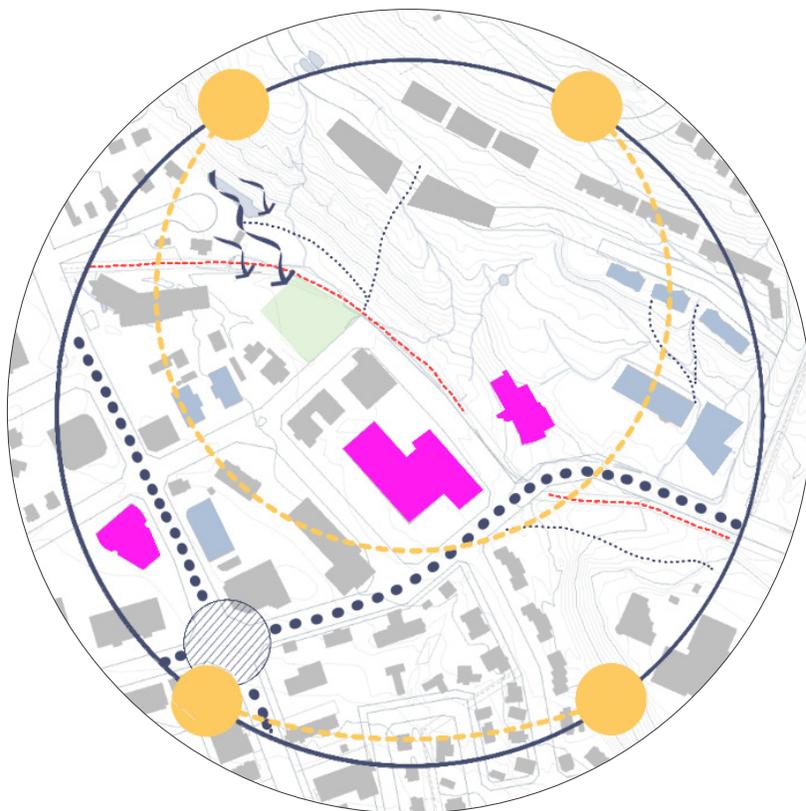
In association with Habitat for Humanity Iqaluit, Habitat ReStore and at the request of the City of Iqaluit's 2014 Waste Management plan, this thesis introduced a restore program in the Iqaluit. Habitat ReStores are an integral part of waste diversion in North America and is a program in need across the arctic. Selecting a potential site for a new purposed built ReStore in Iqaluit was based on suggestions from various Habitat ReStore member interviews. Their team members suggested having a site that is in an accessible, safe part of town and that the location is key to acquiring donations. Initially, this led me to the West Forty industrial area where the current landfill is located. I would later reconsider this location as the ReStore was developing into more of a public program with the introduction of a design and research studio as well as the potential relocation of the active landfill. The new potential site is located on Kangiqsliq next to the Elks Club where there are currently two empty lots that were previously occupied by recently demolished housing structures. This location is centrally located and in close proximity to the Nunavut Arctic College campus, a key part of the proposed Community Collaboration Studio.

Legend:

- ReStore Site
- Housing Site



The site sits at the base of the Lower Plateau with prevailing North-West winds sweeping across the untouched slope below the Upper Plateau. The design intent of the ReStore structure is to utilize existing seacans in the community as a means to not only store restore material but to create a substructure to create industrial and commercial space. The seacans are strategically stacked in two rows to create a two-story space between that is shaped by the environmental forces on the site. The north façade cuts into the prevailing northwest winds to carry snow over and under the rectangular structure. The south façade is similarly angled, to capture as much solar gain and power as possible. To mitigate the solar gain in the long days of summer, a double-glazed façade is introduced to capture unwanted heat that can be utilized later in the day if desired. The structure also creates opportunities for passive cooling in the summer using cross ventilation and stack effect techniques.



Legend:

- ReStore Site
- Key Programs
- Arctic College
- 4-Corners



Figure 46: (left) ReStore Site Analysis.

Figure 47: (right-top) Plan and Section analysis of proposed ReStore showing snow accumulation and passive strategies.

Figure 48: (right-bottom) Plan and Elevation development sketches of proposed ReStore.

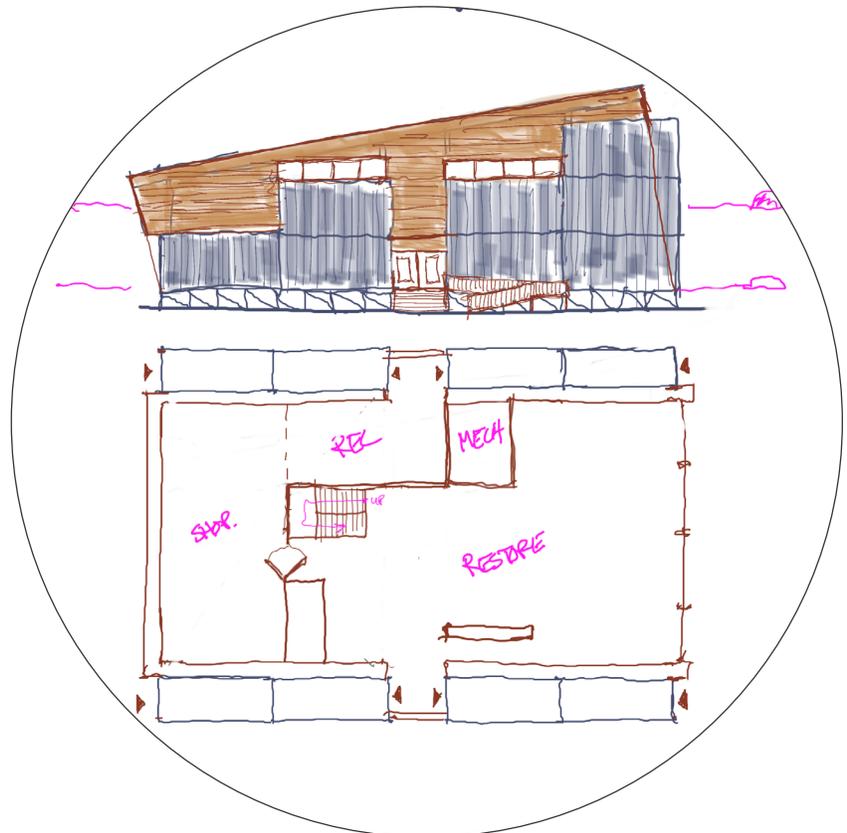
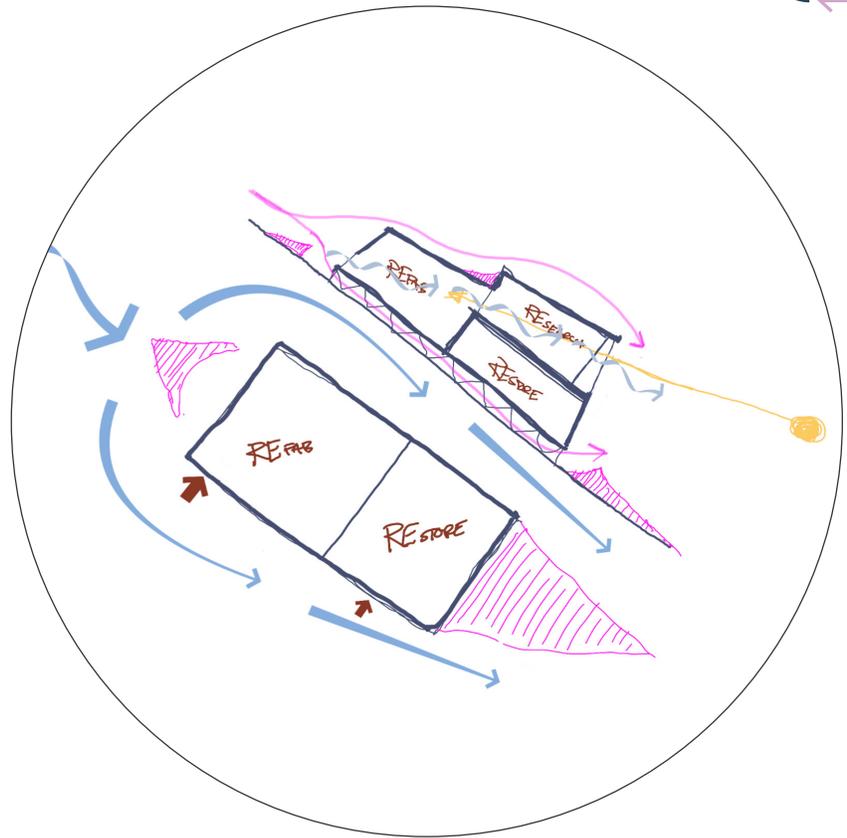
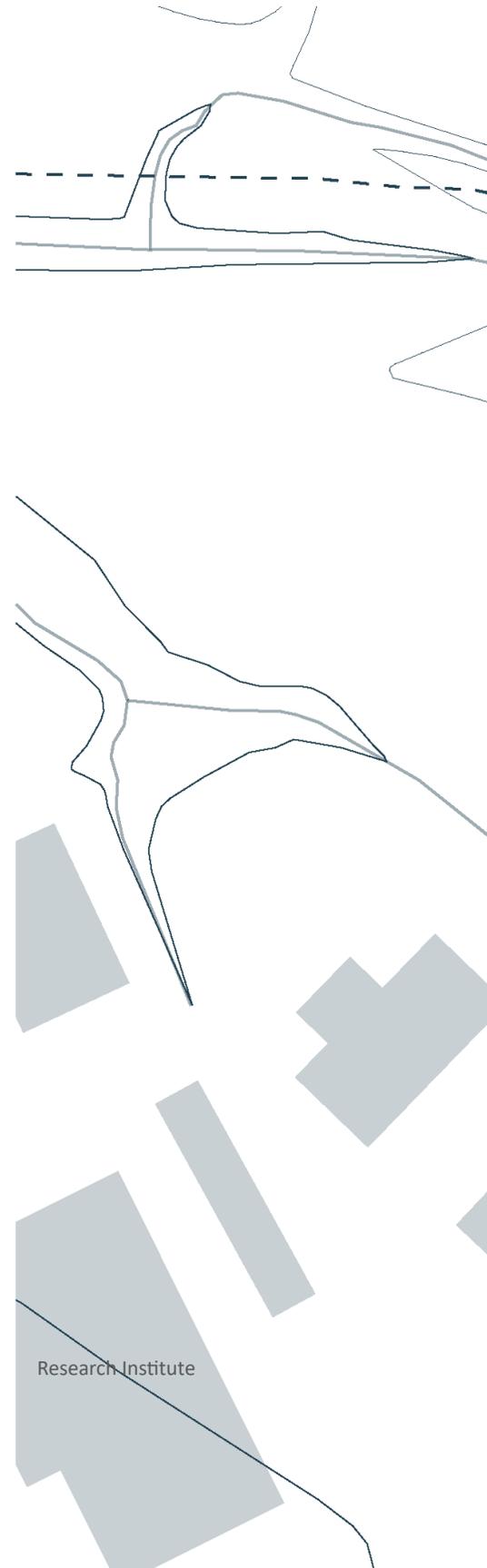


Figure 49: (left) Exterior Vignette of proposed ReStore.

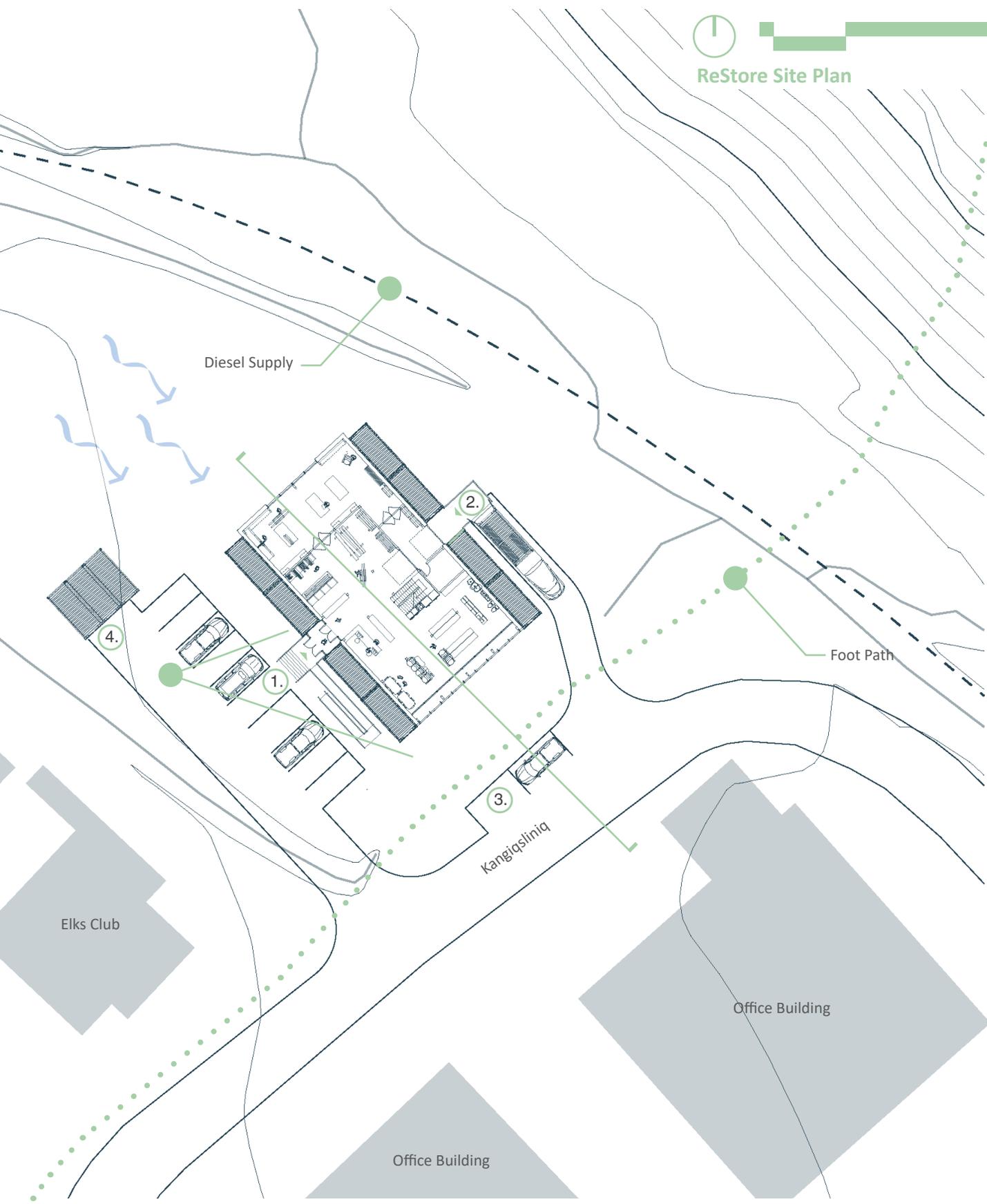
Figure 50: (right) Proposed ReStore Site Plan.

1. ReStore Main Entry.
2. Loading Dock.
3. Pickup/Drop-off Que.
4. Seacans for material pickups.





ReStore Site Plan

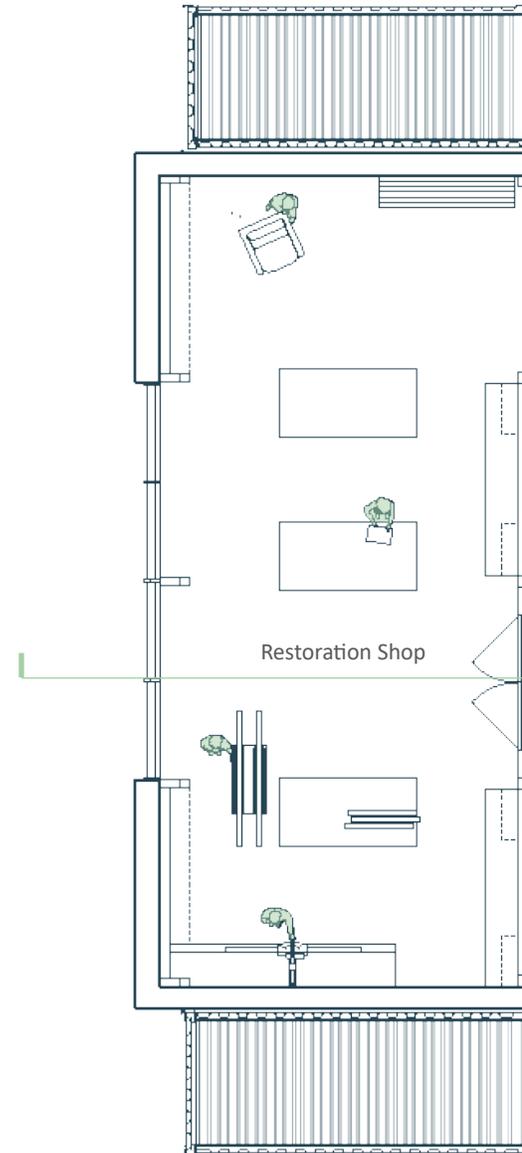


The first-floor plan of the proposed building has two main programs, the open plan ReStore and the restoration shop. In general, ReStores have an open, flexible floor plan to accommodate the wide variety of donations received. Donations vary drastically in quantity and scale meaning the retail space and shelving needs to be adaptable in order to accommodate the shifting needs of the space. Currently the space has four basic areas: construction material, appliances, household fixtures and furniture. The adjacent seacans will accommodate material overflow as well as incoming or outgoing material not for purchase. The restoration shop is simply a space with workbenches and tables for various levels of restoration or upcycling of donated items. The shop, along with the ReStore, has direct access to an airlocked receiving bay which will accommodate the restore pickup and delivery truck as well as donations and pickups by the general public.



Figure 51: (left) Interior Vignette of 1st floor ReStore space.

Figure 52: (right) Proposed ReStore 1st Floor Plan.





ReStore 1st Floor Plan

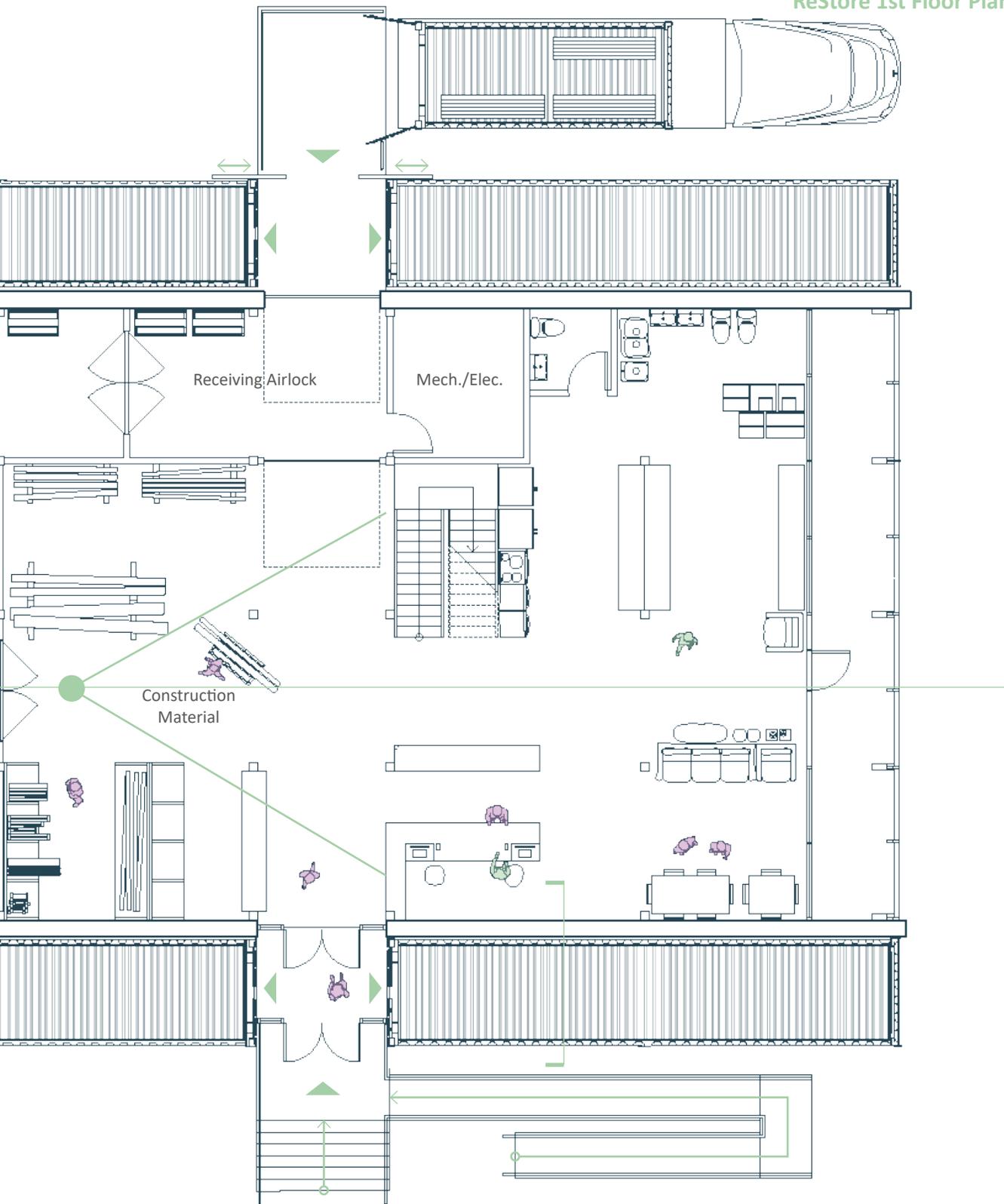
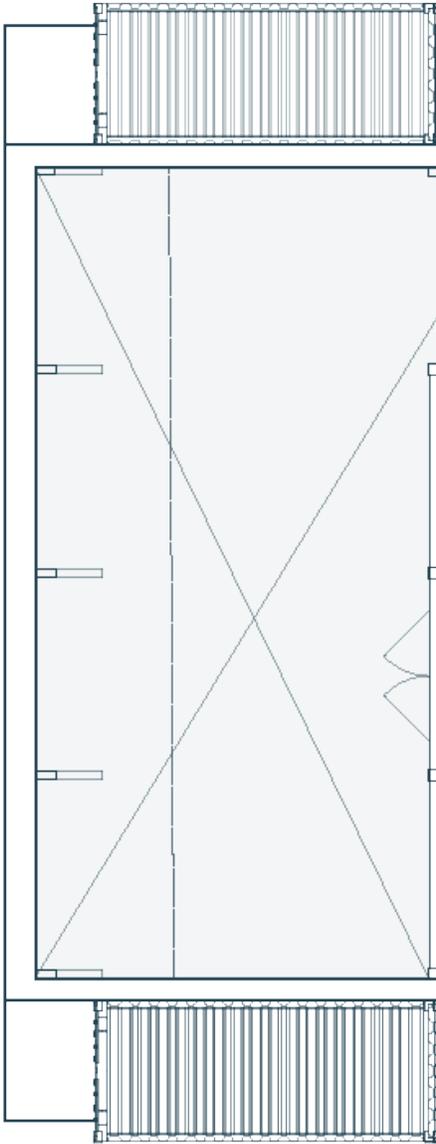


Figure 53: (left) Interior Vignette of 2nd floor Co.Studio space.

Figure 54: (right) Proposed ReStore 2nd Floor Plan.

The second-floor plan is accessed by a central open stair and accommodates the Community Collaboration Studio which includes an open studio and classroom space intended to host a small number of Nunavut Arctic College students in a proposed design-build program. The new program is modeled after Rural Studio, a small-scale off-site design-build studio from Auburn University that is based in rural Alabama. The students work alongside the community to generate, place-based, affordable housing solutions and facilitate the design-build process with the owners. The handful of local students are guided by a team of design and construction professionals with local experience as well as traditional knowledge carriers. The Co-Studio has a round table room for discussions with the team of collaborators, an enclosed office for the team leader along with support spaces for both the Co-Studio and ReStore teams including a washroom and staff area. There is a secondary office for the ReStore and Material manager who will not only oversee the management of the ReStore employees but also manage the deconstruction process and the resulting material.





ReStore 2nd Floor Plan

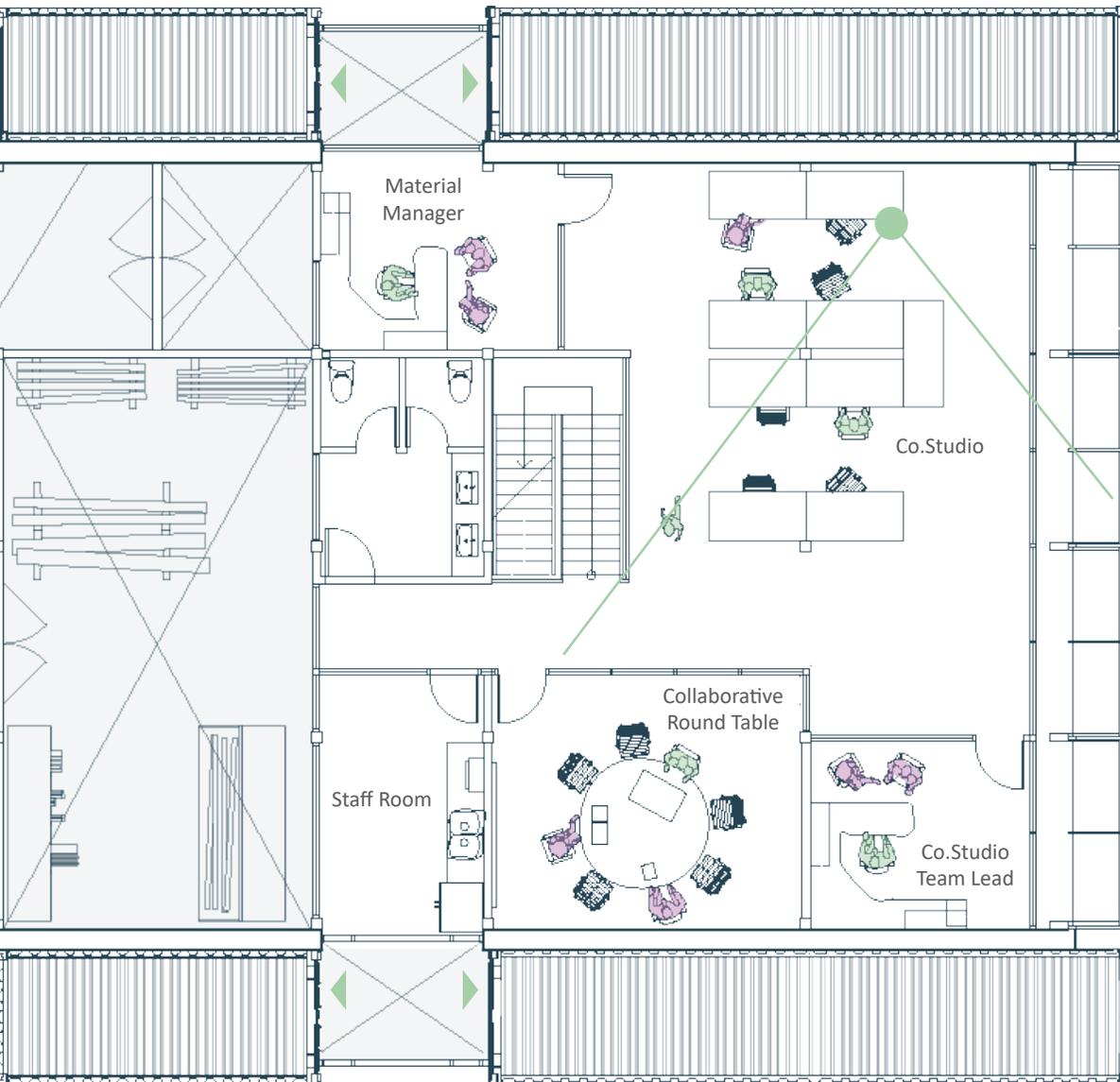
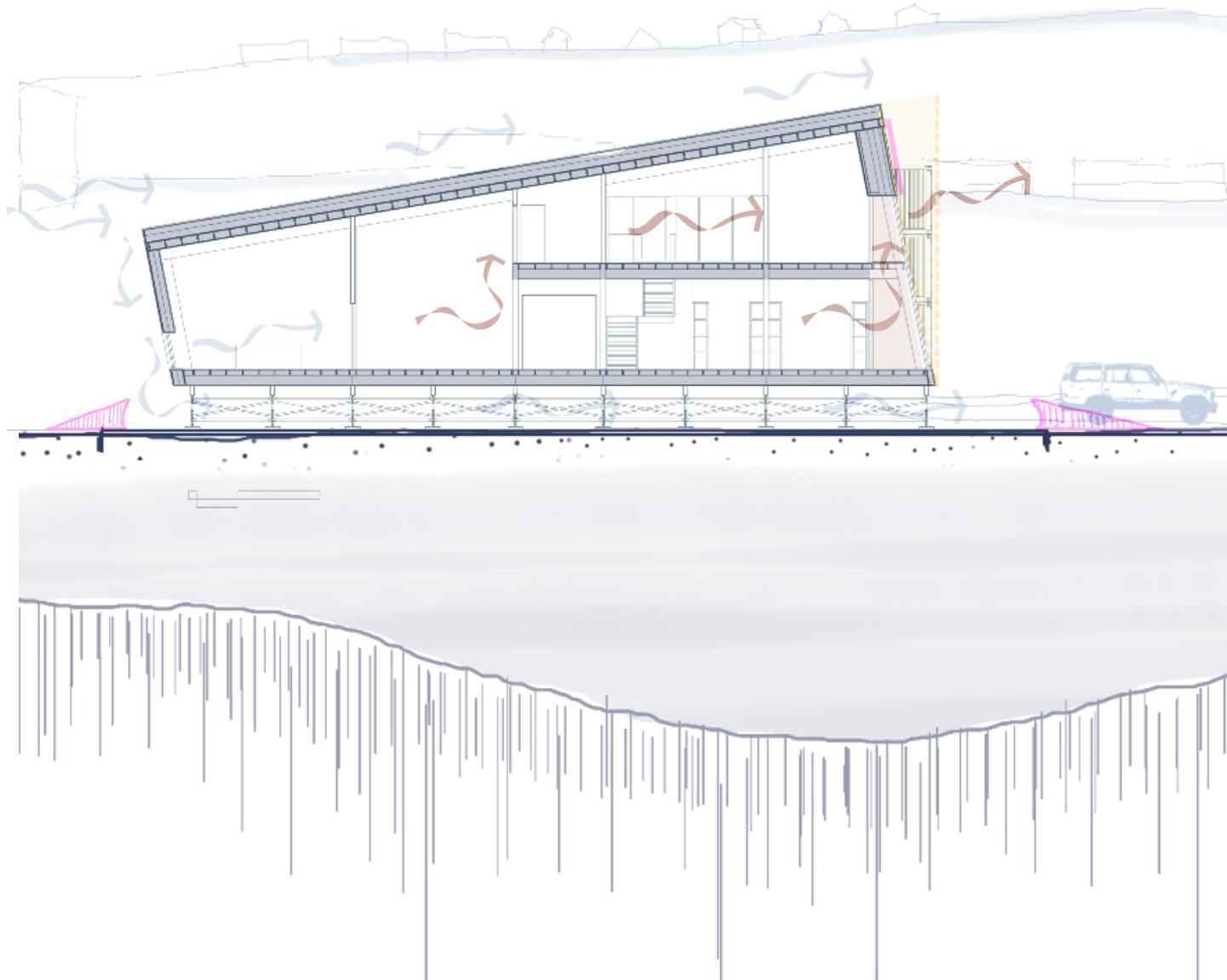
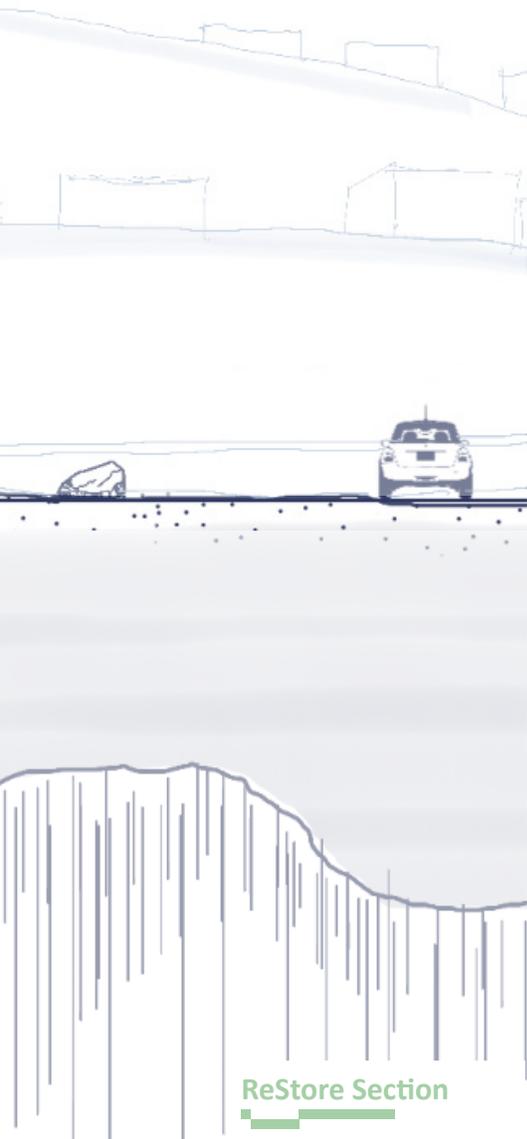


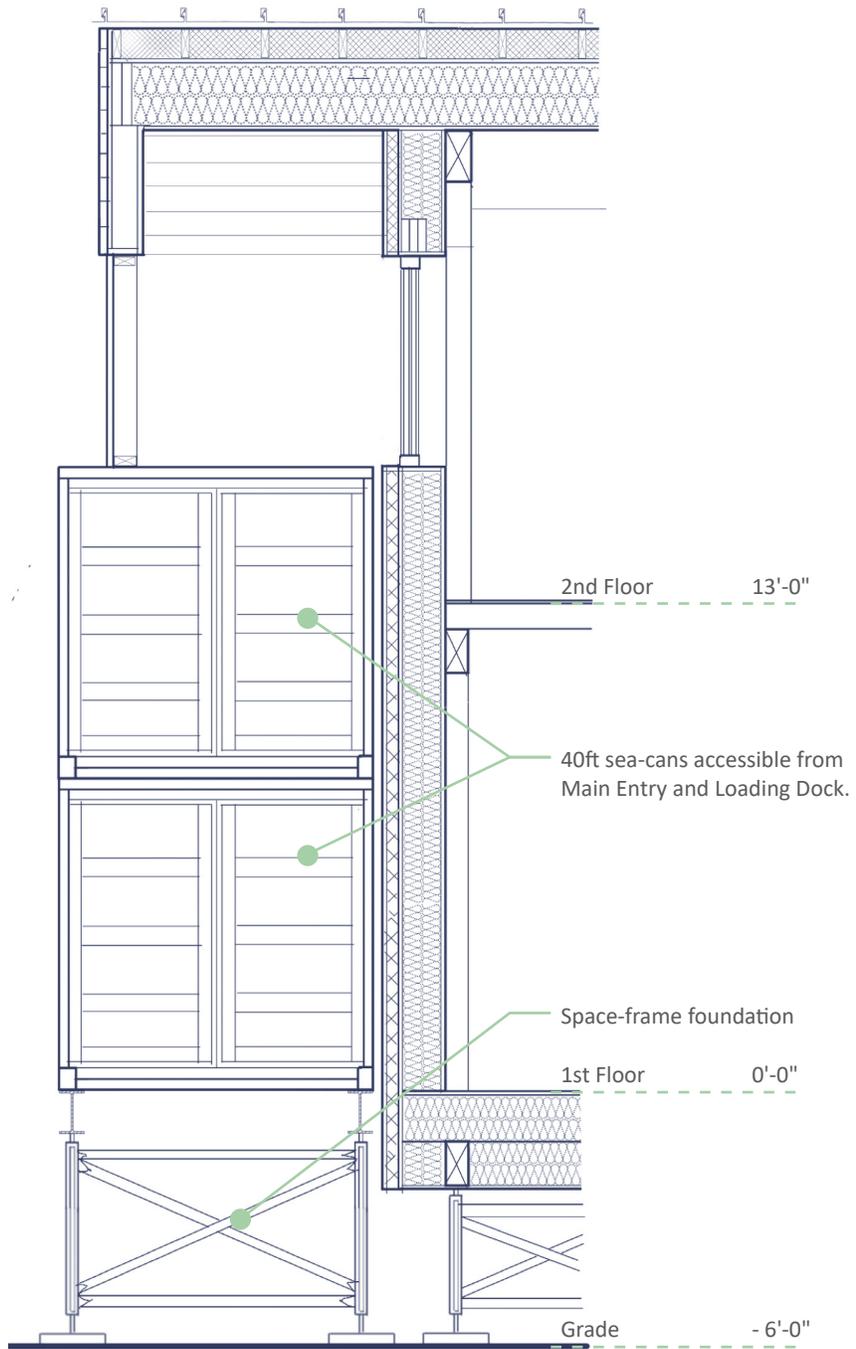
Figure 55: (left) Building Section and passive strategies of proposed ReStore.

Figure 56: (right) Wall Section of proposed ReStore.



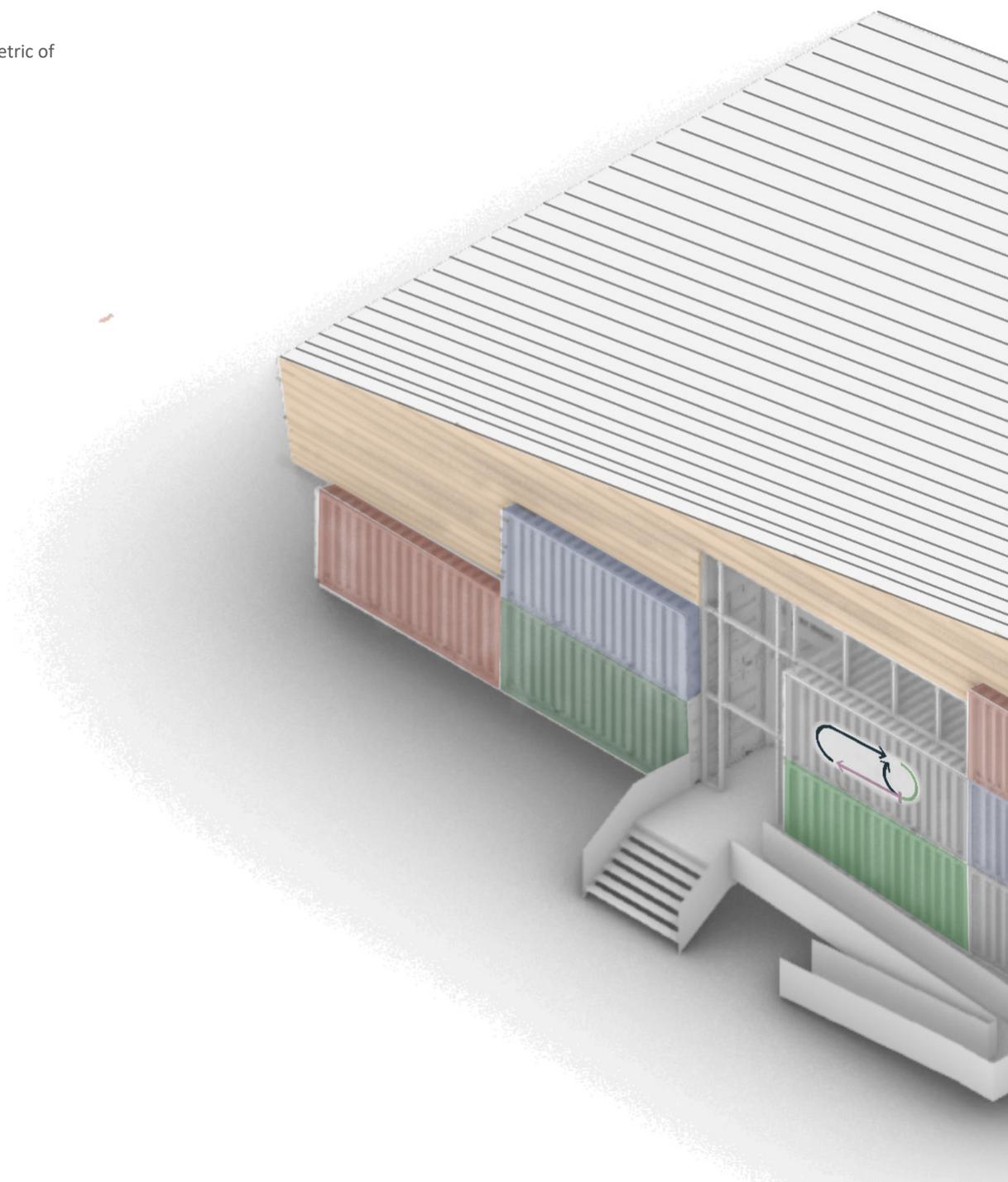


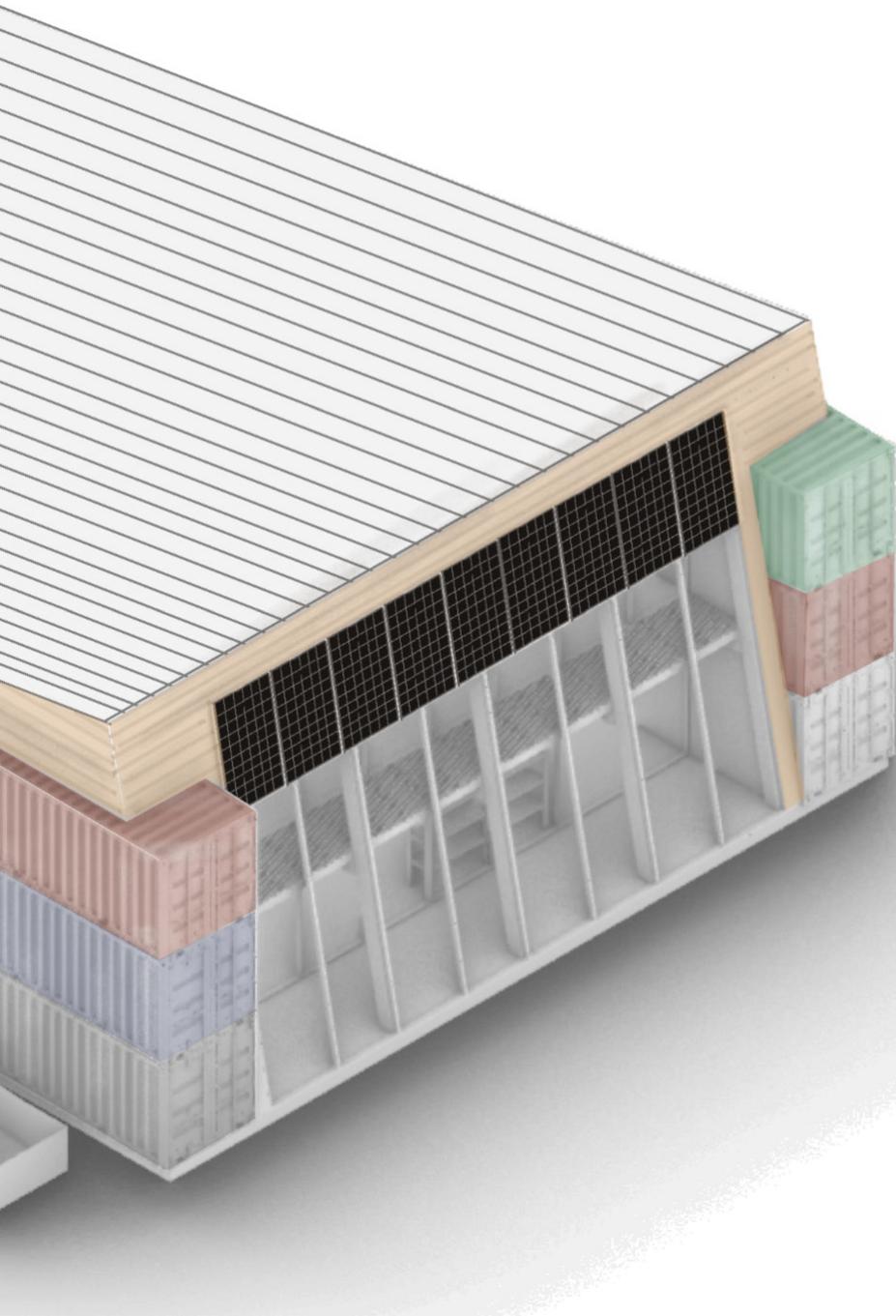
ReStore Section



ReStore Wall Section

Figure 57: South Isometric of proposed Re-Store.





5.2 - Cyclical Housing Demonstration

Following my research and development of the circular construction framework I decided to demonstrate the framework on an underutilized, walkable site off of Queen Elizabeth between Sinaa and Nipisa Street. The site is currently home to eleven single family dwellings, six of which are abandoned houses currently owned by the City of Iqaluit and previously owned by the federal government for housing members of the RCMP. The site is also home to two commercial buildings, a 2-storey Arctic Survival Store and a 3-storey office building for the Nunavut Power Corporation. The site development is approached incrementally as the circular construction framework unfolds by deconstructing three of the abandoned houses to stock the Re-Store and encourage spatial agency within the community. Due to the severity of the housing shortage it is required to continue the efforts of the Nunavut Housing Corporation to mitigate the housing crisis by supplying housing to communities in need, including Iqaluit. The circular construction framework proposes that the existing NHC 5-plex model be redesigned using the Design for Deconstruction (DfD) principles which enable the reclamation of material, space and agency in the future. As more depleted housing is deconstructed and reclaimed material volumes increase, small scale reclaimed housing projects will emerge from the collaboration with new home owners and the Co-Studio. The results of this collaboration are speculative as the needs of clients will be at the forefront of the proposed housing design process but for the purpose of this thesis I feel it is necessary to communicate housing *potentials* at various scales and levels of detail.

Figure 58: (left) Existing tenure of housing site.

Figure 59: (top-right) City of Iqaluit key plan showing ReStore and Housing sites.

Figure 60: (bottom-right) Housing site analysis.



Legend:

- Abandoned House
- Private Home
- NHC Rental Unit
- Commercial



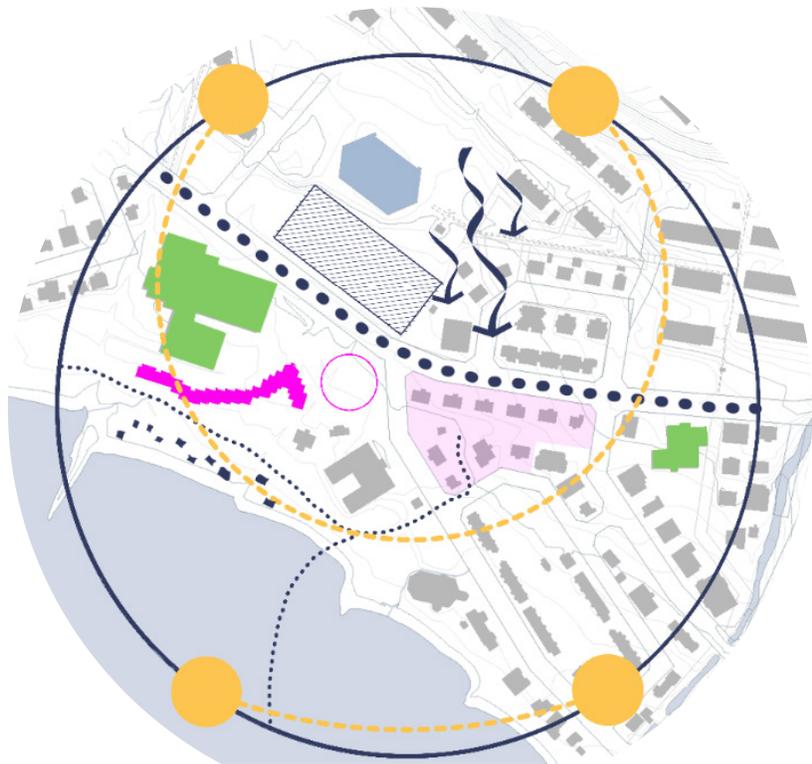
Legend:

- ReStore Site
- Housing Site



Legend:

- Housing Site
- Elder Residence
- Grocery Store
- Elementary School
- Community Gathering



0 - Existing Condition

An Underutilized, central **site used as a demonstration for the proposed framework**. The site includes 6-abandoned single-family dwellings previously owned by the Federal Government for housing the RCMP.

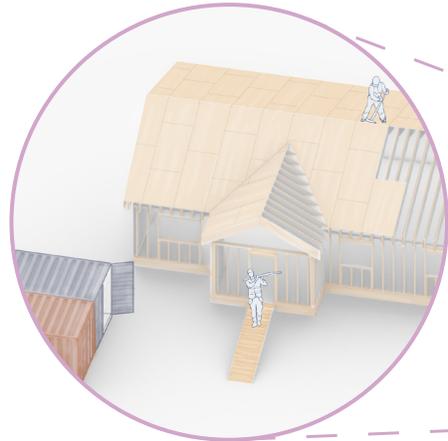
Figure 61: (top-left to right) Existing Condition: A) Photo. B) Isometric. C) Figure Ground.



1 - Deconstruction

Deconstruction of 3-abandoned dwellings, **generating 6x the jobs compared to conventional demolition**. Reclaimed material is collected to provide affordable construction material for future use at the proposed Re-Store.

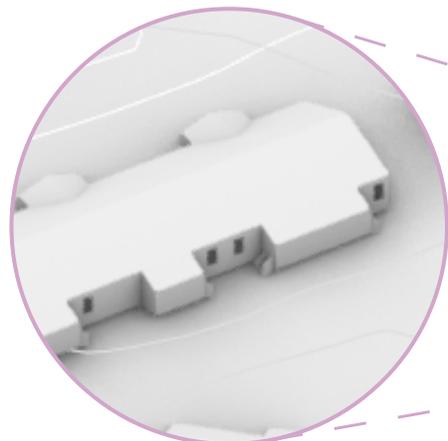
Figure 62: (middle-left to right) Deconstruction: A) Vignette. B) Isometric. C) Figure Ground.

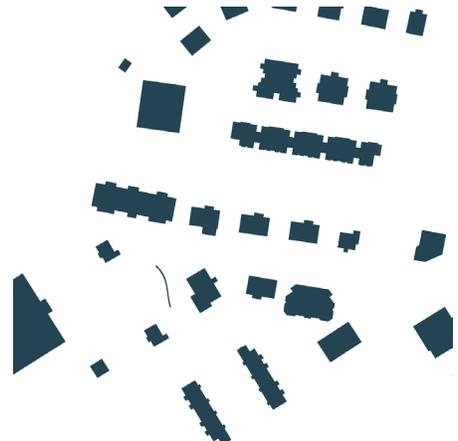
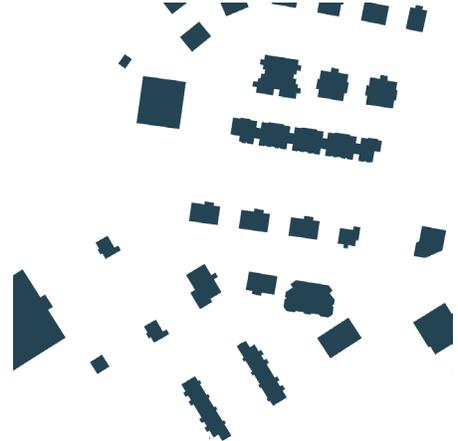
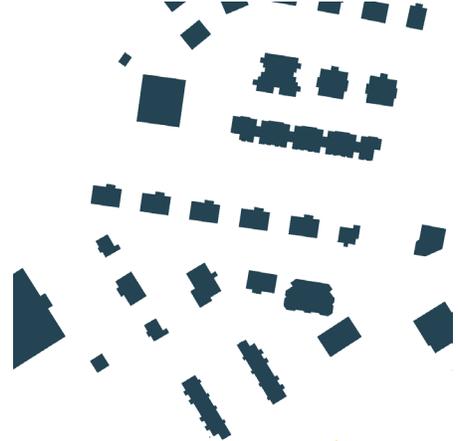


2 - Design for Deconstruction (DfD)

All future housing projects by the NHC to be Designed for Deconstruction (DfD) to **make deconstruction easier and more efficient in the future in order to reduce construction waste**. The new DfD housing will be reclaimed by the community when applicable.

Figure 63: (bottom-left to right) DfD: A) Vignette. B) Isometric. C) Figure Ground.





3 - Existing Spatial Agency

The existing spatial agency within communities surfaces through housing additions, sheds, cabins and in between spaces. These practices will be **encouraged using affordable construction material** from the proposed Re-Store.

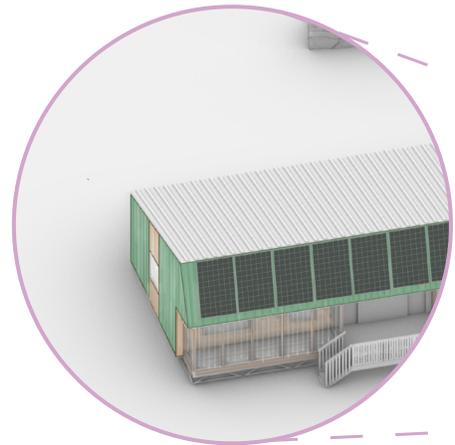
Figure 64: (top-left to right) Existing Spatial Agency: A) Vignette. B) Isometric. C) Figure Ground.



4 - Affordable Housing Type

Affordable housing types will be **generated through the Co. Studio and reclaimed construction materials**. The proposed semi-detached, affordable grow home is primary affordable type proposed in this thesis.

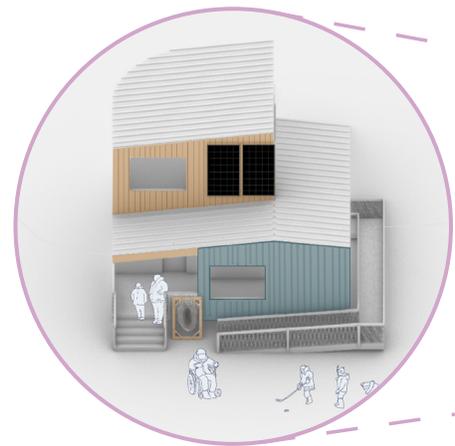
Figure 65: (middle-left to right) Affordable Housing Types: A) Vignette. B) Isometric. C) Figure Ground.

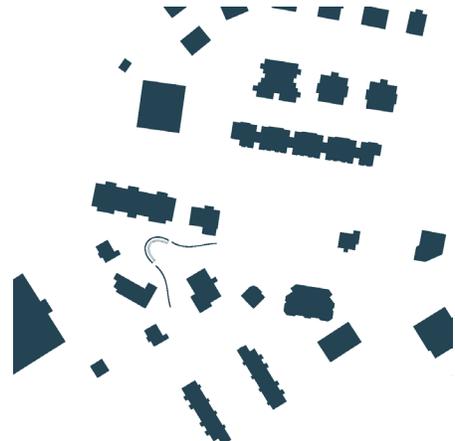
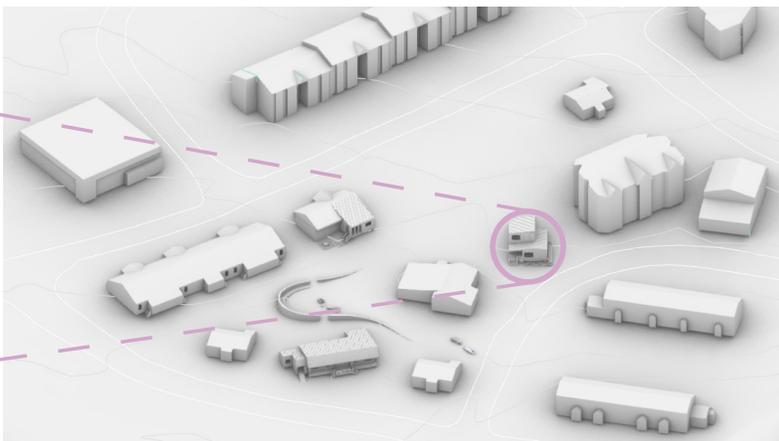
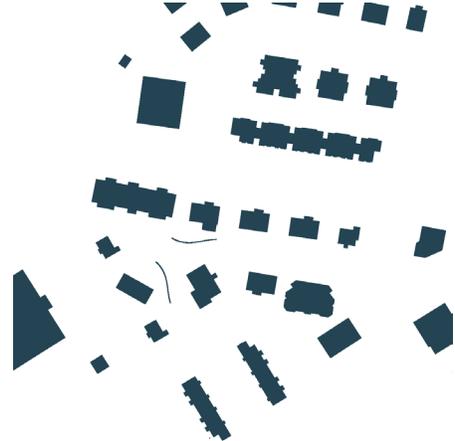
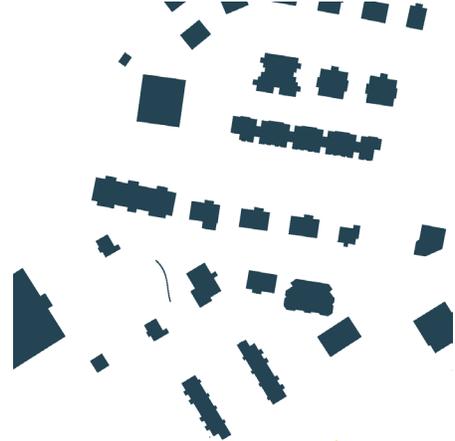


4 - Affordable Housing Type

Another way of making home ownership more affordable is to provide **purpose-built intergenerational living or market rental suites** for financial support.

Figure 66: (top-left to right) Affordable Housing Type: A) Vignette. B) Isometric. C) Figure Ground.

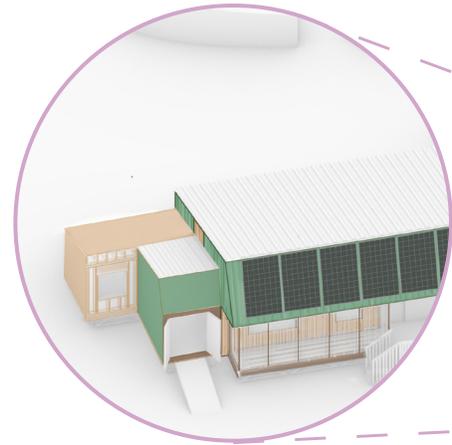




5 - Improving Spatial Agency

The primary potential housing type proposed in this thesis allows for **incremental growth to adapt to the needs of the residents**. The structure allows for the space to be adapted easily to be affordable for the residents.

Figure 67: Improving Spatial Agency: A) Vignette. B) Isometric. C) Figure Ground.



5 - High Density Collectives

As the deconstruction economy increases in scale so can the reclaimed housing. **Developing Co-ops and Co-Housing groups** can be an affordable ownership structure by sharing responsibility while maintaining the benefits of single-family dwellings.

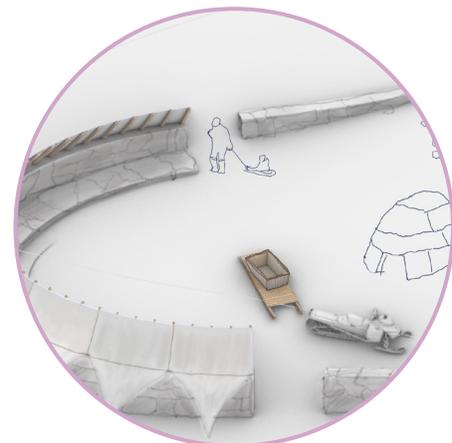
Figure 68: (middle-left to right) High Density Collectives: A) Vignette. B) Isometric. C) Figure Ground.

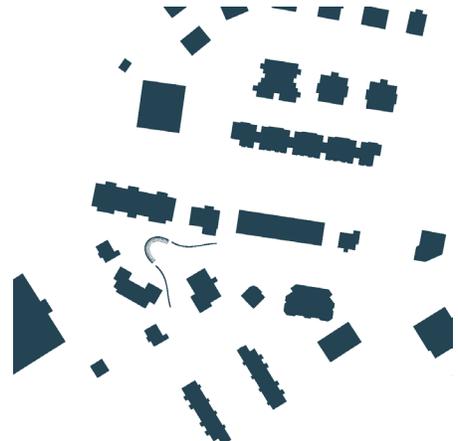
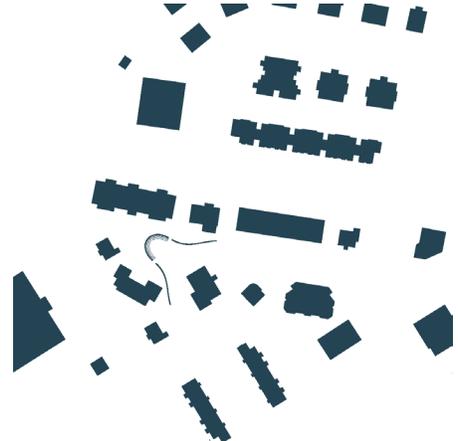
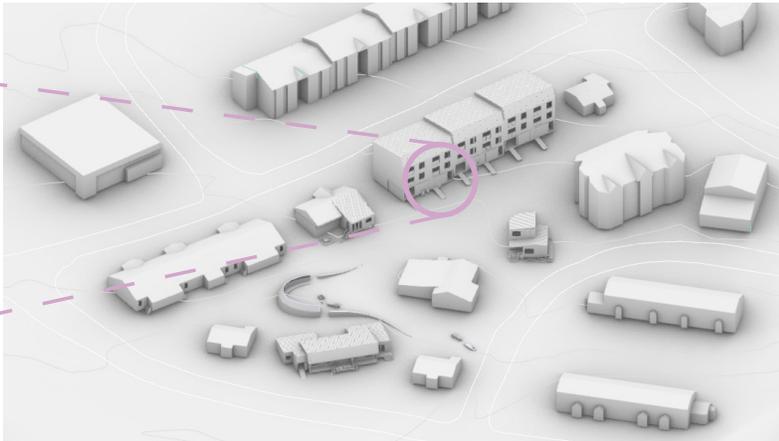
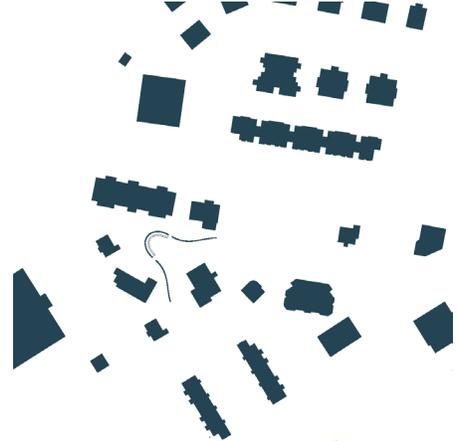


6 - Shared In-Between Spaces

The reclaimed material and spatial agency can be utilized to incrementally develop shared gathering spaces. New housing developments should be **designed to encourage the development of outdoor space**.

Figure 69: Shared In-between Spaces: A) Vignette. B) Isometric. C) Figure Ground.





5.3 - Potential Housing Outcome

The potential housing designs communicated in this thesis focus on increasing the affordability of owning and maintaining a home. The primary potential for housing is the semi-detached grow home; the grow home consists of two 550 sq.ft bachelor/1-bedroom units with an open living area and adjacent service core. The grow home units are designed so the owners can expand their house as needed when they have the means to do so. The design of the wood structure allows for this process to be easier by using a series of built-up columns and beams (potentially out of reclaimed wood) to allow for exterior walls to be taken down without comprising the structure. The built-up wood structure is finished with a panelized interior with accessible, wall, floor and ceiling plenums for ease of maintenance and expansion of building systems. In order to minimize the use of fossil fuels for heating and power, the south façade captures the power and heat from the sun via solar panels and an enclosed winter garden or heating porch.¹⁰⁹ The grow home will be heated by a ducted pellet stove as a low-carbon bio-fuel alternative to fossil fuels. The intention of proposing the use of wood pellets as a heat source is not to replace fossil fuels at a large scale but to move away from single sourcing strategies to avoid depending on resources such as diesel power and heat. Wood pellets will still need to be shipped north and will produce carbon throughout the process but at lower rates and with minimal environmental risk compared to fossil fuel. As an example, back in 2015 in the community of Pangnirtung a fire broke out at the local power generator plant leaving the community in a state of emergency for over a month with the risk of community evacuation present in the days following the outage. Each community across the territory relies on this aging infrastructure with next to no alternatives. Systems such as the one proposed for the grow home which are similar to existing cabin systems, have the ability to be resilient and run independently from the centralized grid.

As the owners of the grow home add to their house based on their needs, the site also slowly develops. The other three abandoned structures are deconstructed, providing more space to be reclaimed. The unique transient population in Iqaluit also has the potential to make home ownership more affordable as market rent for a 1-bedroom apartment is over \$2300 per month.¹¹⁰ Typically, developers hold most of the market rent units leaving much of the population unable to afford market rent or homeownership. There is a potential opportunity to marry these two issues by encouraging local homeownership by adding rental

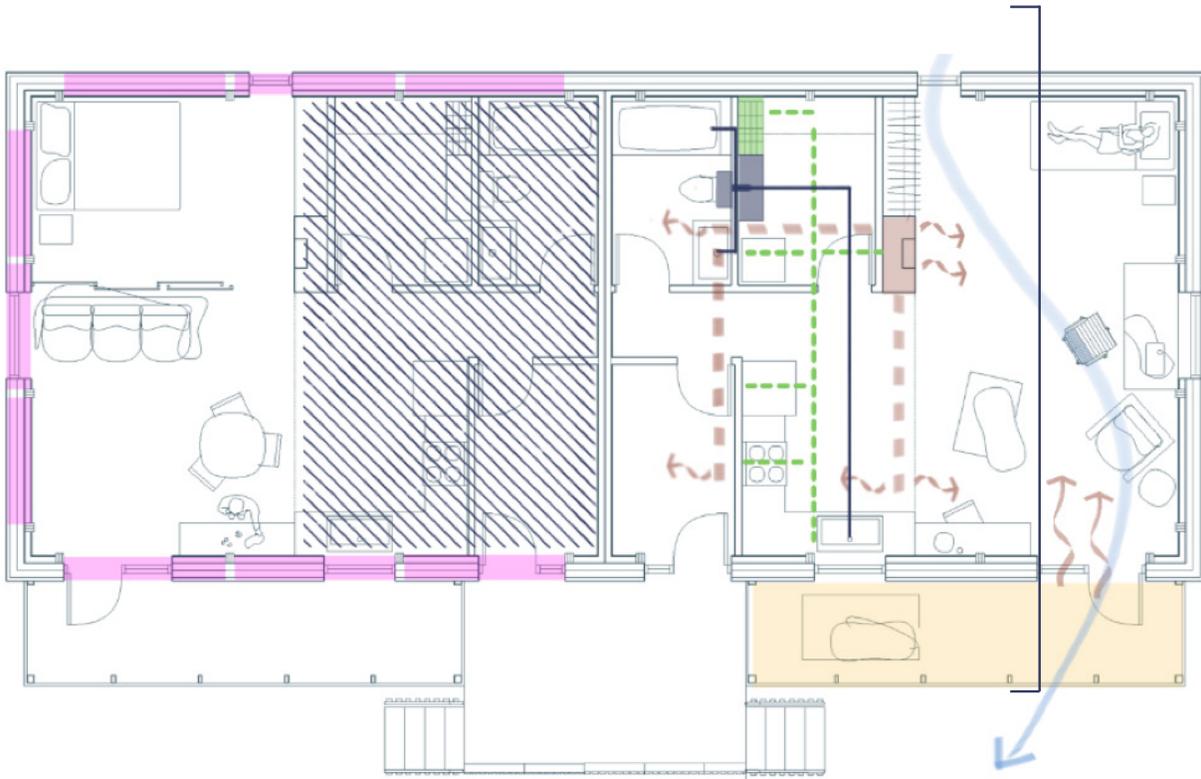
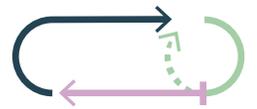
suites to homes for financial support and benefit from the local economy that sees a significant number of transient southerners with the

109 In contrast to existing Cold Porch/Arctic Entry

110 CMHC Government of Canada, "Northern Housing Report 2020," 2020.

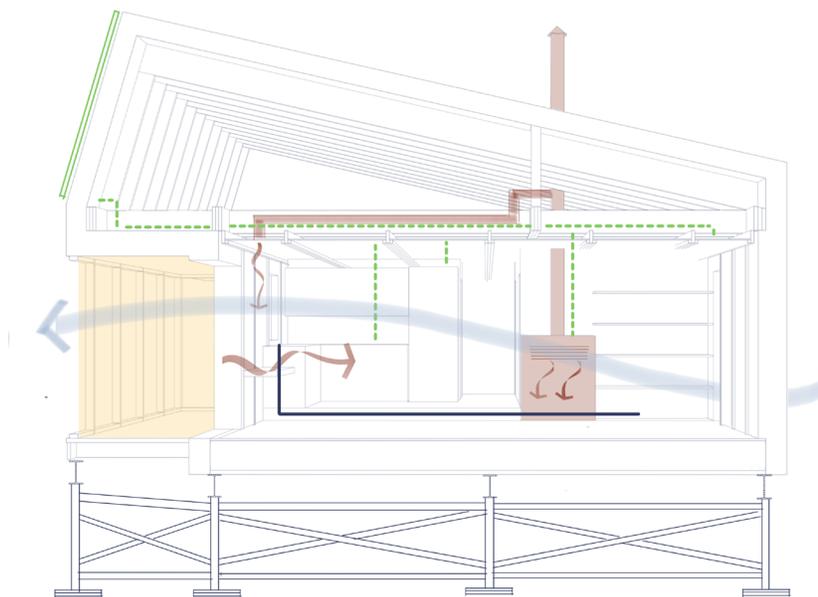
Figure 70: (top-right) Grow Home floor plan representing proposed systems: structure, water, power and heating.

Figure 71: (bottom-right) Grow Home perspective section representing proposed systems: structure, water, power and heating.



Legend:

- Pellet Stove Heat Source
- Passive Heating Porch
- Passive Cooling
- Solar Power
- Grey Water System
- Removable Ext. Wall
- ▨ Service Core



means to rent at market value. Similarly, Elders' suites are in need in the community due to the lack of long-term care facilities. Inuit Elders are an integral part of current and future identity of the local population and play a significant role in the traditional teachings, as Christopher Alexander states in *A Pattern Language*, "Old people cannot be integrated socially as in traditional cultures unless they are first integrated physically."¹¹¹

The small-scale housing projects using reclaimed materials are key to 'reclaiming' space and spatial agency but there is still a need for density within the existing built-environment to minimize community sprawl and the reliance on the car. As a final housing potential, a dense co-housing type is represented that begins to emerge from existing high-density social housing types with but the spatial agency present in existing single-family dwellings. Co-housing is an initiative that brings together the benefits of homeownership and shared amenities that creates small, close-knit communities that bring together a mix of incomes, occupations and ages. Co-housing members have their own space to meet their personal needs along with shared communal spaces. Current Inuit homeowners adapt the outdoor space around their home with sheds and workshops, the dense co-housing type similarly proposes a series of shared, south facing adaptable spaces to support various traditional activities. The intention of communicating these design potentials is to show possible collaborative design outcomes that generate a discussion about affordable housing solutions in Iqaluit, Nunavut.

Figure 72: (top-right) Grow Home incremental growth Stage1 in construction.

Figure 73: (middle-right) Grow Home incremental growth Stage2 in construction.

Figure 74: (bottom-right) Grow Home incremental growth Stage3. in construction.

111 Alexander, Christopher. *A Pattern Language*. München: Fachhochsch., Fachbereich Architektur, 1990. 217

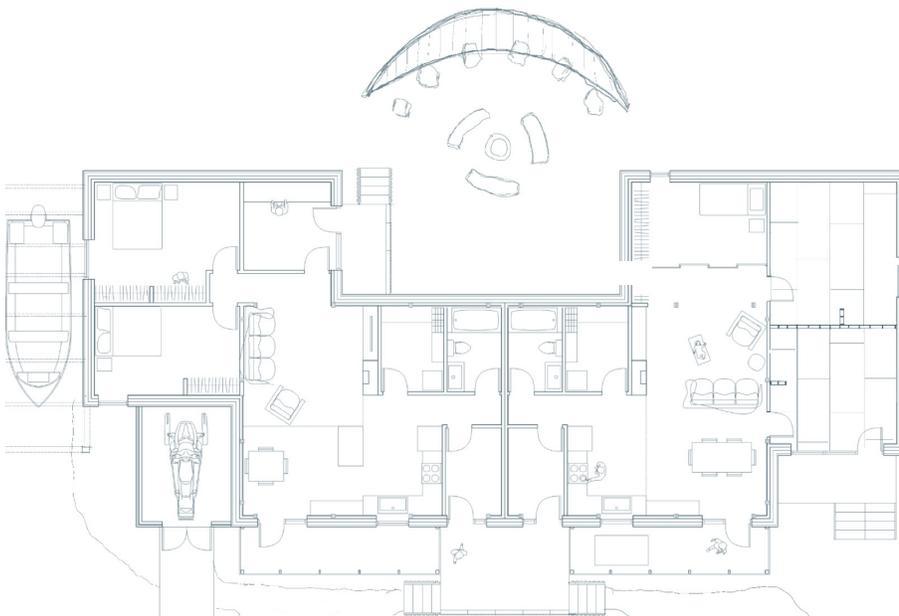
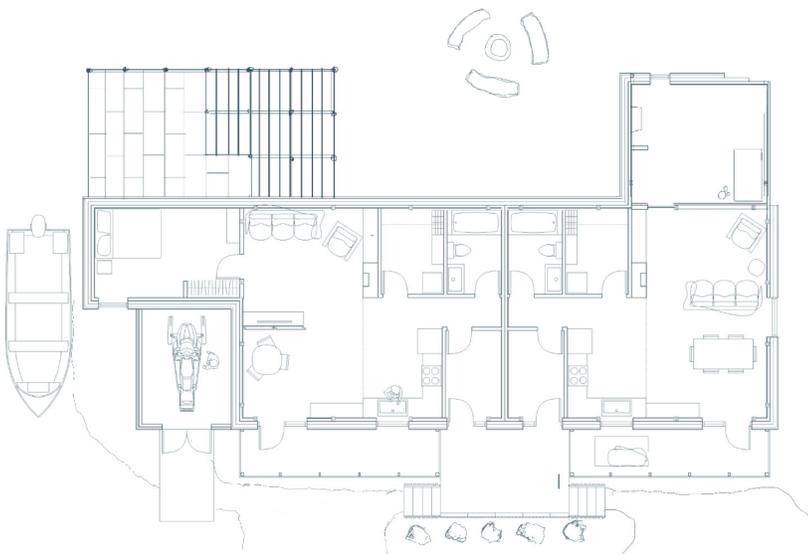
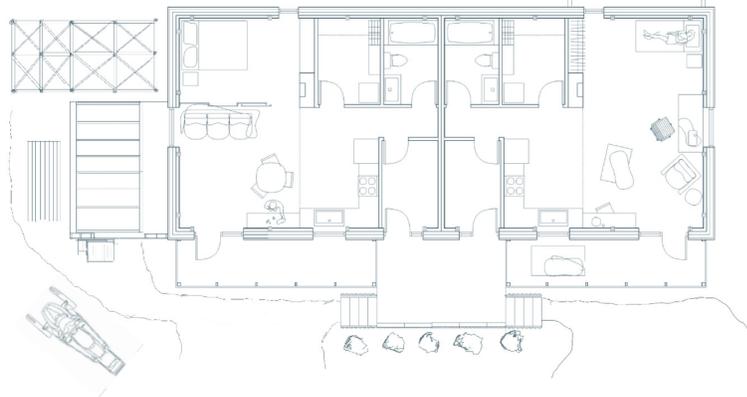
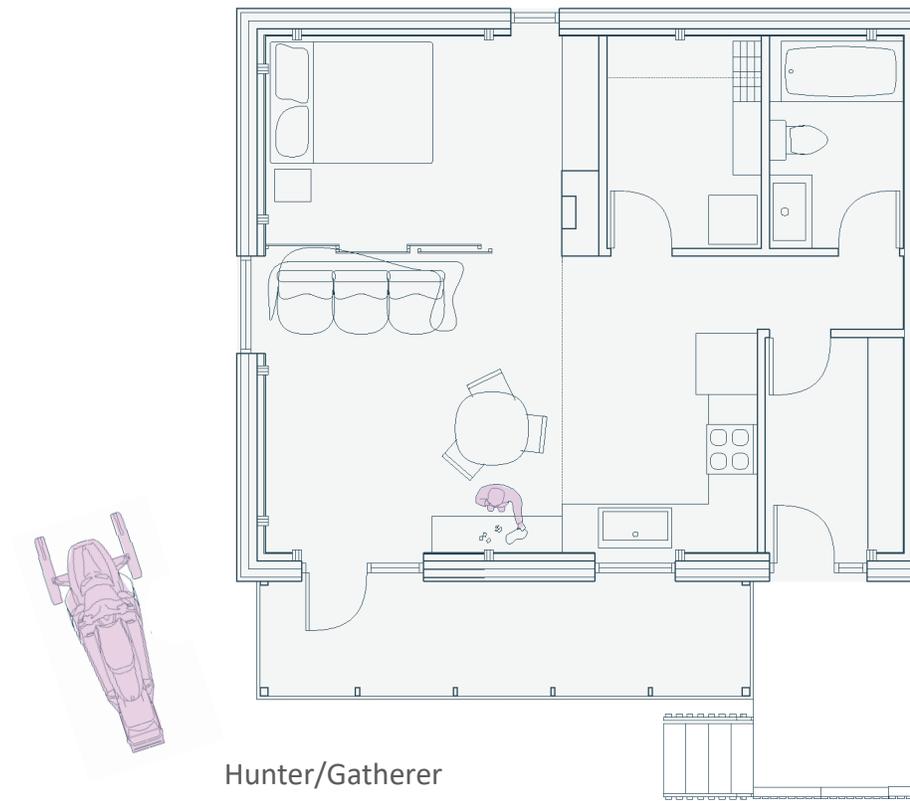
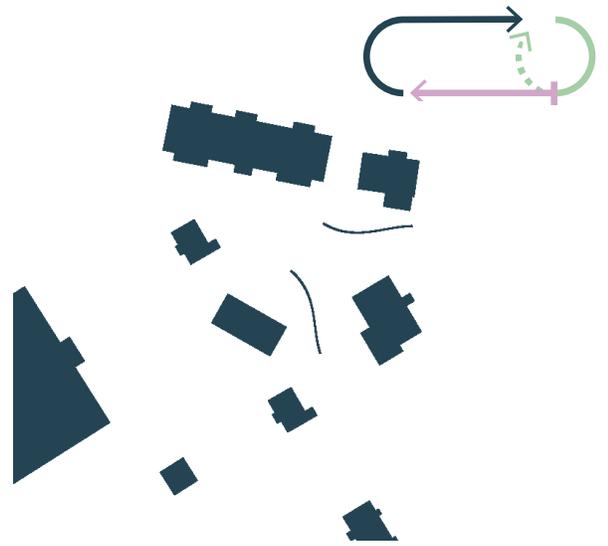


Figure 75: Grow Home incremental growth Stage 1 Floor Plan

Figure 76: Grow Home incremental growth Stage 1 - Key Plan





Typical Room Callouts:

- 1. Arctic Entry.
- 2. Washroom.
- 3. Sealift-Laundry-Mech.
- 4. Kitchen.
- 5. Adaptable Living Space.
- 6. Solar Porch.

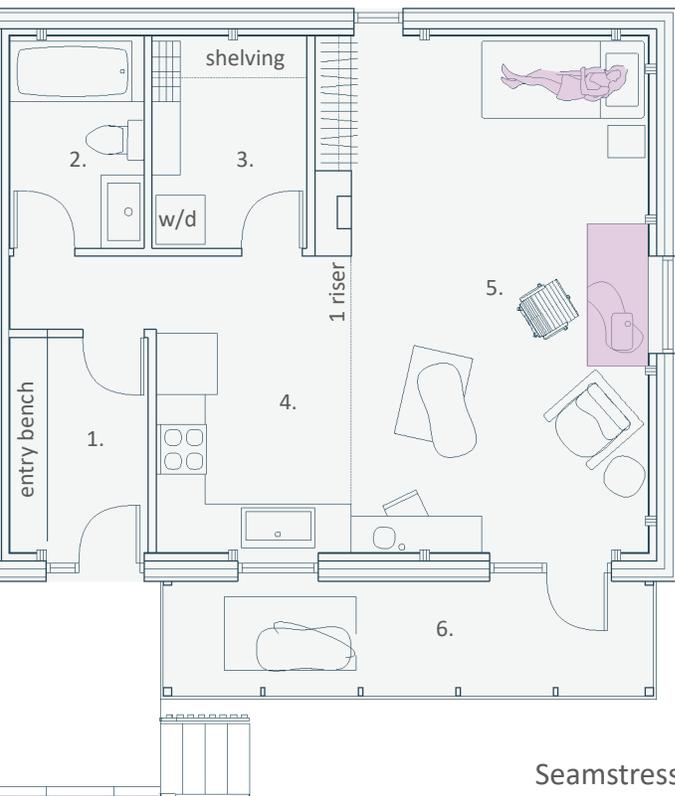
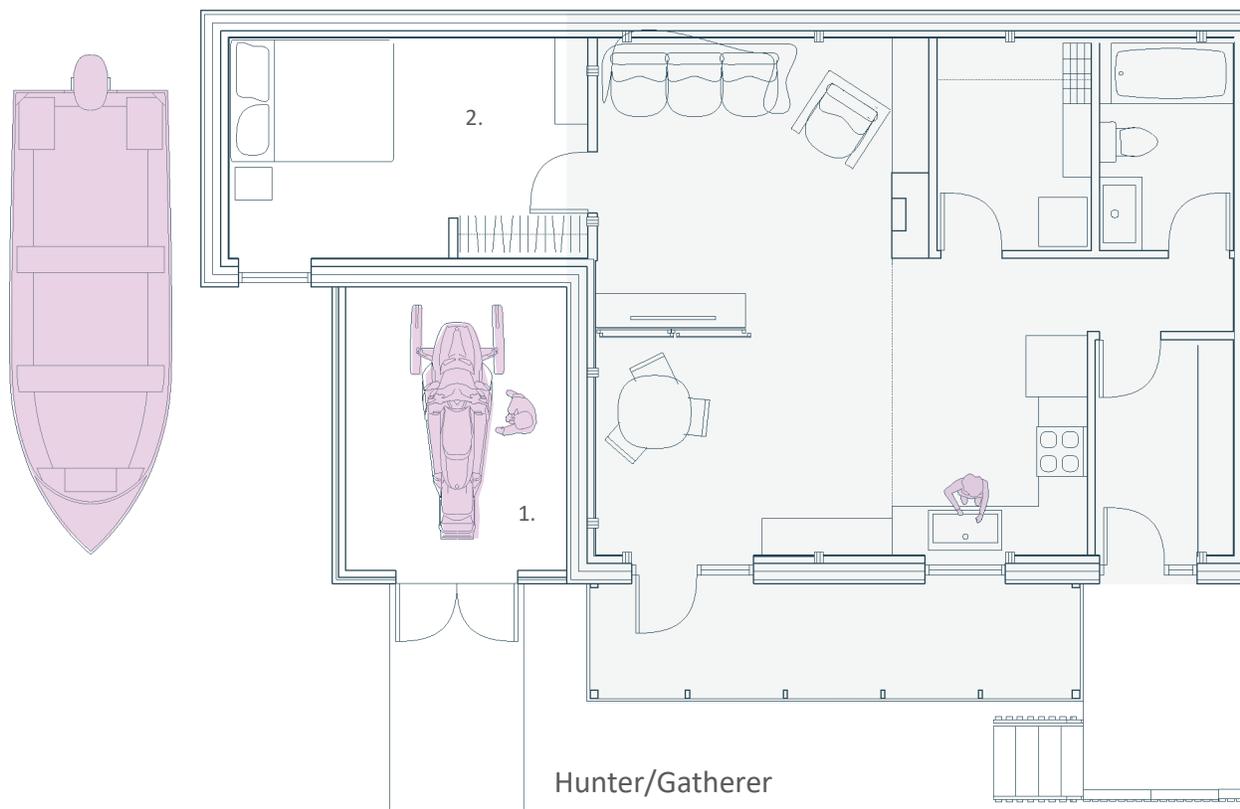
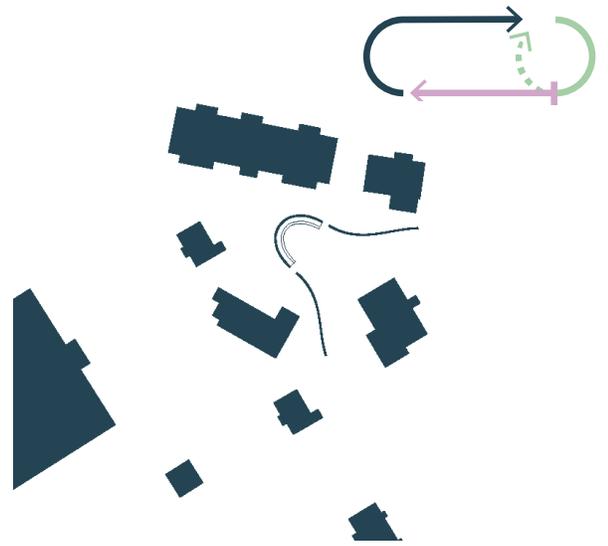


Figure 77: Grow Home incremental growth Stage 2 Floor Plan.

Figure 78: Grow Home incremental growth Stage 2 - Key Plan





Seamstress Adaptations:

1. Bedroom and Workspace.
2. Family Living.
3. Family Dining.

Hunter/Gatherer Adaptations:

1. Snowmobile Storage/Shop.
2. Bedroom.

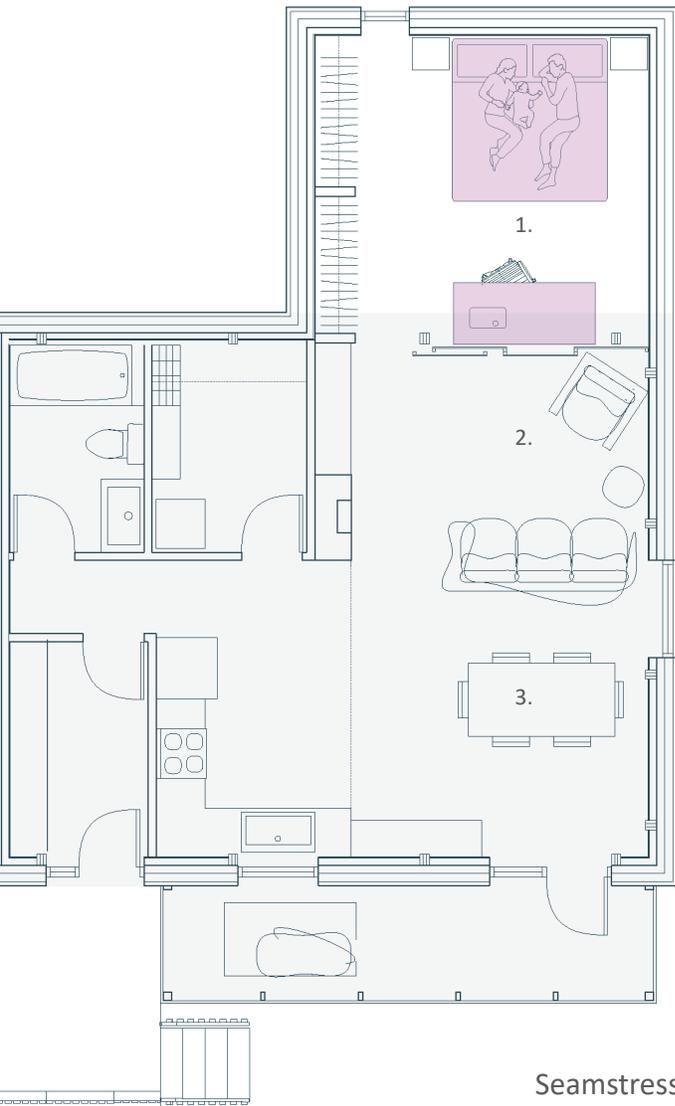
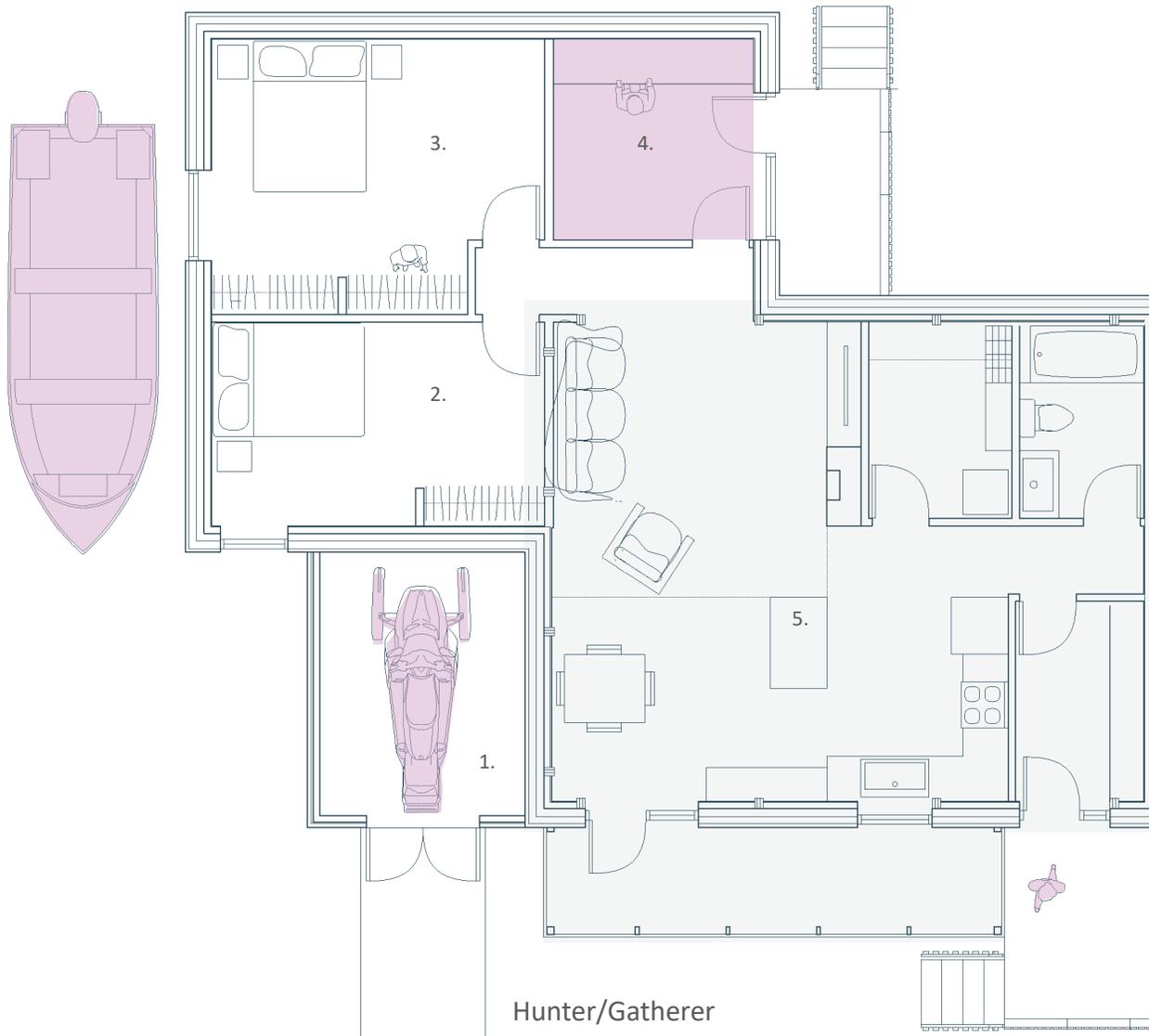
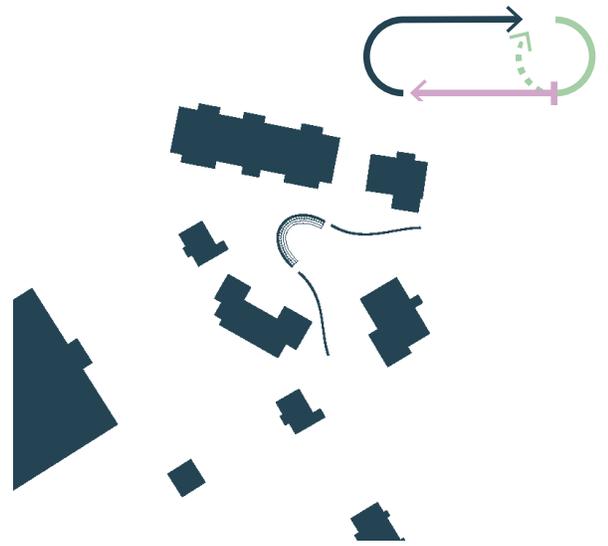


Figure 79: Grow Home incremental growth Stage 3 Floor Plan.

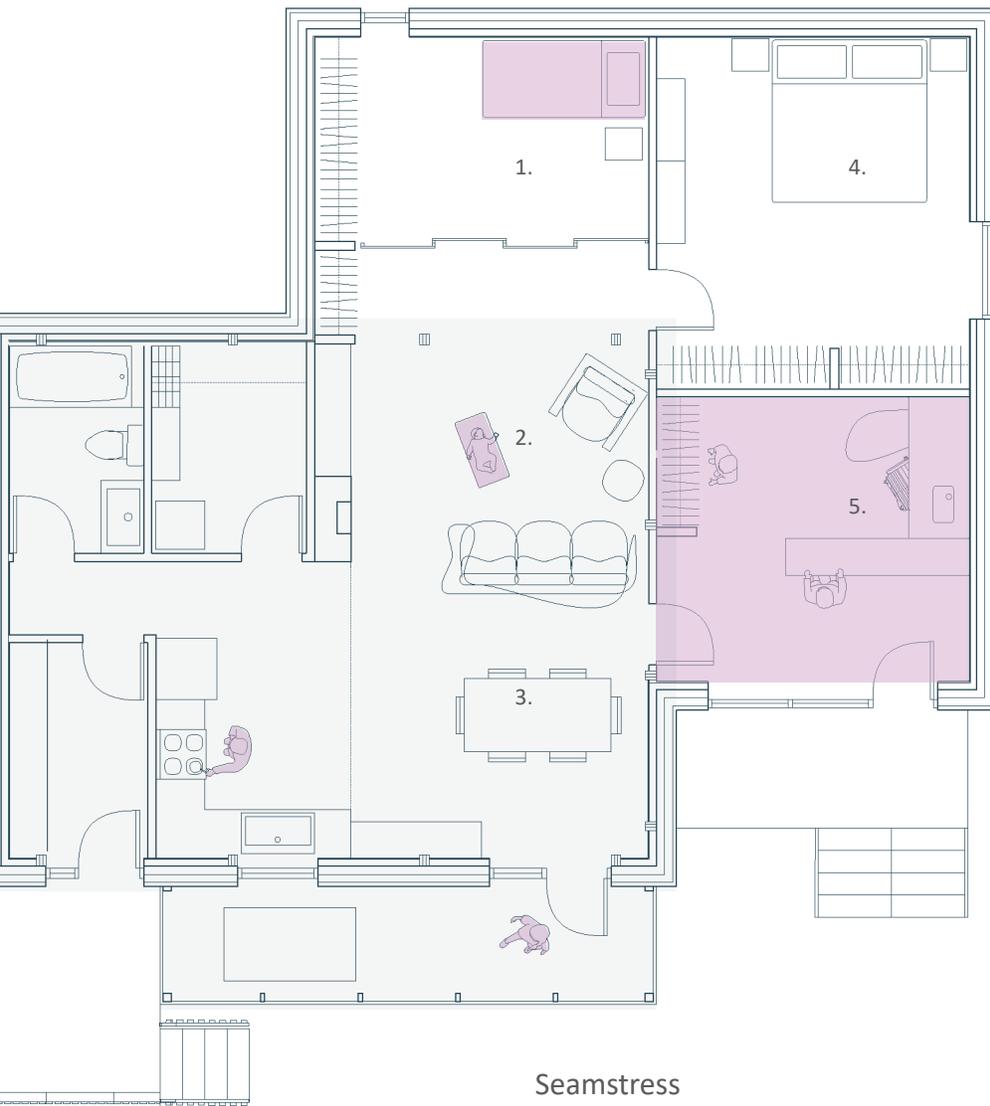
Figure 80: Grow Home incremental growth Stage 3 - Key Plan





Seamstress Adaptations:

- 1. Kids Bedroom.
- 2. Family Living.
- 3. Family Dining.
- 4. Master Bedroom
- 5. Workspace/Storefront



Hunter/Gatherer Adaptations:

- 1. Snowmobile Storage/Shop.
- 2. Bedroom.
- 3. 2nd Bedroom.
- 4. Workshop.
- 5. Kitchen Update.

Conclusion

Conclusion
Past, Present and Potential Networks

The final chapter of this thesis reiterates the intention of the proposed Circular Construction Framework in an effort to initiate the restoration of circularity in the Canadian Arctic. The closing images outline the main supply streams that need to be addressed to return to circularity: Dwellings, Energy, Food and Transportation.



Conclusion

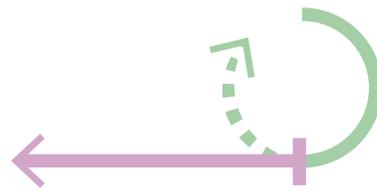
My research into the Nunavut housing crisis has built upon my previous experience working at a small firm and living in Iqaluit, Nunavut. The current singular approach of supplying social housing units across Nunavut in an attempt to alleviate the housing shortage has left the Nunavut Housing Corporation with a large, aging housing stock that has been overused and will continue to be at risk into the future due to a lack of reliable funding required as well as the uncertainties of the rapidly changing climate. The current housing system also lacks any sort of spatial agency for tenants leaving a disconnect between tenant and dwelling as stated throughout this thesis. The pride and sense of accomplishment seen in the self-built cabins as well as the former traditional dwelling practices demonstrate a sensitive and sustainable way of living outside of a settler-colonial structure and are evidence that there is potential to improve spatial agency for the housing system as a whole within the community of Iqaluit. The circular construction framework proposed in this thesis targets the concerns of the rapidly aging housing stock, need for improved spatial agency as well as the concerns surrounding solid waste in the growing capital city of Nunavut. The introduction of this systematic approach to begin dismantling the current housing system has the potential to play a role in moving towards a decolonized housing system that is built by and for arctic communities. It may seem counterproductive to deconstruct housing during a housing shortage yet if the current housing system continues its trajectory, it is unlikely to climb out of the 1.5-billion-dollar hole it finds itself in. The circular construction framework is by no means the answer to this severe crisis, it will take several similar systematic alterations from various angles to address the growing concern of housing across the territory of Nunavut. The programs proposed in this thesis project, including the ReStore, Co.Studio and Design Build program are intended to build upon the capacity to generate local solutions and clear a path to reclaim the housing system. The potential housing outcomes of the proposed circular construction framework are intended to represent possibilities to build upon when implementing the proposed system. The future results of this framework have the potential to become catalysts for a self-reliant, decolonized housing system in the future along with further research into the development of local materials and resources. The return to circularity will be a challenging path but a necessary one to ensure that sensitive and sustainable living practices are restored now and into the future.



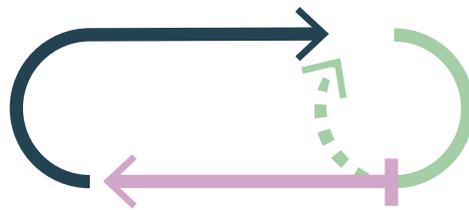
Figure 81: Series of circular concept diagrams which represent stages of circularity previously practiced by Inuit culture, currently colonial practices and circular practices proposed in this thesis.



Traditional



Colonial



Circular



Decolonize

Past, Present and Potential Networks

The Traditional Inuit network used local resources to sustain their Dwellings, Food, Energy, and Transportation utilizing the full potential of each element. The shift in lifestyle is evident in the colonial network where a reliance on unsustainable southern practices has surfaced. Through this shift in climate and identity a new form of traditional practices has emerged in the form of a cabin culture where colonial materials and spaces are adapted using traditional techniques.

Figure 82: Past and Existing Networks: dwelling, food, energy and transportation.

Legend:

- Traditional Culture
- Colonial Practices
- Adaptations

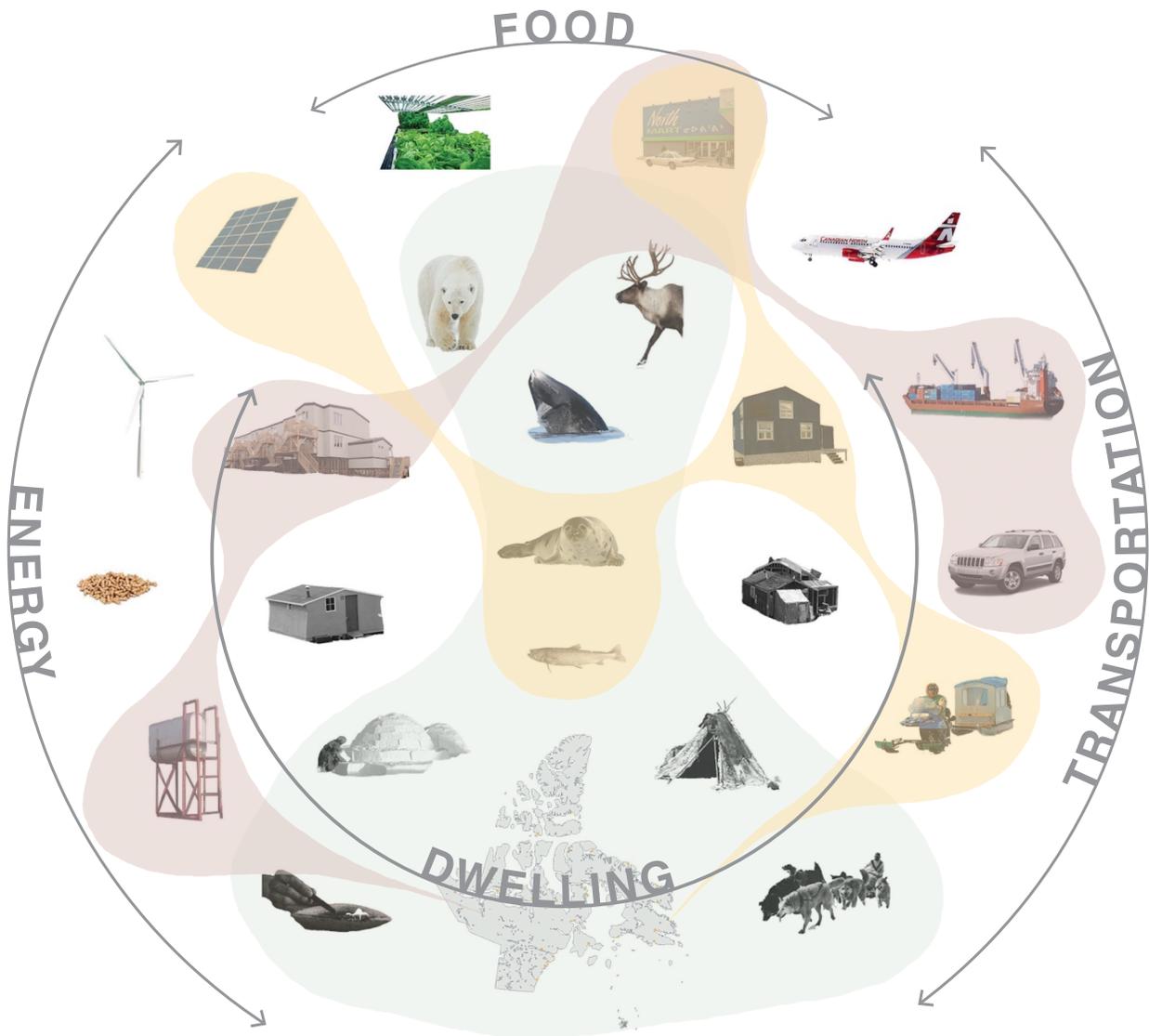


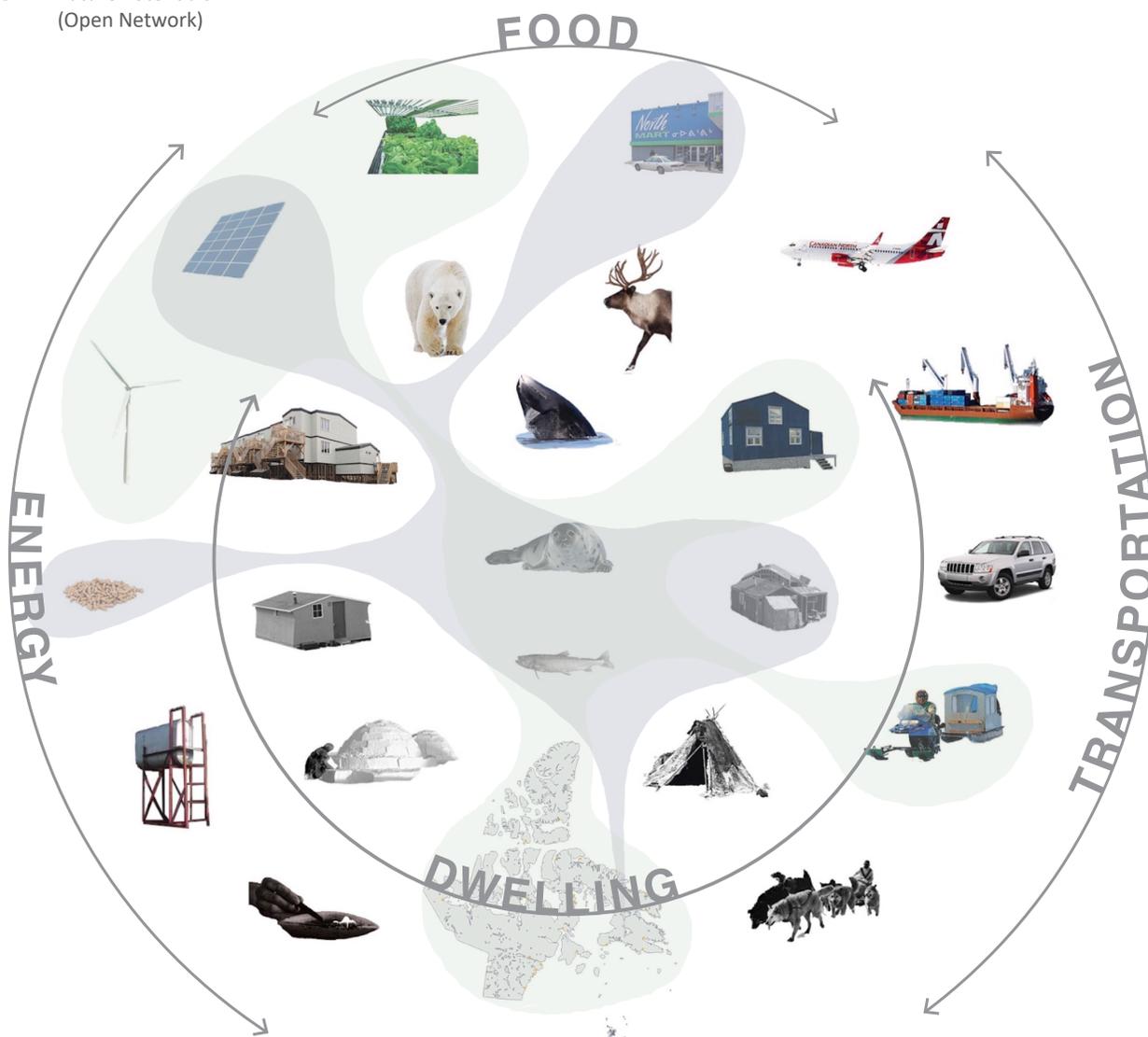


Figure 83: Potential Future Networks: dwelling, food, energy and transportation.

Legend:

- Proposed Circular Construction Framework (Thesis)
- Future Potentials (Open Network)

The network for the proposed Circular Construction Framework targets the potential of the previous local adaptations in an effort to 'restore' a local and sustainable network. The zones of color represent an open network of relationships between Dwelling, Food, Energy, and Transportation. The future, decolonial network also introduces new sustainable practices to sensitively develop systematic change to 'reclaim' arctic independence.



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