Gather, Bridge, Weave, Dream:
A Two Eyed Seeing Approach to Architecture and Design

by

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Contents

Abstract

This thesis emerges out of my belief that any tangible effort towards a future more sustainable than our present reality requires the integration and amplification of Indigenous perspectives. This thesis aims to unite the strengths of the sustainable architecture discourse as experienced through my own perspective and the ways of knowing and experience of Indigenous communities. Harnessing diverse perspectives is facilitated through Two Eyed Seeing, developed by Mi'kmaq Elder Albert Marshall as a means of cross cultural collaboration and co-learning. Design methods for developing a Two Eyed Seeing approach to architecture are explored and subsequently illustrated in the context of on reserve housing in a Nova Scotia Mi'kmaq community. This thesis represents my co-learning journey to understand how architecture can work to reconcile disparate worldviews. This co-learning journey to develop a Two Eyed Seeing approach to architecture is told in four parts: gather, bridge, weave and dream.

Acknowledgements

Chapter 1: Introduction

[Indigenous] peoples hold the key to the reversal of processes in Western Civilization which threaten unimaginable future suffering and destruction. (Haudenosaunee Declaration, Akwesasne Notes 1978)

An Unanswered Call to Action

In 1977, the Haudenosaunee Confederacy sent a message to the western world, a call to consciousness and to action. Almost half a century later in 2021, the weight of this declaration feels even heavier. The Haudenosaunee Declaration offered the guidance of Indigenous cultures to the western world as a way to move forward and reverse the pattern of devastation inflicted upon the landscape and its original caretakers (Akwesasne Notes 1978). The declaration stresses the intrinsic connection between the protection of Indigenous cultures and the vitality of the natural world, stating that the balance of life of on earth directly relates to principles of fairness and equity among humans and beyond (Clarkson, Morrissette and Regallet 1992).

Just over a decade later, the International Institute for Sustainable Development published *Our Responsibility to the Seventh Generation*, a foundational work on Indigenous Sustainable Development (Clarkson, Morrissette and Regallet 1992). This document echoes the call of the Haudenosaunee Declaration, indicating a shift in the balance among life on earth as a primary factor affecting both environmental and social equity. This report outlines the deeply problematic impacts of the "cumulative effect of colonial policies, shortsighted development patterns and denial of Indigenous values and lifestyles" calling for all members of society to take part in the healing of this destructive system (Clarkson, Morrissette and Regallet 1992). Within

the discipline of sustainable design and development, the overarching authority of a singular dominant worldview has resulted in a lack of diversity in both approaches and outcomes, contributing to dangerous patterns of erasure and marginalization while missing opportunities for growth and innovation (Clarkson, Morrissette and Regallet 1992). "Wherever there is a dominant perspective that is so readily accepted and widely influential that it can unconsciously exclude all other perspectives, the process of real communication and understanding is diminished tremendously" (Clarkson, Morrissette and Regallet 1992, 10).

The Case for Diverse Perspectives

As outlined by Indigenous authors of the second half of the 21st century, matters of human and ecological distress go hand in hand. Our singular and Euro-centric worldviews cannot equip us to reverse the impacts of anthropogenic climate change and mitigate damage to the intrinsically linked health of the planet and its most vulnerable communities. As evidenced in the Haudenosaunee Declaration, symbiosis between humans and the earth must remain in sacred balance in order to prevent further damage (Akwesasne Notes 1978). This linkage between social equity, environment and economy underpin the competing priorities of sustainable development, forming what this thesis terms a "complex challenge" for designers to operate within (Campbell 1996).

Sustainable approaches to architecture and development present a complex challenge given the interconnected, multidisciplinary and highly political nature of the field. Authors in the field of sustainable architecture make the case
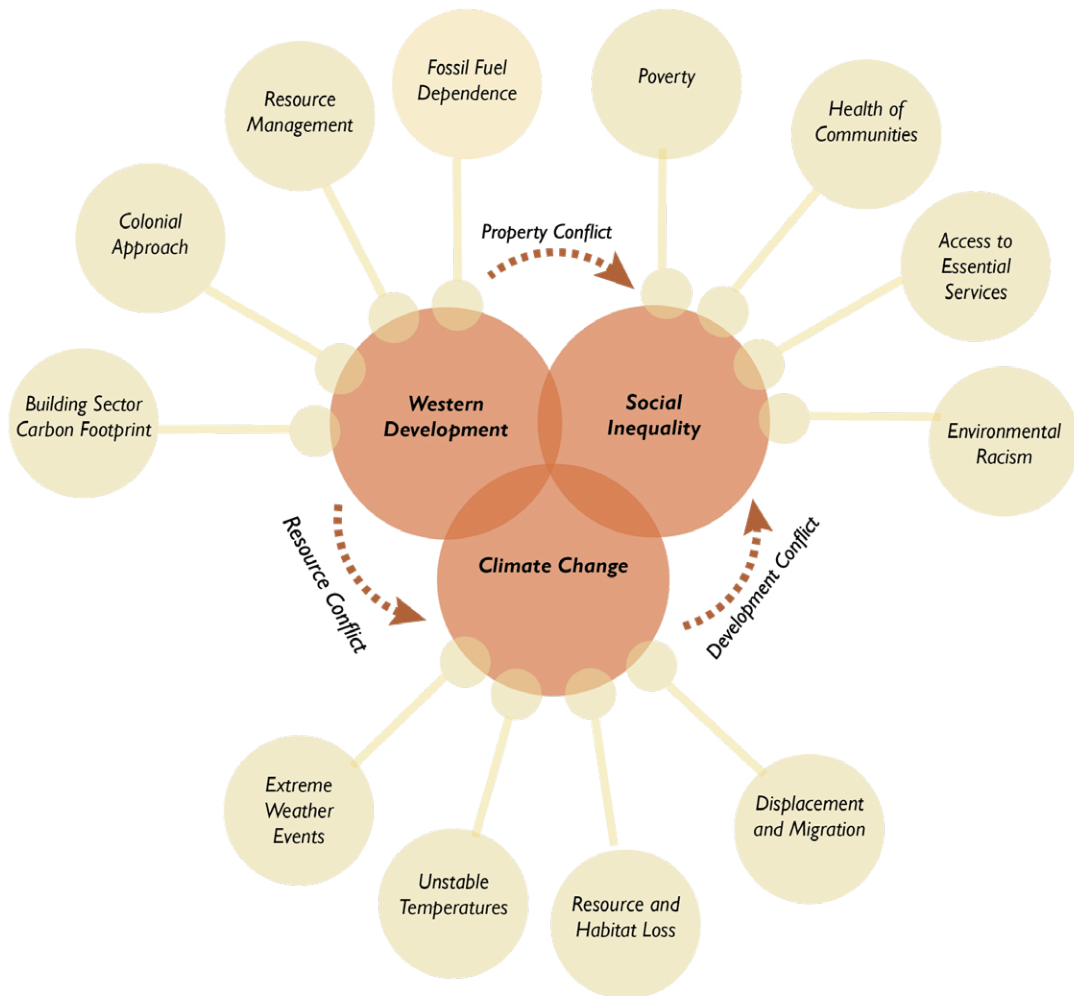
A complex challenge for designers to operate within:
the competing priorities of sustainable development
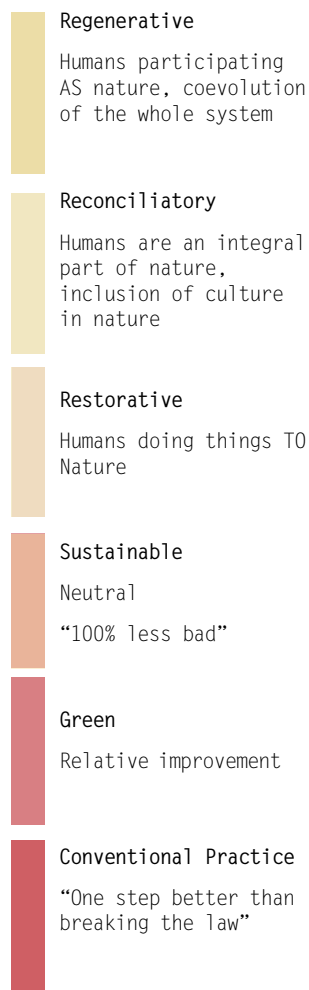
for diversity in the form of diverse perspectives and voices, diverse approaches and designing for diverse outcomes and futures (Guy and Farmer 2010). In *Understanding Sustainable Architecture*, Terry Williamson argues that cultural diversity is an essential component of sustainable architecture, describing it as "humankind's contribution to maintaining the delicate balance in the variety of contextual circumstances throughout the globe" (2003, 89). This is founded on the fact that variety among human societies has allowed for adaptation and innovation to occur throughout history (Williamson, Radford and Bennetts 2003, 89). This thesis aligns with this argument, calling for Indigenous perspectives to be included and amplified within the discourse of architecture in order to generate truly sustainable design solutions. The following review of the sustainable architecture discourse will outline perspectives and best practices existing in the field and where there is room for growth.

From Conventional to Regenerative

To understand the need for diverse perspectives in the field of sustainable design requires first recognizing the existing opinions in the discourse ranging from conventional to regenerative design practices.

Sustainable Design

William McDonough describes sustainability as "100% less bad" indicating the meaninglessness the word has acquired in the discourse (Wahl 2016). Despite the prevalence of the term in the field of design, most authors on the subject argue that sustainability is no longer enough, operating as a new baseline standard.

Regenerative

Humans participating
AS nature, coevolution
of the whole system

Reconciliatory

Humans are an integral
part of nature,
inclusion of culture
in nature

Restorative

Humans doing things TO
Nature

Sustainable

Neutral

"100% less bad"

Green

Relative improvement

Conventional Practice

"One step better than
breaking the law"

Design practice continuum ranging from conventional to regenerative practices. (Wahl 2016)

Pragmatism

Sustainable urbanism authors Simon Guy and Graham Farmer explore how the field of sustainable design can be linked to a higher degree of environmental ethics (2010). They propose sustainable design as a "co-evolutionary ethical practice", a process that engages all aspects of life in a socio-technical arena (Guy and Farmer 2010, 368). Guy and Farmer promote the philosophy of pragmatism as a way to encourage more diverse engagement in the field of sustainable design. Key features of the philosophy include an emphasis on place, embrace of contextual plurality and a high regard for the value of all types of knowing and experience (Guy and Farmer 2010). The emphasis on place and context also applies to our understanding of environmental problems.
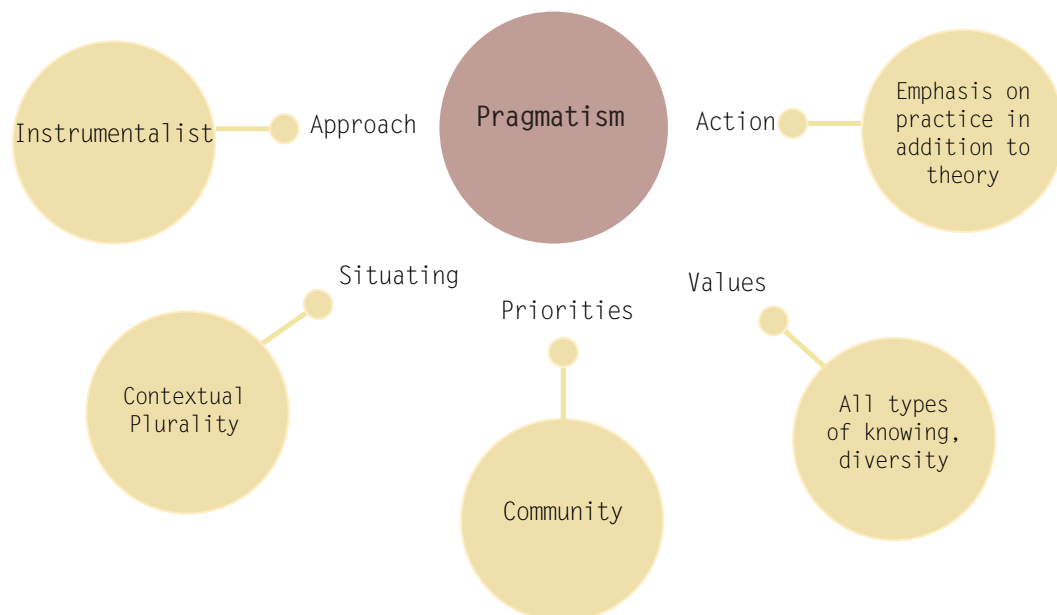
Components of Pragmatism as a means of advancing sustainability in architecture. (data from Guy and Farmer 2010)

In order to fully understand the heterogeneity of sustainable architecture, we therefore have to account for the multiple ways environmental problems are identified, defined, translated, valued and then embodied in built forms through diverse design and development pathways. (Guy 2011, 24)

Guy and Farmer assert that pragmatism as an analytical and moral framework can support open and diverse design practices, allowing for plurality in both approach and outcome (2010). This theory points out the dangers in adopting singular approaches that are upheld by technical data and performance standards, calling for designers to reduce dependency on standardized, universal design solutions (Guy and Moore 2007).

Pragmatism is a valuable tool for moving towards a more diverse practice of sustainable design due to a focus on our interrelated values while encouraging diversity of actors, approaches and outcomes (Guy and Farmer 2010, 371).

Regenerative and Reconciliatory Design

"Life creates conditions conducive to life" (Benyus 2002, 254). This statement has been deemed the golden rule for regenerative design practices, marking a shift away from degenerative human impact on earth. Regenerative design requires that we design as nature, rather than attempting to learn from nature (Wahl 2016). This is part of a process of learning, imitating, restoring and tending of nature, moving towards a more participatory design relationship and recognizing ourselves as complex, biological organisms (Wahl 2016). Regenerative design strategies can include bio mimicry, permaculture, and circular economies. Regenerative design practices are also linked to place based, Indigenous cultures that provide the last examples of truly sustainable societies (Wahl 2016). Learning from

these cultures requires reinserting culture into nature and vice versa, often called reconciliatory design. Designing regenerative systems simultaneously requires looking forward and looking back. Typically, regenerative design strategies that look to Indigenous cultures for guidance focus on ancient wisdom or Traditional Ecological Knowledge (TEK) (Wahl 2016). This is where my thesis respectfully departs from the discourse. The methods I aim to develop will focus on contemporary Indigenous knowledge and experience in order to develop a more resilient approach to design that honours the past while remaining rooted in the present and preparing for the future.

Moving Forward

The current sustainable design discourse provides a basic framework to build upon moving forward. Authors such as Guy and Farmer provide compelling rationale for promoting diversity in our approaches and imagining of projects. A rejection of universal approaches in favour of place based solutions inherently asks us to consider local knowledge and experience (Guy and Farmer 2011). Additionally, encouraging participation of stakeholders is a guaranteed way to promote diverse perspectives in design. Regenerative design takes this several steps further, encouraging us to view ourselves as part of nature and revisit the ancient wisdom of Indigenous cultures. My thesis will build upon the calls for diversity echoed by several authors listed above and will seek to center contemporary Indigenous voices in the discourse of sustainable and regenerative architecture. This contribution will be facilitated through the development of a series of design tools, intended as a means of bridging the gap between the sustainable architecture discourse and Indigenous worldviews.

Context

In the spirit of pragmatism and maintaining the importance of context driven approaches to design, the context behind the development of this thesis is important. Pragmatism places power in small scale solutions and actions, approaching design through local challenges. As such, this thesis emerges out of my own beliefs that have been shaped through my experience and education, while cognizant of the context in which I live and study.

My position in this research is that of a settler, with a shared British and Canadian citizenship. As a non-Indigenous person, I cannot speak to the experience of Canada's Indigenous people. However, my privileged position as a post graduate student can provide a platform on which these voices and experiences can be amplified and shared as part of a co-learning journey. My educational career greatly shaped the development of this thesis, as competing interests of social equity and sustainable design found their way together through this research.

This research is situated in Mi'kma'ki, the unceded territory of the Mi'kmaq people. It is the philosophy and knowledge sharing of a particular Mi'kmaq Elder, Albert Marshall, that has facilitated the process of embracing diverse perspectives through the concept of Two Eyed Seeing. As the guiding principle for this thesis and a methodological framework for co-learning across cultures, Two Eyed Seeing will be discussed in detail as both a philosophy and a methodology.

Architecture and Reconciliation

The importance of context and place has been discussed in regards to sustainability and design, however building a
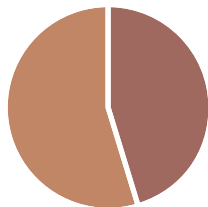
Socio-economic
inequalities between
Indigenous Peoples and
non-Indigenous Canadians
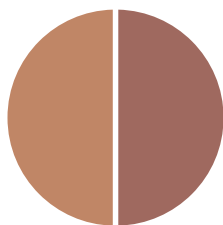
Non-Indigenous Canadians
lack of knowledge of
Indigenous history/
culture
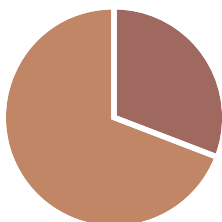
Different worldviews/
values held by Indigenous
Peoples and non-Indigenous
Canadians

Indigenous People

Non-Indigenous
Canadians
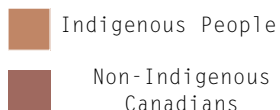
Barriers to reconciliation
in Canada. (Data from
Reconciliation Canada
2017)

shared knowledge and understanding of historical, cultural and ecological context is central to engaging an ongoing process of reconciliation.

A report published by Reconciliation Canada in 2017 provides a glimpse in to the "Canadian Reconciliation Landscape" through survey results from Indigenous and non-Indigenous Canadians. The survey questions identify primary barriers to reconciliation in Canada. Among these barriers to reconciliation are socioeconomic inequalities between Indigenous Peoples and non-Indigenous Canadians, Non-Indigenous Canadians lack of knowledge of Indigenous history and culture, and finally, different worldviews and values held by Indigenous Peoples and Non-Indigenous Canadians (Reconciliation Canada 2017). A key finding on reconciliation in Canada that has served as a catalyst for this thesis is the importance of mutual learning across world views as a precursor to reconciliation (Levac et al. 2018).

> As well as addressing many of the deep socioeconomic, political, and ecological challenges we face, reconciliation within contemporary Canadian society requires learning from and across, Indigenous and Western knowledge systems, without privileging Western knowledge or appropriating Indigenous knowledge. This is especially significant for non-Indigenous people, who are accustomed to working from a position that privileges Western approaches to knowledge creation. (Levac et al. 2018, vii)

Thesis Question

As a non Indigenous student of architecture, my thesis exists in the space between two opposing worldviews, with one common goal. Therefore, the question this thesis asks is: how can architecture work to reconcile disparate worldviews?

Objective

The space between worldviews is described as the third space, or ethical space (Ermine, Jeffery and Sinclair 2004). This thesis can be understood as my co-learning journey to uncover the ethical space between the discourse of sustainable architecture and the knowledge and expertise of Indigenous communities. On this co-learning journey, I will develop a Two Eyed Seeing approach to architecture and design through four phases: gather, bridge, weave, dream. Gathering means collecting diverse perspectives and guiding principles from both paradigms. Bridging entails finding relationships across and between guiding principles to develop design methods that traverse the space between worldviews. Weaving design methods together in the context of a project is a way of illustrating and understanding the approach. Finally, dreaming imagines the implications of the approach beyond the scope of the project.

The project that will illustrate this co-learning journey explores the implications of a Two Eyed Seeing approach to on reserve housing in a Mi'kmaq community in Cape Breton. On reserve housing is a complex challenge that requires urgent attention and best practices from both worldviews.

Gather

OUTCOMES

GUIDING
PRINCIPLES

Dream

Bridge

Project: A Two Eyed
Seeing Approach to
On Reserve Housing
in Cape Breton

CONTEXT

DESIGN METHODS
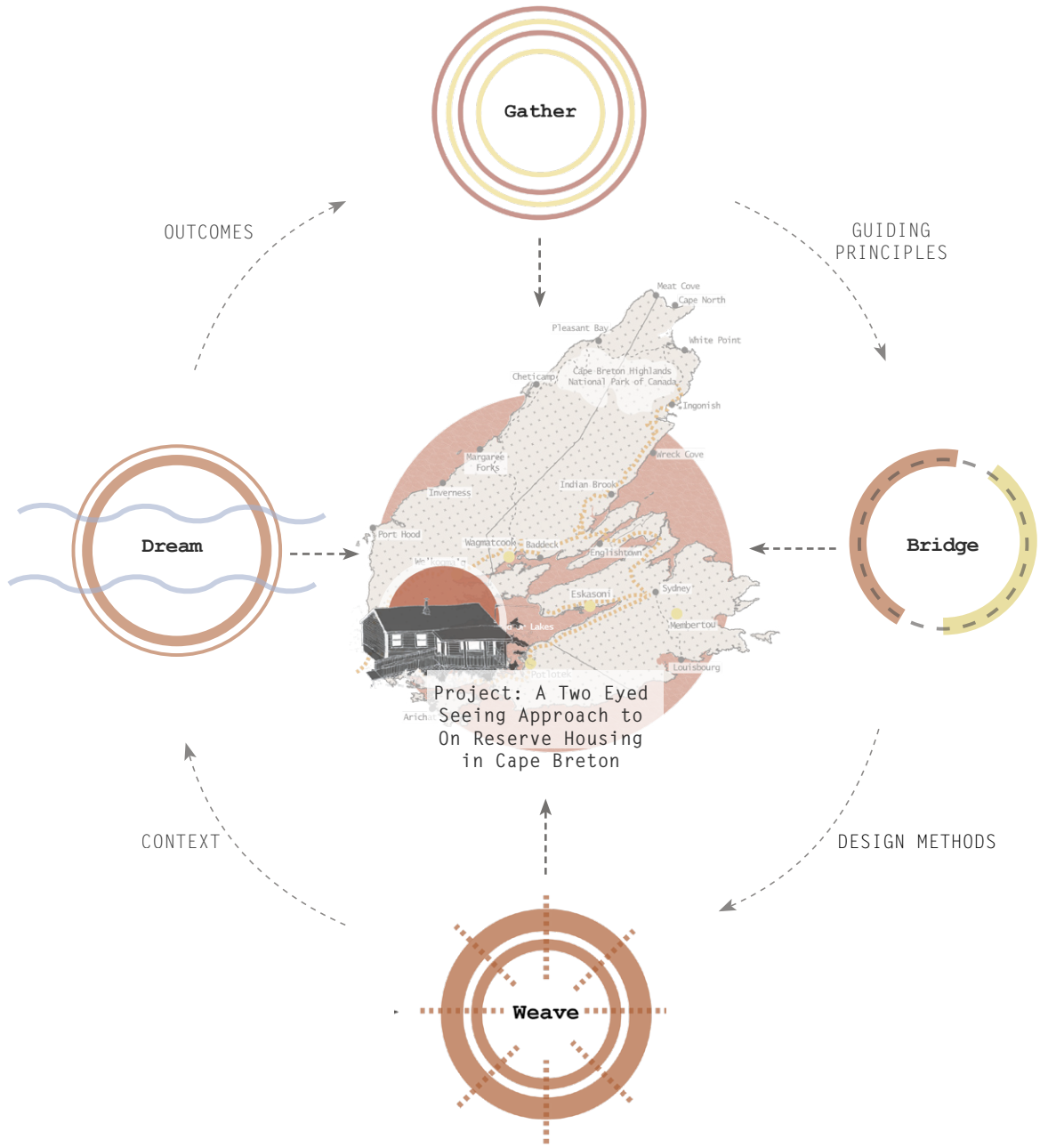
Weave

Thesis Methods and Phases: Gather, Bridge, Weave, Dream

Chapter 2: Two Eyed Seeing

Two Eyed Seeing is the underlying philosophy guiding this work, providing a method of co-learning that brings together Indigenous and mainstream knowledges and ways of knowing. The concept was developed by Mi'kmaq Elders Albert and Murdena Marshall and Cheryl Bartlett as part of the Integrative Science program they co-created at Cape Breton University . In their words, Two Eyed Seeing requires:

> Learning to see from one eye with the strengths of Indigenous knowledges and ways of knowing, and from the other eye with the strengths of Western knowledges and ways of knowing ... and learning to use both these eyes together, for the benefit of all. (Bartlett, Marshall and Marshall 2012)

Two Eyed Seeing, or *Etuaptmumk*, simply means the gift of embracing multiple perspectives (Bartlett, Marshall and Marshall 2012). This gift of diverse perspectives and collaboration is a well established concept in traditional Indigenous cultures and acts as the founding principle for various forms of cross cultural, multidisciplinary work (Bartlett, Marshall and Marshall 2012).

Background

Two Eyed Seeing was not catalysed by a single event, but rather the wish to impart the message that we are all connected and the health of our communities is linked to the health of the planet. Interconnection between ourselves and all living things is a central tenet to Indigenous sciences and ways of knowing. Thus the term Integrative Science emerged out of the author's desire for Indigenous sciences to gain equal opportunity and value to western sciences at a post secondary level (Bartlett et al. 2012). The idea is to "break down the boundaries between the academy and the community" (Bartlett et al.

**Strengths of Western
Ways of Knowing**

**Strengths of Indigenous
Ways of Knowing**
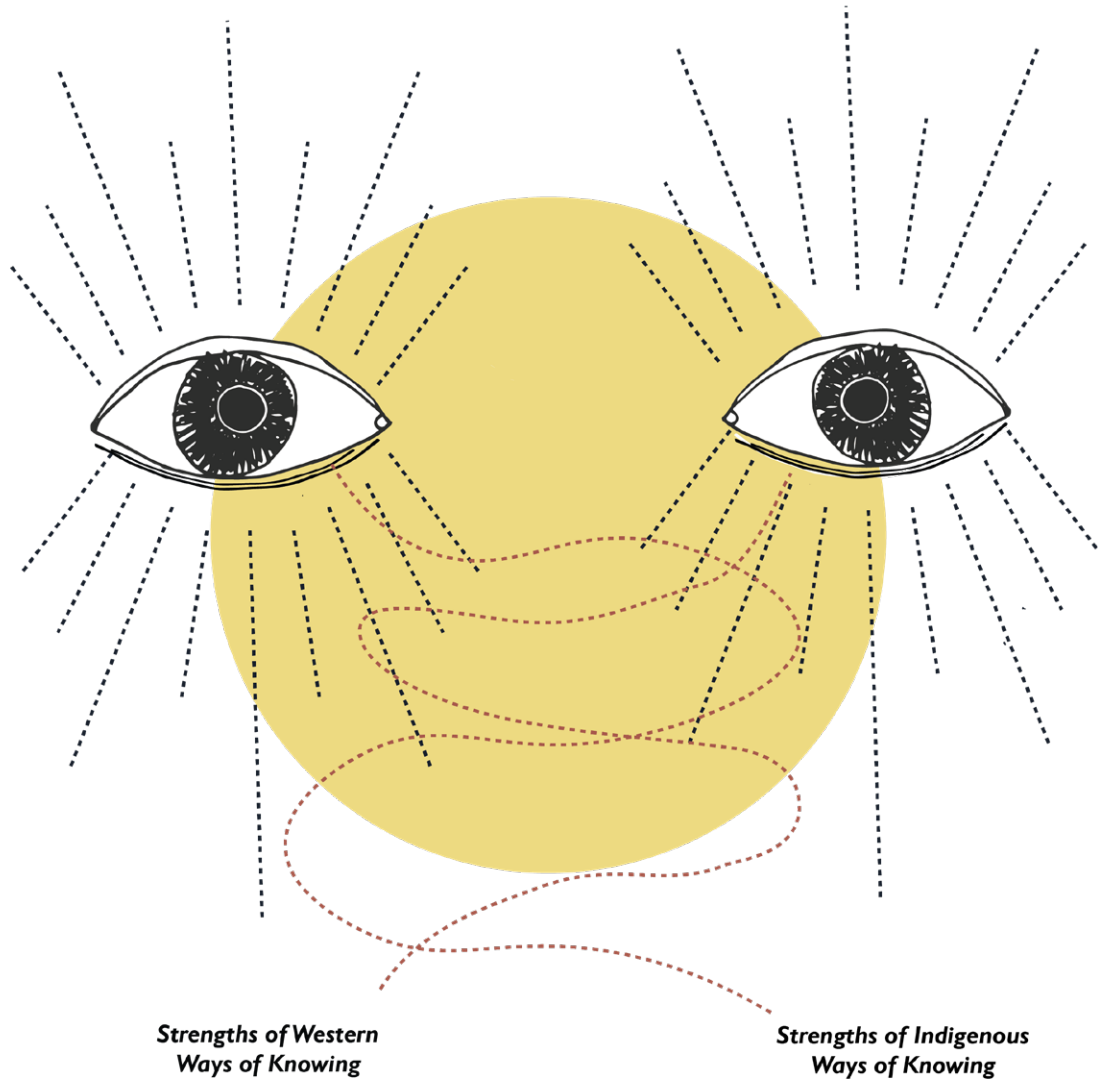
Visual representation of a typical application of Two Eyed Seeing
as a means of bridging western and Indigenous ways of knowing.

2012). This concept was brought into Cape Breton University in the mid 90's as part of the novel Integrative Science program, *Toqwa'tu'kl Kjijitaqnn*. The vision was and remains to unite scientific knowledges and ways of knowing from Indigenous and western worldviews (Bartlett et al. 2012). This idea belongs to a larger belief by all authors that the urgent issues we face today, or complex challenges, require the insights and approaches of diverse cultures around the world, if done so in an appropriate and respectful manner (Bartlett et al. 2012).

Two-Eyed Seeing adamantly, respectfully, and passionately asks that we bring together our different ways of knowing to motivate people, Aboriginal and non-Aboriginal alike, to use all our understandings so we can leave the world a better place and not compromise the opportunities for our youth (in the sense of Seven Generations) through our own inaction. (Bartlett, Marshall and Marshall 2012,11)

Co-learning

Two Eyed Seeing is the guiding principle for embarking upon a co-learning journey, such as integrative science or multidisciplinary, transcultural activities (Bartlett et al. 2012). Co-learning is an ongoing process that requires an acknowledgement of our similarities and differences in order to draw upon the best practices from either perspective and weave between these in a particular circumstance. This is further explained by eight "Lessons Learned" published by the authors as a means of synthesizing their co-learning journey to date.

Lessons Learned

Equally important to developing new relationships and opportunities for collaboration in the mainstream world is reflection on the process. The authors of Two Eyed Seeing assert that reflexivity is central to the co-learning journey,

encouraging us to identify meaningful "lessons learned" throughout the process (Bartlett, Marshall and Marshall 2012). The authors provide eight lessons learned throughout their co-learning journey, intended to facilitate the "talking and walking together of Indigenous and mainstream sciences"(Bartlett, Marshall and Marshall 2012).

1. Acknowledge that we need each other and must engage in a co-learning journey.

2. Be guided by Two-Eyed Seeing.

3. View "science" in an inclusive way.

4. Do things (rather than "just talk") in a creative, grow forward way.

5. Become able to put our values and actions and knowledges in front of us, like an object, for examination and discussion.

6. Use visuals.

7. Weave back and forth between our worldviews.

8. Develop an advisory council of willing, knowledgeable stakeholders, drawing upon individuals both from within the educational institution(s) and within Aboriginal communities. (Bartlett, Marshall and Marshall 2012)

These lessons remind us that both knowledge systems must acknowledge each other and be valued equally. The lessons learned also call for a constant weaving back and forth between paradigms to provide appropriate, contextual solutions to the challenge at hand.

Applications

Two Eyed Seeing has been undertaken in a variety of contexts to contribute to more holistic, inclusive and diverse solutions. Examples of these applications range from biodiversity conservation, health care, education, research methodology and resource management. One particular example strongly indicates the necessity of this approach in the context of health and medicine. Though many architects have employed the concept of Two Eyed Seeing

in the design of singular projects, a framework for a general application of Two Eyed Seeing to the field of design has not yet been developed.

Project: American Eel Recovery Strategy
Client: Province of Ontario

Project: "The Path We Share" Natural Resources Strategy
Client: Government of Nova Scotia

Biodiversity Conservation

Resource Management

Knowledge and Expertise

Land Stewardship

Collaborative Relationships

Holistic Healing

Youth Engagement

Knowledge Translation

Meaning and Authenticity

Healthcare

Education

Research Methodology

Project: Aboriginal Peoples' Wellness in Canada
Client: Canadian Institute of Health Research

Project: Bringing Science and Inuit Knowledge Together Through Hands-on Co-learning
Client: Government of Nunavut

Project: An Application of Two-Eyed Seeing: Indigenous Research Methods With Participatory Action Research
Client/Author: Cindy Peltier

Field of Study

Motivation for applying Two Eyed Seeing

Multidisciplinary applications of Two Eyed Seeing as a generator of diverse, inclusive solutions.

Ethical Space

Additional authors and academics have engaged in this arena of cross cultural collaboration and co-learning, supporting the creation of opportunities within the mainstream academy for engagement with diverse perspectives. Cree legal academic Willie Ermine raises the question of how we traverse the space between paradigms asking "how do we reconcile worldviews?" (Bartlett et al. 2012, 6). His answer to this question draws upon the theory of ethical space put forth by Roger Poole in 1972 (Bartlett et al. 2012). Ethical space can be understood as the space between two knowledge systems, a space not owned by anyone, that opens and supports the possibility for co-learning and collaboration (Ermine 2007). Ethical space is formed when the worldviews of two disparate societies are engaged with one another (Ermine 2007). This creates a space for dialogue between different human communities to occur, creating channels for communication between opposing knowledge systems, such as Indigenous and western worldviews. Ermine states that ethical space requires an acceptance of the cultural divide, solidifying the need for open dialogue and co-learning to occur (Ermine, Jeffery and Sinclair 2004, 21). This thesis is located within such ethical space, at the interface of two distinct knowledge systems.

Relevance

The objective of this thesis is to advance our capacity to address complex challenges of an interconnected nature through listening and engaging with Indigenous perspectives. Two Eyed Seeing provides a means for this co-learning journey to take place, catalysed by a shared desire for interconnectivity and collaboration. A Two Eyed

Seeing approach places equal value on both knowledge systems at hand, allowing for designers, policy makers or other interested participants to weave between best practices to fit the circumstances.

> As Two-Eyed Seeing implies, people familiar with both knowledge systems can uniquely combine the two in various ways to meet a challenge or task at hand. In the context of environmental crises alone, a combination of both seems essential. (Aikenhead and Michell 2011, 114)

A Two Eyed Seeing approach to sustainable design can build upon the existing discourse, drawing upon the strengths of regenerative, reconciliatory and restorative design practices while seeking the knowledge, experience and expertise of Indigenous communities to promote more holistic, inclusive and resilient practices.

As recognized by the authors of Two Eyed Seeing, drawing upon Mi'kmaq knowledge in their application of Two Eyed Seeing represents one of many Indigenous cultures that is central to their own context and positionality. There is no limit to the amount of perspectives and cultures that could be applied, resulting in perhaps "Four Eyed Seeing or Ten Eyed Seeing" (Bartlett, Marshall and Marshall 2012).

This research aims to bring together the eyes that best represent and examine the context within which the research is situated in order to explore the role of architecture in reconciling worldviews.

Western Science   Traditional Knowledge

Co-Learning Journey

Ethical Space

Strengths   Strengths

Complex Challenge
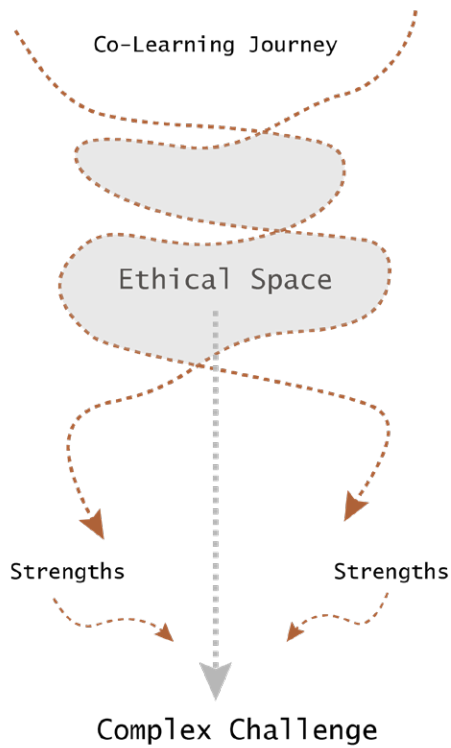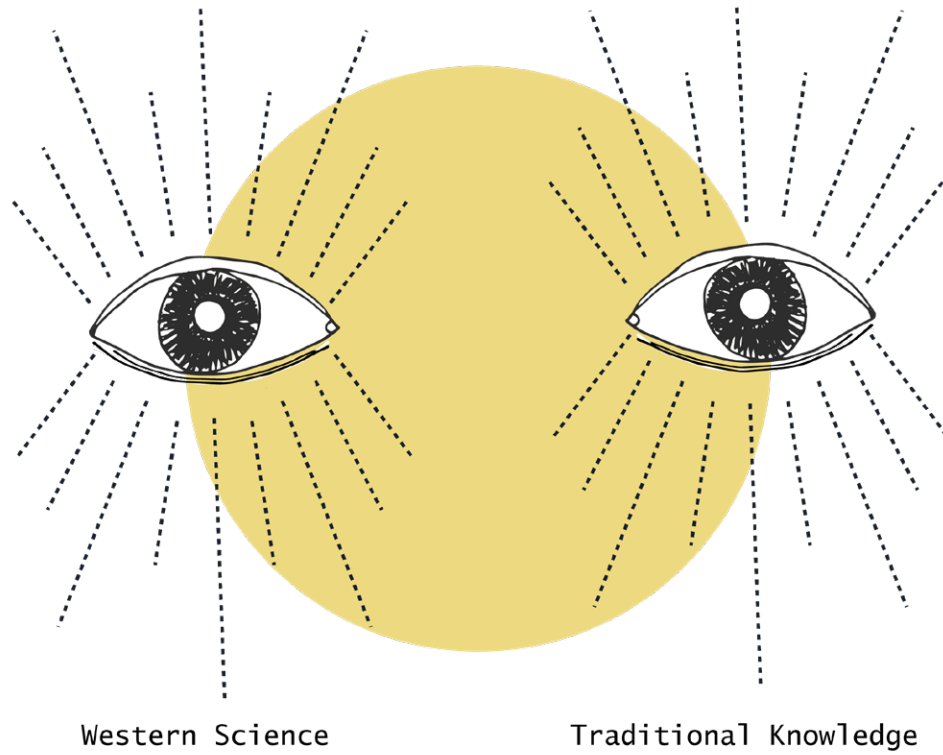
Two Eyed Seeing as a method for traversing the ethical space at the interface of two distinct worldviews.

Chapter 3: Methodology

> Central to the act of restorying is upending colonial structures and dissolving colonial ideas; actions that require the use of Indigenous voices and methodologies. While recognizing the core role of Indigenous voices I believe decolonization must also be performed by non-Indigenous scholars, like myself, using western methodologies and sources. (Olsen 2016, 118)

Traversing the space between knowledge systems provides an exciting opportunity to engage with new methodologies and approaches. In preparing for this thesis, I consulted Shawn Wilson's *Research is Ceremony: Indigenous Research Methods* (2008). Given that my experience in a research role has been shaped by the western institutions I have attended for my entire life, it was critical to engage an Indigenous methodology in developing my approach to this thesis. As expressed in Sylvia Olsen's passage, when seeking to depart from colonial structures in search of more diverse ways of thinking, our methods for gathering, analysing and presenting information must be decolonized and understood as part of a larger relationship.

Indigenous Research Paradigm

Eurocentric research has played a significant role in the colonization and oppression of Indigenous people (Wilson 2008). As a result, Indigenous communities have grown weary of research, and more specifically their exclusion from the process. In *Research is Ceremony*, Shawn Wilson introduces the concept of an Indigenous research paradigm. A research paradigm generally refers to the underlying beliefs or assumptions that form a framework upon which research is based (Wilson 2008, 33). The set of beliefs that make up research paradigms are the interrelated concepts of ontology, epistemology, methodology and axiology (Wilson 2008).

Wilson argues the issue with western research on Indigenous communities is the focus on "pulling up" Indigenous communities to the standards of the dominant paradigm (2008). An Indigenous research paradigm responds by not attempting to justify Indigenous research to the dominant system. Rather, it can "provide ways to celebrate the uniqueness and glory of Indigenous cultures while allowing for the critical examination of shortcomings." (Wilson 2008, 19). This responds to another issue with western research agendas that focus on aspects of life that tend to enforce negative stereotypes, focusing on "sickness rather than health" (Wilson 2008, 13). In developing the research methods through which to pursue my thesis, this focus on positivity has been an important reminder, and at times a challenge. Wilson describes how Elders taught him the importance of positivity in research: "It forms a relationship that pulls things together. Making a connection in this way allows for growth and positive change to take place. Researching the negative is focusing on giving more power to disharmony" (Wilson 2008,109).

Subjectivity

Unlike Euro-centric research methods, subjectivity is central to an Indigenous research paradigm. Departing from the unwavering quest for objectivity characterized by western research methods, Indigenous research strategies strive for subjectivity in order to be relational. "Western approaches to research that strip any personal emotion or motive from the research is not the right approach" (Wilson 2008, 54).

Respect, Relationality and Reciprocity

An Indigenous research paradigm should be guided by the "Three R's" Respect, Reciprocity and Relationality (Wilson 2008). "Respect regulates our treatment of all living things. It means you listen intently to other ideas and you do not insist that your idea prevails"(Wilson 2008, 54). Relationality means that all knowledge is shared. New ideas emerging out of research must respect the other relationships they become a part of and ensure there is a balance of power between new and old connections. This balance of power and the importance of restoring imbalanced relationships underpins the concept of reciprocity (Wilson 2008). The Three R's reflect how all living things are related and interconnected. When applied to research, the Three R's require research to be based in a community context and be accountable to the relationships it is connected to (Wilson 2008, 101).

Chapter 4: Gather

I am proposing the development of a novel application of Two Eyed Seeing that is specific to the field of sustainable architecture. This application seeks to develop an approach for designers to utilize in future projects, whether for Indigenous clients or not, as a response to the mainstream, western approach to design that has been perpetually imposed on diverse cultures and clients.

This application of Two Eyed Seeing builds upon typical applications that assign one eye to the strengths of western, scientific ways of knowing and the other to Traditional Knowledge of Indigenous communities. This application is intended to focus on contemporary design practices as well as contemporary experiences and knowledge in order to develop a more resilient approach to design that is rooted in the present and prepares for the future. For this new application, the paradigms represented by each eye will take on an architectural role termed as the "Architecture of Facts" and the "Architecture of Stories".

Architecture of Facts

Based on the statistical and empirical methodological approach to western academics and the focus on measuring performance standards in contemporary sustainable architectural practice, this eye will be termed the "Architecture of Facts". This eye will focus on the best practices in sustainable architecture for addressing interconnected crises of human and ecological resilience.
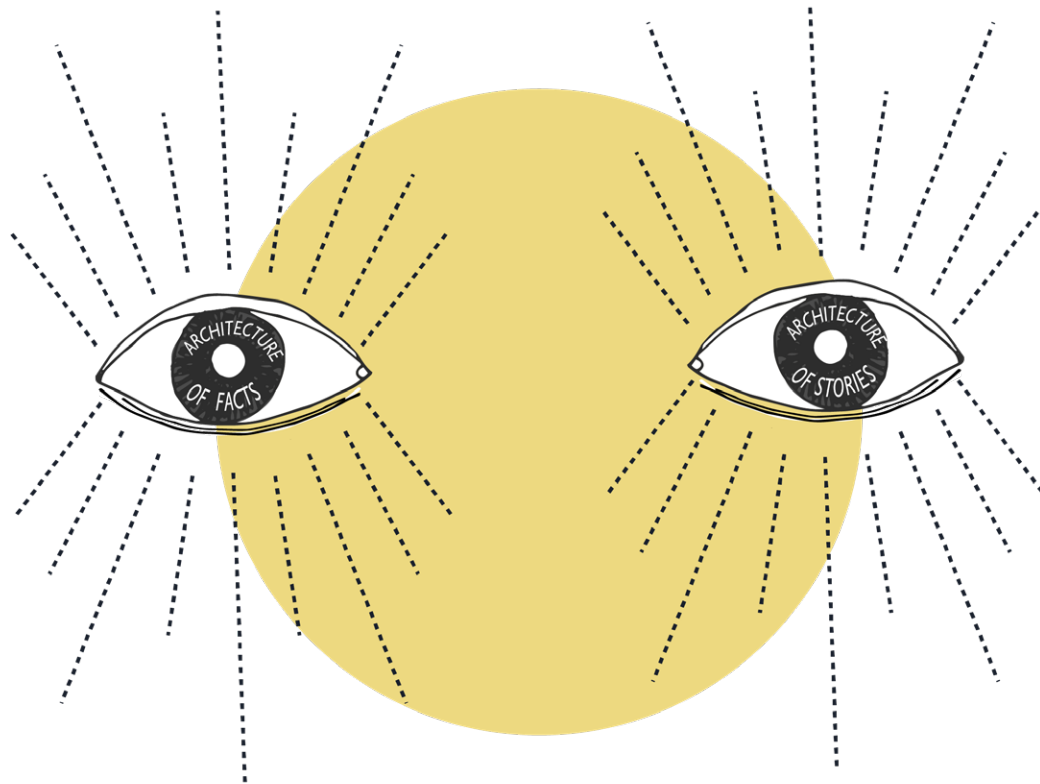
Architectural application of Two Eyed Seeing in the context of this thesis

Perspectives

Perspectives gathered under the Architecture of Facts have emerged primarily out of research and case studies regarding best practices in the sustainable architecture discourse for advancing resilience and embracing diversity in design.

Systems Theory

Key Perspective:
Systems Theory

Systems theory encompasses how buildings interact with the world around them. In typical scientific fashion, our understanding of buildings often tends to disaggregate elements and process that make up the whole. A systems view requires that we see all pieces as part of a larger whole or pattern as a means of dealing with the complexity of real life

conditions (Williamson, Radford and Bennetts 2003). Systems theory is used to respond to and advance the "triple bottom line'" of sustainable development priorities (Williamson, Radford and Bennetts 2003). The authors of *Understanding Sustainable Architecture* argue that competing sub systems of environment, economy and sociocultural society are useful for considering general development issues, but fail to include the important additional subsystems of the building and building users (Williamson, Radford and Bennetts 2003, 84). In stead, they recommend expanding the model to address the needs of all relevant stakeholders, both human and non-human (Williamson, Radford and Bennetts 2003, 85).
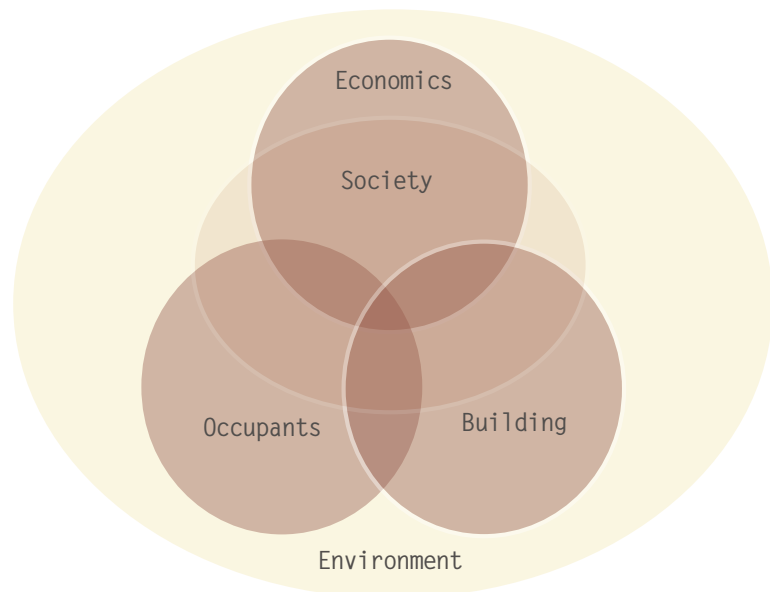
Expanding the three pillars of sustainability: subsystems for a building centered system model. A building centred system model created from 5 competing sub systems includes the Environment subsystem containing the Society subsystem and the subsystems of Economics, Occupants and Building that overlap with Environment and Society. (Williamson, Radford and Bennetts 2003, 84)

Key Perspective:
Passive Survivability

Key Perspective: Life
Cycle Analysis

Passive Survivability

A key feature of resilient design is the notion of passive survivability. As a response to increasing rates of extreme environmental events, passive survivability implies the potential for a building to maintain liveable conditions during peak winter or summer time weather (USGBC n.d.). Concentrating on simple and passive systems, this approach requires an understanding of climate and orientation to maximize solar gain and minimize the possibility of overheating. Design and construction to Passive House standards can help facilitate passive survivability by focusing on reducing overall energy demands through super insulation and air tight building envelope. Passive House standard buildings provide additional benefits of occupant health and comfort by improving air quality and eliminating issues of moisture and mould. A Passive House standard building may also integrate natural ventilation and integration of thermal mass to further reduce the building's energy demands (USGBC n.d.). Designing for passive survivability also addresses other necessary conditions for life such as access to water, a heat source for cooking and the potential for off grid and net positive design strategies.

Life Cycle Analysis

It is a well established fact that buildings contribute disproportionately to other industries in terms of global carbon dioxide emissions (Architecture2030 n.d.). However, the different phases of the buildings life vary in their contribution. Looking at buildings in subsequent phases through a life cycle approach allows designers to understand the impacts the building may account for throughout its life. Life cycle analysis examines four phases:

Key Perspective:
Calculating Carbon

Key Perspective:
Regenerative Design

production, which includes design and construction; use of the building, including operation and maintenance' the renovation or rehabilitation of the building or its parts; and finally demolition of the building including reuse or waste of materials (Williamson, Radford and Bennetts 2003, 93). Life cycle analysis requires an in depth understanding of the building as a whole and includes additional sustainable design principles of calculating embodied carbon and utilizing low impact materials.

Regenerative Design and Bio-mimicry

Biomimicry is a central perspective in resilient design as it looks to the strengths of the natural world to adapt and bounce back from adversity. Over time, living organisms have evolved to adapt to changes in their environment in creative and effective ways. Biomimicry simply means to imitate life, drawing from these natural systems of adaptation and evolution. This is different from biomorphosis which seeks to imitate the form of nature rather than the function (Okeke, Okekeogbu and Adibe 2017). Biomimicry in the field of sustainable design departs from ideas about architecture as dominant over nature and rather looks to nature for guidance in overcoming challenges (Okeke, Okekeogbu and Adibe 2017). This represents a shift from the building as protecting humans from the environment to protecting the environment from humans (Williamson, Radford and Bennetts 2003). Nature is a powerful teacher of sustainable resource management, resourcefulness and interconnected relationships. "The truth is, natural organisms have managed to do everything we want to do without guzzling fossil fuels, polluting the planet or mortgaging the future" (Benyus 2002).
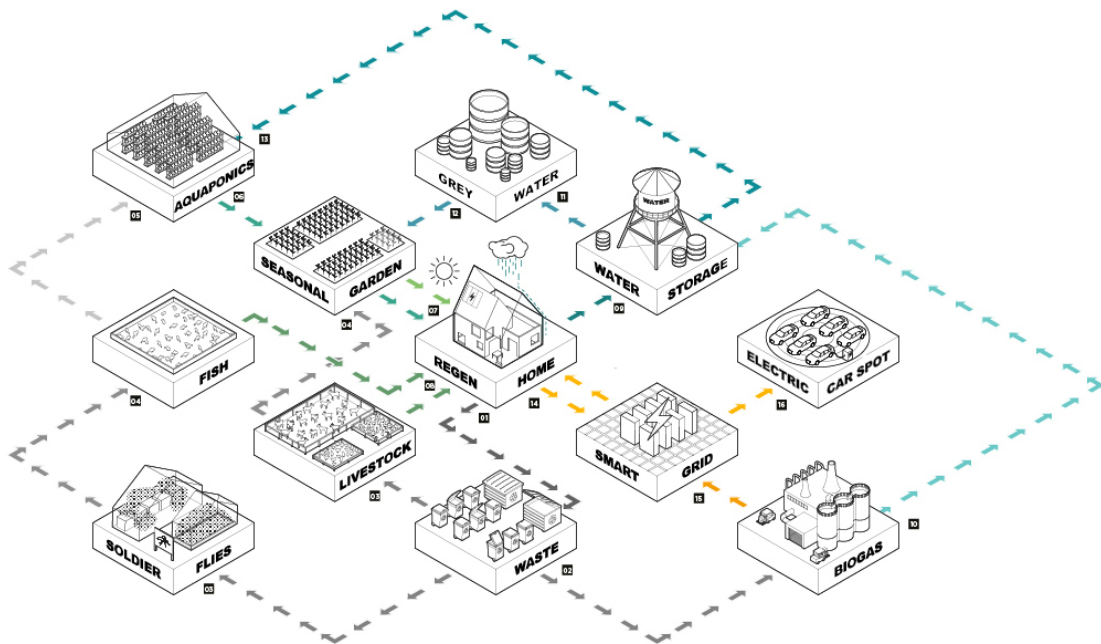
ReGen Villages, designed by EFFEKT proposes a new housing model guided by regenerative design practices that seek to integrate systems and inhabitation. (Crockett 2016)

Architecture of Stories

The second eye will draw upon the strengths of Indigenous knowledge and experiences, gained through engaging with Indigenous communities and authors under the guidance of an Indigenous research paradigm (Wilson 2008). This eye, given the narrative and experiential nature of Indigenous methodologies, will be termed the "Architecture of Stories".

Perspectives

Perspectives gathered under the Architecture of Stories have emerged out of research and dialogue regarding the strengths of Indigenous world views in advancing sustainability and resilience. Dialogue was a primary method for collecting these perspectives, allowing for voices outside of western academia to be shared. Conversations occurred primarily with members of the Mi'kmaq community in Nova Scotia. The following perspectives have been woven from overlapping ideas gathered from both dialogue and research.

Intergenerational and Collective Responsibility

Key Perspective:
Collectivity

As briefly outlined in Chapter 1, Indigenous Sustainable Development answers the call for amplifying diverse perspectives in the world of sustainable design and development. Indigenous sustainable development provides a "vision of sustainable development through the eyes and experience of Indigenous people" without filtering through mainstream perspectives (Clarkson, Morrissette and Regallet 1992, 3). Central to the beliefs and values behind Indigenous sustainable development is the notion of ensuring the health of the next seven generations. This sense of intergenerational responsibility has become

popularized in mainstream sustainability discourse dating back to the Brundtland Commission in 1987. Authors of *Our Responsibility to the Seventh Generation* respond to the short-sighted patterns of western development that fail to consider future inhabitants of the earth. Intergenerational responsibility is a guiding principle in advancing the field of sustainable architecture, asking important questions about the building's end of life phase and how this can support generations to come. "We cannot simply think of our survival; each new generation is responsible to ensure the survival of the seventh generation...Indigenous people are the poorest of the poor and the holders of the key to the future survival of humanity" (Clarkson, Morrissette and Regallet 1992, 1).

Seven Generations = 840 years
One Generation = 120 years

Great Grand Parent	Grand Parent	Parent	Child	Unborn	Unborn of Unborn	Unborn of Unborn of Unborn

20 yrs   40 yrs   60 yrs   80 yrs   100 yrs   120 yrs
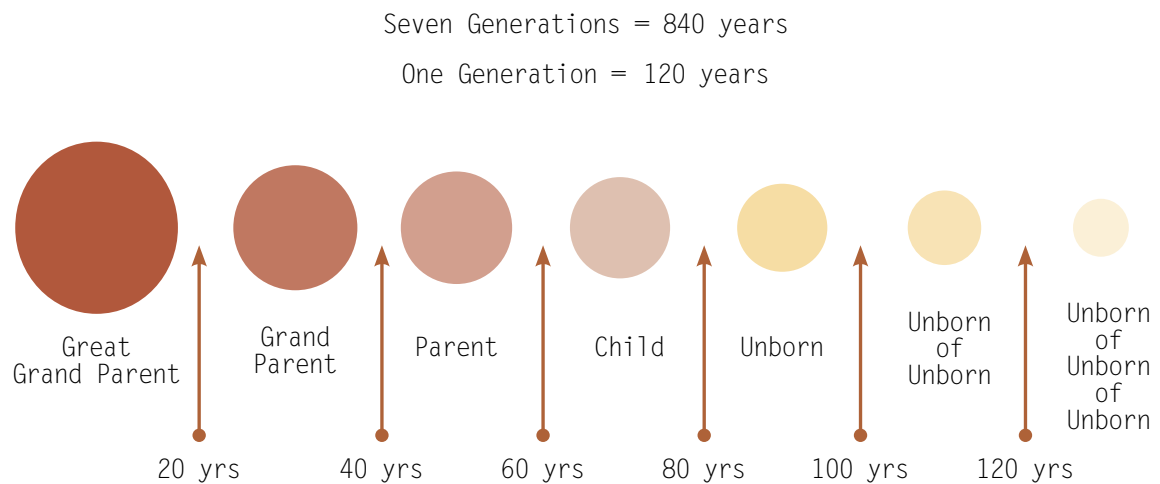
Understanding the meaning of designing for the next seven generations.
(Data from Institute for Integrative Science and Health n.d)

Alongside the idea of intergenerational responsibility is the importance of collective responsibility for the well being of all members of the community and the natural world (Clarkson, Morrissette and Regallet 1992). This sense of responsibility for all living things is rooted to the original law passed down by ancestors, teaching of Indigenous people's sacred responsibility as caretakers of the earth. This has translated into the systems and institutions that govern Indigenous communities such as the clan system, extended family system and consensus decision making (Clarkson, Morrissette and Regallet 1992).

Natural Law

Building on the original law and instructions passed down through generations, natural law is an important principle in advancing sustainable design. Abiding by natural law asks us to work with the natural systems and cycles in place rather than against them. Natural law can simply be understood as the dichotomous law of life and death (Clarkson, Morrissette and Regallet 1992, 13). If a creature fails to understand this relationship, they die. Though this rule holds up for all living creatures, as humans we have complicated things by denying the natural laws of life. In stead we have found ways to extract past natural limits and ignore temporal cycles. Natural law requires an understanding of daily and seasonal cycles and the relationships created by them.

If the plant world tried to grow in the winter, it would die, the earth was not prepared to give life at this time. If the animal world did not heed the changing of the seasons and prepare themselves, by leaving the immediate environment for a more hospitable one or by storing fat for the winter, they would die. If the people were to deplete the animal or plant resources of their immediate environment, pain and suffering could be expected. (Clarkson, Morrissette and Regallet 1992, 13)

Key Perspective:
Natural Law

Key Perspective:
Knowledge of Landscape
and Climate

The changing of seasons also carries meaning, reflecting our own cycles as humans. Spring represents new life and beginnings, or birth. Summer means abundance and growth, a time of youth. Fall signifies time for harvesting the teachings learned so far and embodying these during the middle years of life. Winter is a time for passing on these teachings and planning for the next cycle of life signified by old age (Clarkson, Morrissette and Regallet 1992). Natural law provides guidance for working within the relationships that uphold sacred balance on earth.

Teachings and Local Knowledge

In addition to teachings from natural law, there are also meaningful lessons to be learned from plants and animals.

Key Perspective:
Teachings from Nature

> The tiny mouse teaches us to focus, to observe the world with all our energy and our being and to appreciate the wonder of our world. The bear teaches us to walk quietly upon the earth and to live in harmony with the cycles. One had only to observe and to take the time to see with more than our eyes and our mind. (Clarkson, Morrissette and Regallet 1992, 13)

Teachings from plants and animals also contribute to a vast source of local knowledge. Knowledge of local ecology is built upon natural law and contributes to a holistic understanding of the surrounding environment. This awareness of natural systems and cycles built the foundation for agriculture, animal husbandry, health care, education and environmental conservation among several other aspects of life today (Clarkson, Morrissette and Regallet 1992, 72). Local knowledge extends beyond an ability to identify and utilize certain species, allowing communities to be adaptable and resilient, continuously recalibrating to changing environments and unforeseen events.

> The wider society can benefit from Indigenous peoples by learning from them how to adapt to and utilize fragile, marginal environments. Their contribution to sustainable resource

management built on the primacy of the relationship between people and Mother Earth needs to be recognized, protected and fostered. (Clarkson, Morrissette and Regallet 1992, 72)
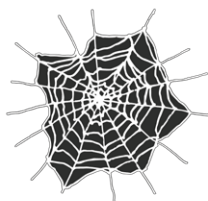
Key Perspective:
Netukulimk

Key Perspective:
Stewardship

Netukulimk: Interconnectedness

Netukulimk describes a Mi'kmaq philosophy of interconnectedness with the natural world (Bartlett et al. 2012). It acknowledges co-existence among all living beings, and a shared community spirit. This principle is not exclusive to Mi'kmaq culture, echoing ideals of stewardship and interconnection shared among Indigenous communities in Canada and beyond. The notion of interconnectedness and caretaking embodied by *Netukulimk* simply means that what we do to the earth we also do to ourselves. This principle requires an understanding of the web of connections that can be so easily disturbed through development.

Lessons Learned

As described, this research engages the ethical space between two distinct worldviews. A primary condition for navigating this space is acknowledgement of the existing cultural divide and an understanding of the intentions, values and assumptions each worldview carries (Ermine, Jeffery and Sinclair 2004, 21). Discerning the similarities and differences between knowledge systems and worldviews is a valuable first step in traversing this fragile space while also providing the foundation for a co-learning journey to take place. As stated by several scholars and knowledge keepers engaging in this field:

> We can and should try to learn from both Indigenous and Western ways of knowing because their complementarity will allow us to gain new ways of thinking about and approaching existing problems, and because their contradictions create learning opportunities. (Levac et al. 2018, 4)

Architecture of Facts   Architecture of Stories

CASE STUDIES   THEORY   ON SITE   CASE
RESEARCH   STUDIES

SYSTEMS   DIALOGUE

SYSTEMS   LIFE CYCLE
INTEGRATION   ANALYSIS   RESOURCEFULNESS

PRAGMATISM   NATURAL   FLEXIBILITY
SYSTEMS

REGENERATIVE
DESIGN   PASSIVE   CULTURAL
SURVIVABILITY   VALUES   COMMUNITY
RESILIENCE

ACTIVE + PASSIVE   ADAPTABILITY

DECENTRALIZED   COLLECTIVITY
INFRASTRUCTURE

BEST PRACTICES/
GUIDING
PRINCIPLES

Key perspectives gathered in the first phase of research under
the Architecture of Facts and the Architecture of Stories.

Differences

The differences between paradigms are largely of a theoretical nature, encompassing fundamental differences between our ways of pursuing knowledge and our views of the world around us. Authors of *Our Responsibility to the Seventh Generation* identify the primary barriers for working collaboratively, including a sacred versus secular relationship to the earth and a collective versus individual sense of responsibility to that relationship (Clarkson, Morrissette and Regallet 1992). In Indigenous worldviews, life on the planet is seen as a gift, which must be reciprocated. Western worldviews see life as a resource to be extracted. Building on this in terms of sustainability, Indigenous cultures view the taking of resources as part of a cyclical process of taking and retuning, whereas western cultures view extraction in a linear process (Clarkson, Morrissette and Regallet 1992). Though these gaps underpinning attitudes towards sustainability are substantial, it is my belief that they can be bridged in the field of architecture through a Two Eyed Seeing approach.

Similarities

Despite the fundamental divergences between knowledge systems and their theoretical backgrounds, it is important to acknowledge the ways in which the paradigms can support one another and begin to chart a shared pathway towards resilience. During the process of translating the research, case studies and dialogues into guiding principles, there were several areas of overlap that are valuable to recognize in moving forward.

Parts And Wholes Worldview
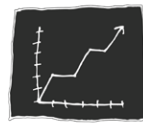
Linear Knowledge System

High Tech Solutions

Opposing Worldviews

Pursuit of Knowledge

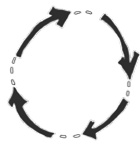Guiding Influences

Holistic Worldview

Interconnected Relationships

Nature and Natural Law

Differences between paradigms

Systems Approach

Regenerative Design

Resilience

Adaptability

Approach

Guidance

Goal

Strategy

Holistic Worldview

Teachings From Nature

Passive Survivability

Prefabrication

Similarities between paradigms

Systems and Relationships

There is a similarity between the principle of systems theory and the principles of *Netukulimk*, or interconnectedness. Systems theory breaks from typical reductionist methods of scientific thought, aiming to bring multiple disciplines and types of knowledge into a conceptual whole (Williamson, Radford and Bennetts 2003). Building systems should address the needs of all living things, not only humans, while maintaining and encouraging cultural diversity (Williamson, Radford and Bennetts 2003). This corresponds with Indigenous knowledge systems that pursue a holistic understanding of the world and view all of life in relationship with one another. Systems can be understood as sets of interconnected relationships, with each input and output impacting the behaviour and connections within the larger web of relationships. This balancing of inputs and outputs subscribes to the principle of *Netukulimk* and the interconnections or overlaps between all subsystems and relationships. What is input into a system is also output, and what we do to the earth, we do to ourselves. This also correlates with the notion of reciprocity and relationality that is central to an Indigenous worldview.

Learning from Nature

The principle of bio mimicry clearly overlaps with Indigenous worldviews regarding learning from natural law and the teachings of plants and animals. Biomimicry looks to nature as the best teacher in adaptability and resourcefulness. Teachings from the natural world are embodied in all aspects of Indigenous worldviews and experience, including design. In both principles, an in depth comprehension of the local environment is necessary.

Resilience and Adaptability
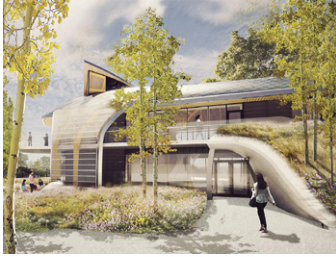
Passive design is rooted in context, requiring an understanding of the natural cycles at play and the quantifiable elements of climate. In this way passive design abides by natural law, adapting to the seasons through methods of heating and cooling, storing heat during the day and dispersing it at night. Passive survivability is directly linked to the idea of resilience, overcoming challenging conditions and adapting to meet these. This notion of adaptability is central to Indigenous worldviews and experience in many ways. During a conversation with Roger Lewis from the Nova Scotia Museum of Natural History, I learned about adaptability of Indigenous dwelling structures and sacred spaces. Roger described how dwelling structures have both elements of permanence and impermanence according to the seasons (Lewis 2020). This pattern of dwelling illustrates intrinsic connection to natural cycles and a great level of adaptability finely tuned with the natural world. Adaptability and resilience go hand in hand as we constantly attune to a changing environment.

Planning for the Future

There is also distinct overlap between the principle of intergenerational responsibility and life cycle analysis. Both of these principles are concerned with impacts occurring in a future tense, ensuring the well being of the environment and its inhabitants in the future. Life cycle analysis provides a way of planning for the future in pragmatic phases, looking at materials, systems and building components. Intergenerational responsibility humanizes the principle by thinking about who the building can be used by generations down the line.

Indigenous House, Formline Architecture. An example of building design and technology inspired by natural systems and cultural precedents. Influenced by the winter wigwam using a thickly insulated roof, central campfire and rock foundation to retain heat with a birchbark air shaft for fresh air intake. (Campbell 2020)

Architect and author Julia Watson introduces the concept Lo-TEK (Tradtional Ecological Knowledge) as an approach to climate resilient design drawn from Indigenous philosophy and vernacular. In *Lo-TEK, Design by Radical Indigenism* Watson highlights various approaches to sustainability that work with natural systems and materials exhibited by traditional Indigenous communities all over the world. These include the Jingkieng Dieng Jri Living Root Bridges created by the Khasi tribe in India above and the Tortorra floating reed islands in Peru pictured below. (Watson 2019, 16, 287)

Designing for Adaptation and Resilience Case Studies
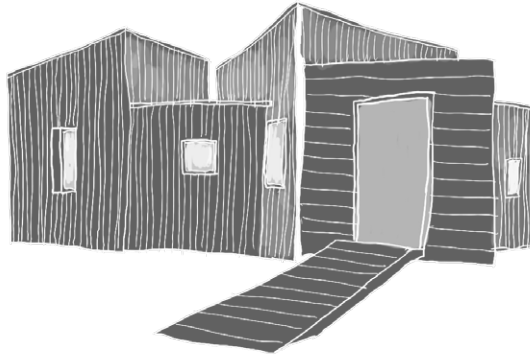
One House Many Nations: project by Idle No More promoting community building practices on remote reserves with resourceful, upcycled materials. (Davine 2019)
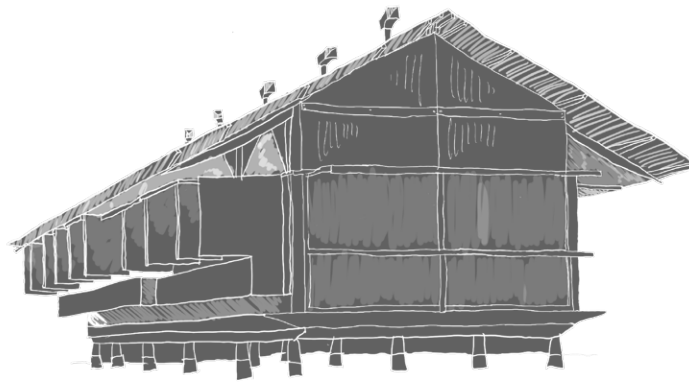
Marika Alderton House: designed by non-Indigenous architect Glenn Murcutt to be flexible to climate and familial dynamics. (Heneghan and Lassen 2008)

Tiny House Warriors: 10 tiny off grid houses built as part of a mission to stop the Trans Mountain pipeline from crossing unceded Secwepemc Territory. (Tiny House Warriors n.d.)

Guiding Principles

As has been discussed, there is significant overlap between perspectives within and across the two paradigms. The areas of overlap give way to categorizations of guiding principles loosely based on spatial organization and inhabitation, site considerations and environmental relationships, building components and capacity building. These categorizations allow for the establishment of guiding principles summarizing the perspectives gathered under each paradigm.

Under the Architecture of Facts, the principles closely relate to regenerative design principles and strategies. Regenerative, or positive impact design strategies act as indicators and goals for enhancing human and environmental health and well being (Attia 2018). Regenerative design strategies consider the construction system and the ability for this system to be adapted and reused. Additional strategies look at the incorporation of specific design elements that provide positive impact for building users such as connection to outdoors, improved air quality and water collection (Attia 2018). The use of regenerative materials, primarily biosphere materials that are naturally derived and technosphere materials where they may be disassembled, reused and are non-toxic are encouraged as positive impact design strategies (Attia 2018).

These three design strategies have influenced the development of the guiding principles for the Architecture of Facts, consisting of pragmatic design, building performance and life cycle assessment. Pragmatic design encompasses the importance of context and designing the structure to accommodate changing dynamics and building function. Performance refers to the performance of the building in its

site context and the potential for self sufficiency. Life cycle considers the buildings components over time, looking at the source of materials, processing, fabrication and end of life practices.

The Architecture of Stories guiding principles follow the central tenets of an Indigenous research paradigm proposed by Wilson, consisting of responsibility, respect and reciprocity. Responsibility extends to the building user, the surrounding environment and the next seven generations. Respect considers the relationship with nature, place, culture and values, drawing upon local knowledge and natural law. The third category, reciprocity, concerns the relationships between the building user, the community and the environment. This embodies ideas around giving back to the land and to the community through transfer of skills and knowledge, including principles of collectivity and resourcefulness.
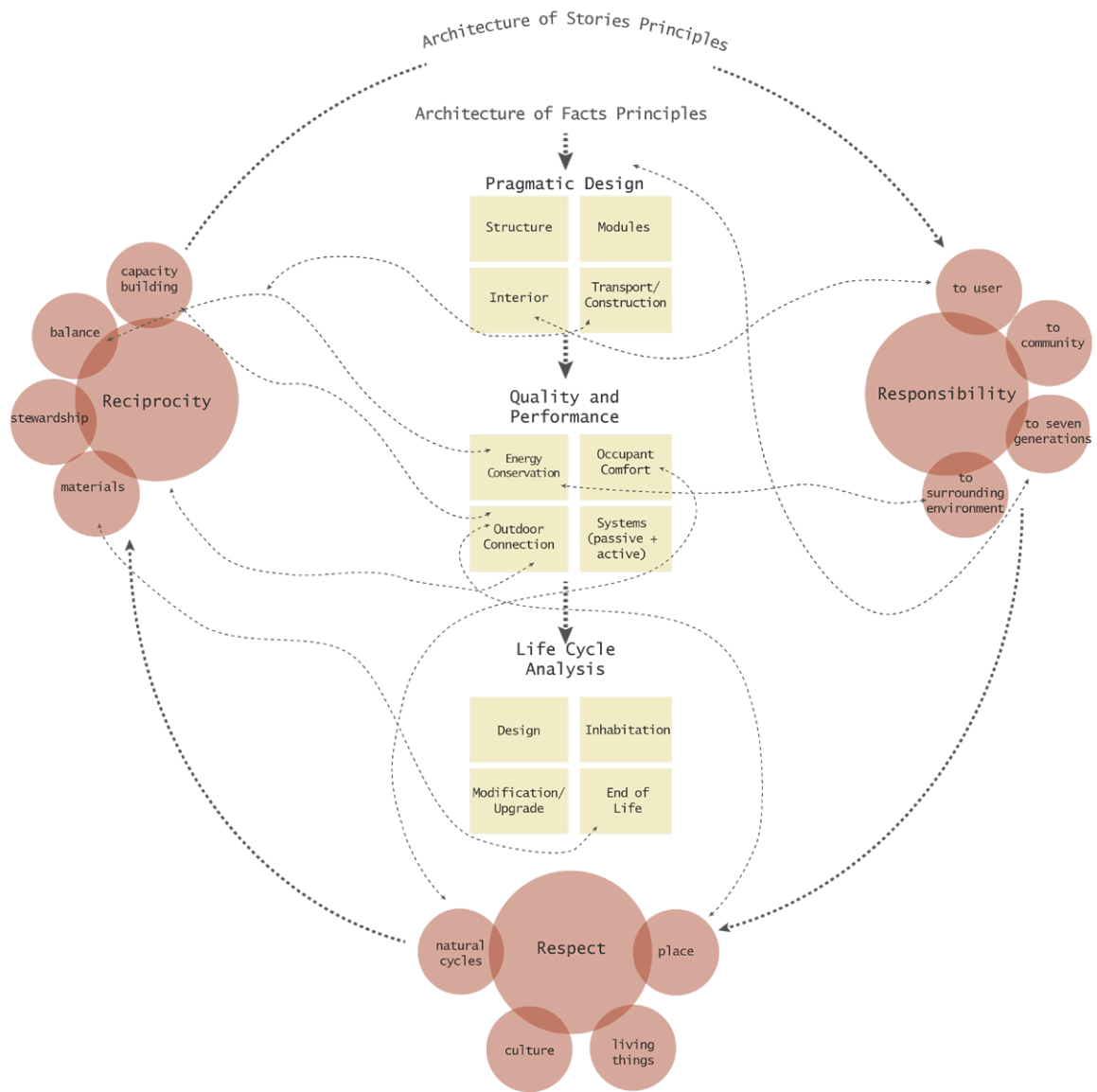
Guiding Principles of the Architecture of Facts and Architecture of Stories and the relationships between and across them.

"Wish Image" collaging similarities and overlapping principles

Chapter 5: Bridge

In developing the Integrative Science program at Cape Breton University, the authors were explicit in their definition of "integrative". The concern was that people might see the term integrative as meaning two knowledge systems merged into one. This raises dangerous associations with Canada's history of assimilation (Bartlett et al. 2012). In stead, for the purpose of this thesis, the notion of bridging knowledge systems will not take place in the sense of merging Indigenous ideas with western, inserting fragments of ideologies where fitting. Rather, this will take on what Newhouse describes as "grappling with each other's cognitive universes and learning to see through the minds of others" (2004). In order to maintain the integrity of each paradigm and avoid blurring boundaries, the guiding principles for each eye have been interpreted into a design language representing the third space between paradigms. This design language seeks to translate guiding principles into applicable design methods that can be integrated into a particular project context. These design methods provide a tangible way to engage with the process of Two Eyed Seeing in various contexts.

Two Eyed Seeing Design Methods

The exercise of translating guiding principles into design methods requires an understanding of the relationships between and across the principles. Translation into a design language provides the opportunity for the third space to be created between paradigms. This exercise of exploring linkages and the meanings behind connections led to the creation of the following six design methods for engaging Two Eyed Seeing in a design project.

Design Methods

Pragmatic Design
Environment
User
Multipurpose

Responsibility
To User
To Community
To Earth
To Seven Generations

Flexible Spatial
Composition

Responsive
Building Form

Interconnection
with Land

Performance
Passive Survivability
Passive + Active Systems
Connection to Outdoors

Decentralized
Systems

Respect
Nature
Natural Cycles
Place
Culture + Values

Carbon Storing
Materials

Life Cycle
Materials
Construction
End of Life

Resourceful
Construction

Reciprocity
Giving back to land
Giving back to community
Learning + Capacity Buildir
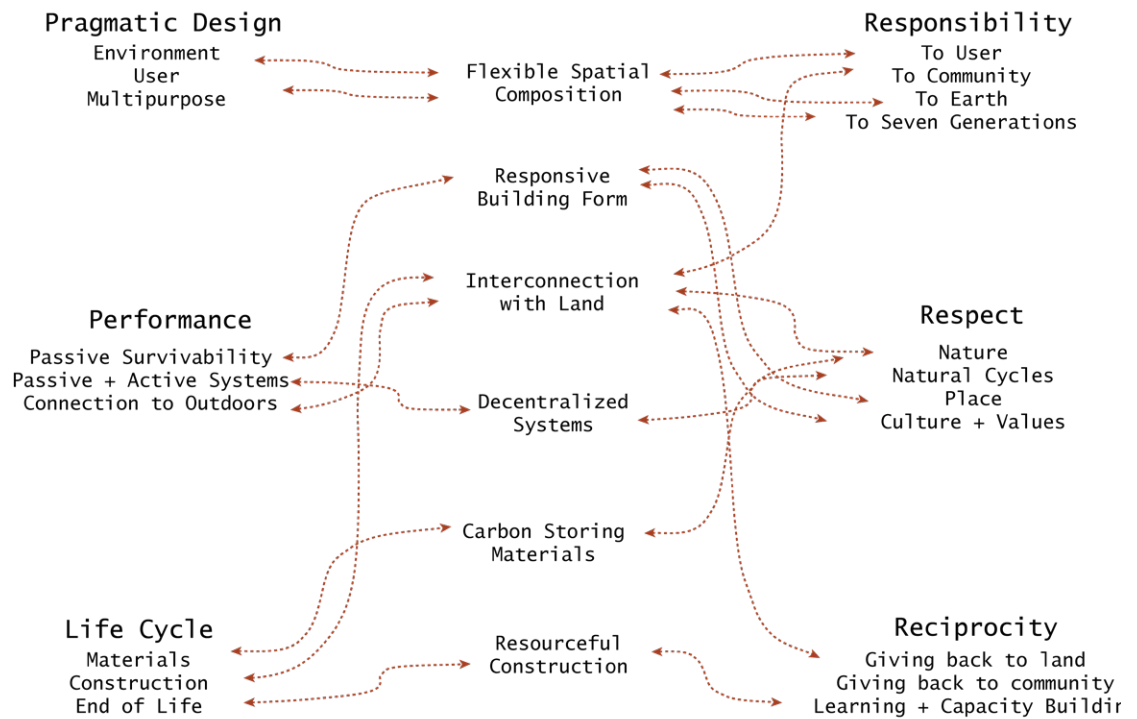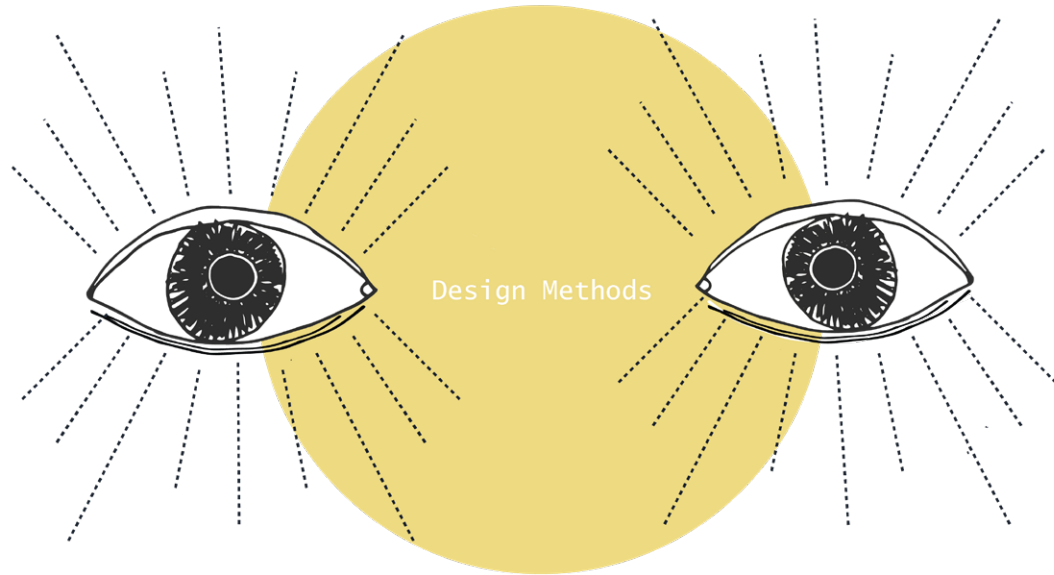
Diagram illustrating how the relationships between guiding
principles leads to the creation of architectural design methods.

Responsive Building Form

The first design method, responsive building form, indicates the relationship between form, building performance and place based values. The building form must respond to the natural conditions, cycles and features of the place, while engaging the cultural and social values of the community inhabiting the site. This idea resonates with the work of John-paul Jones, an architect of American and Choctaw-Cherokee heritage, who writes of the importance of discerning between symbolism and values when studying or designing based on traditional building forms (Jones 2018).

Interconnected Landscape

This design method emerges out of reciprocity, responsibility, performance and life cycle. An interconnected landscape considers how the building site can provide reciprocal habitat to the surrounding environment. This approach asks that whatever land is taken away or disturbed by construction be returned in some way to the species inhabiting the site. This method also aims to weave human inhabitants into this interconnected web of relationships through provision of outdoor space, connection to the surroundings and stewardship of the landscape.
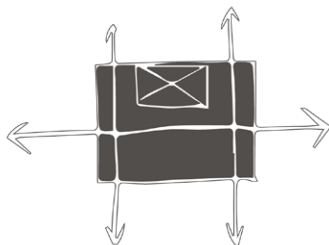
Flexible Spatial Organization

Flexible spatial organization is a method that thinks to the future of the building and the changing needs of its inhabitants. This leads to an idea of nested spatial organization, locating more permanent, essential components of the building at the center while allowing for flexible spaces to aggregate around this. Flexible design allows occupants to adjust the space to their needs and recompose spatial elements

Design Method 1:
Responsive Building Form

Design Method 2:
Interconnected Landscape

Design Method 3:
Flexible Spatial
Organization

over time. Flexible design methods are often employed in housing design as they accommodate changes in household dynamics. By creating structural systems that support adaptability and flexibility, the building can grow, change and continue to be inhabited further into the future. Designing flexibly is a critical component of regenerative design strategies, allowing the building's life to be extended into the future through provision of adaptable, multifunctional spaces. This also aligns with Indigenous values of intergenerational responsibility, providing future generations with the flexibility to adjust a building to suit their needs.
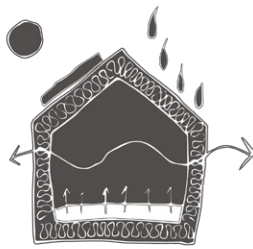
Decentralized Systems

Decentralizing systems requires a knowledge and integration of both passive and active systems that best support the function of the building and the health and well being of the user. Decentralization is an important precursor to self sufficiency and passive survivability and requires an inherent respect and comprehension of the natural cycles governing the site environment. Reducing pressure on centralized infrastructure grids increases the resiliency of the building and the comfort of the occupant.

Carbon Storing Materials

A central element of regenerative design strategies is employing the use of carbon storing materials. Carbon sequestration is an increasingly important criteria for material selection as buildings continue to improve in efficiency. A material's capacity to store carbon reflects the identity of the material as a living thing that once relied upon the same mechanisms and elements for life as we do. Incorporating living materials is not only important for drawing down the carbon foot print of the building under the Architecture of

Design Method 4:
Decentralized Systems

Design Method 5:
Carbon Storing Materials

Facts view, but is important to Indigenous value systems that treat all living things with respect and reciprocity.

Resourceful Construction
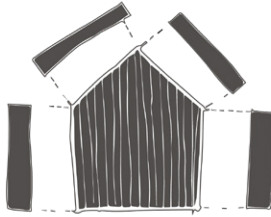
Design Method 6:
Resourceful Construction

Combining life cycle, performance and reciprocity through capacity building, resourceful construction embodies a Two Eyed Seeing approach to building. This method looks to utilize local materials that may be considered unconventional in conventional ways, aiming to make use of materials that may otherwise go to waste. This method encourages the use of prefabricated and/or panelized construction methods combined with local materials as a way of reducing material waste and ensuring ease of construction, renovation and deconstruction. Prefabricated construction systems have the added benefits of reduced construction time, extended construction season and reduced costs for both labour and materials. This method is largely influenced by Indigenous values of resourcefulness, utilizing all parts of a plant or animal, and combining this mentality with conventional methods of saving time, money and material through panelized systems.

Chapter 6: Weave

A Two Eyed Seeing Approach to On Reserve Housing

This chapter explores how the design methods established in Chapter 5 are applied in the specific context of on reserve housing in Wagmatcook First Nation on Cape Breton Island. The following chapter explores how a Two Eyed Seeing approach to on reserve housing could contribute to community resilience and independence while recognizing the nuances of the subject of on reserve housing and the limitations in addressing it. It is important to understand what can and cannot be addressed through a design project as factors such as policy, governance and funding remain entangled in federal jurisdiction while challenges around building quality, operating costs, climate and cultural suitability provide possible opportunities for intervention. A brief summary of on reserve housing in Canada sheds light on challenges of a deeply systemic nature and those that could be addressed through a Two Eyed Seeing approach to design.

On Reserve Housing

Abiding by Shawn Wilson's principles of an Indigenous research paradigm, it is important to not focus solely on the negative aspects of on reserve housing and look also to the opportunities presented (Wilson 2008). It is important to note that the current housing conditions on reserves across Canada cannot be used to negatively enforce stereotypes around Indigenous communities. Rather, the conditions can be attributed as symptoms of a larger cause that implicates the Government of Canada as the responsible party.

In her doctoral thesis, Sylvia Olsen sheds light on the government's complicity in perpetually under-delivering poor quality housing on reserves in Canada (2016). She indicates that government housing programs are to blame for creating poverty on reserves through the perpetuation of a separate housing system that offered different standards of living for Indigenous people (Olsen 2016). As has been discussed, the roots of the issue can be traced back to the federal government's unwillingness to relinquish control over Indigenous matters to Indigenous people. As a result, houses on reserves "became imposed objects, symbols of oppression and experiences of discomfort and shame" (Olsen 2016).

Today, housing conditions on many reserves remain in a perpetual state of crisis (SSCAP 2015). Issues around on reserve housing are generally experienced throughout Canada, with the exception of northern communities where extreme climate and remote location pose additional challenges. On reserve housing challenges include a major shortage of units and overcrowding, poor quality homes in need of repair and severe mould contamination. A report from 2015 by the Standing Senate Committee on Aboriginal Peoples provides a "statistical portrait" of on reserve housing throughout Canada, indicating a general worsening of conditions and a widening gap between housing shortage and delivery (2015). Between 2010 and 2031 a backlog of 130,000 housing units is expected, taking into account the disproportionate growth of Indigenous populations at present and anticipated in the next 20 years (SSCAP 2015, 6).
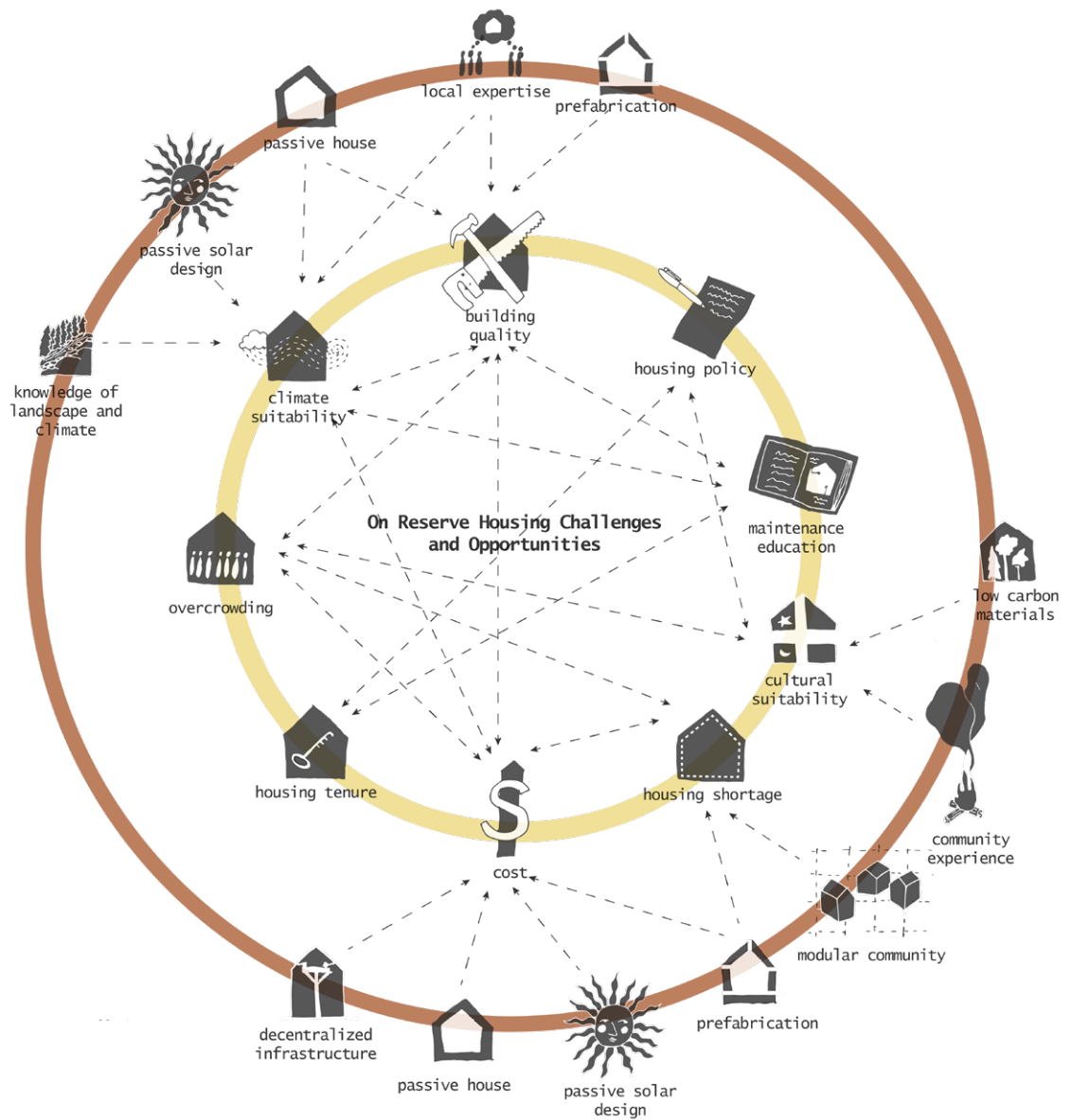
On Reserve Housing Challenges: examining the limitations and the opportunities for intervention.

Though the housing conditions may be similar across Canada, respondents to the 2015 report indicate that it is dangerous to generalize challenges and solutions as solutions especially need to be designed for specific communities (SSCAP 2015, 13). Given the complex nature of on reserve housing challenges, a diverse array of housing solutions is needed to meet the needs of different community members, ranging from single adults, to families, to elders. Building quality remains a large issue on reserves as housing deteriorates faster due to low quality materials, lack of information around building maintenance and moisture and mould issues associated with overcrowding and continuous boil water advisories (SSCAP 2015).

In Nova Scotia these issues persist across reserves and are heightened at the two reserves established as a part of the government's centralization policy in 1941 (SSCAP 2015). Eskasoni First Nation and Indian Brook First Nation were chosen as the two sites to funnel the Mi'kmaq population into as a part of this policy (Tobin 1999). The effects of this policy are experienced today, with overcrowding and housing shortage posing a significant challenge in these highly populated locations.

Year: 1833
Population: 810
On Reserve: 633
Off Reserve: 177

Year: 1832
Population: 1,430
On Reserve: 909
Off Reserve: 521

Unama'kik
Land of Fog

Year: 1833
Population: 976
On Reserve: 893
Off Reserve: 83

Epexiwisk
Lying in the Water

Wagmatcook

Membertou

Year: 1865
Population: 650
On Reserve: 498
Off Reserve: 152

Siknikt
Drainage Area

We'koqma'q

Eskasoni

Year: 1832
Population: **4,314**
On Reserve: 3,689
Off Reserve: 625

Year: 1880
Population: 283
On Reserve: 119
Off Reserve: 164

Year: 1907-1984
Population: 359
On Reserve: 89
Off Reserve: 270

Pictou Landing

Agg Piktuk
The Explosive Place

Potlotek

Paqtnkek

Year: 1792
Population: 714
On Reserve: 581
Off Reserve: 133

Year: 1820
Population: 330
On Reserve: 106
Off Reserve: 224

Millbrook

Year: 1820
Population: 330
On Reserve: 106
Off Reserve: 224

Annapolis Valley

Glooscap

Sipekne'katik

Eskikewa'kik
Skin Dressers Territory

Year: 1860-1886
Population: 1,780
On Reserve: 900
Off Reserve: 880

Year: 1820
Population: 565
On Reserve: 427
Off Reserve: 138

Bear River

Sipekne'katik
Wild Potato Area

Kespukwitk
Land Ends

Year: 1820
Population: 2,554
On Reserve: 1,296
Off Reserve: 1,258

Acadia

Year: 1820
Population: 1,498
On Reserve: 224
Off Reserve: 1,274

Mi'kmaq Population Demographics
Atlantic Region
        Total Population: 62,468
        On Reserve: 23,416
        Off Reserve: 39,052
Nova Scotia
        Total Population: 19,090
        On Reserve: 10,878

◄ Relocation during 1942 Centralization

Map of Nova Scotia Mi'kmaq Communities and population demographics of the reserve.
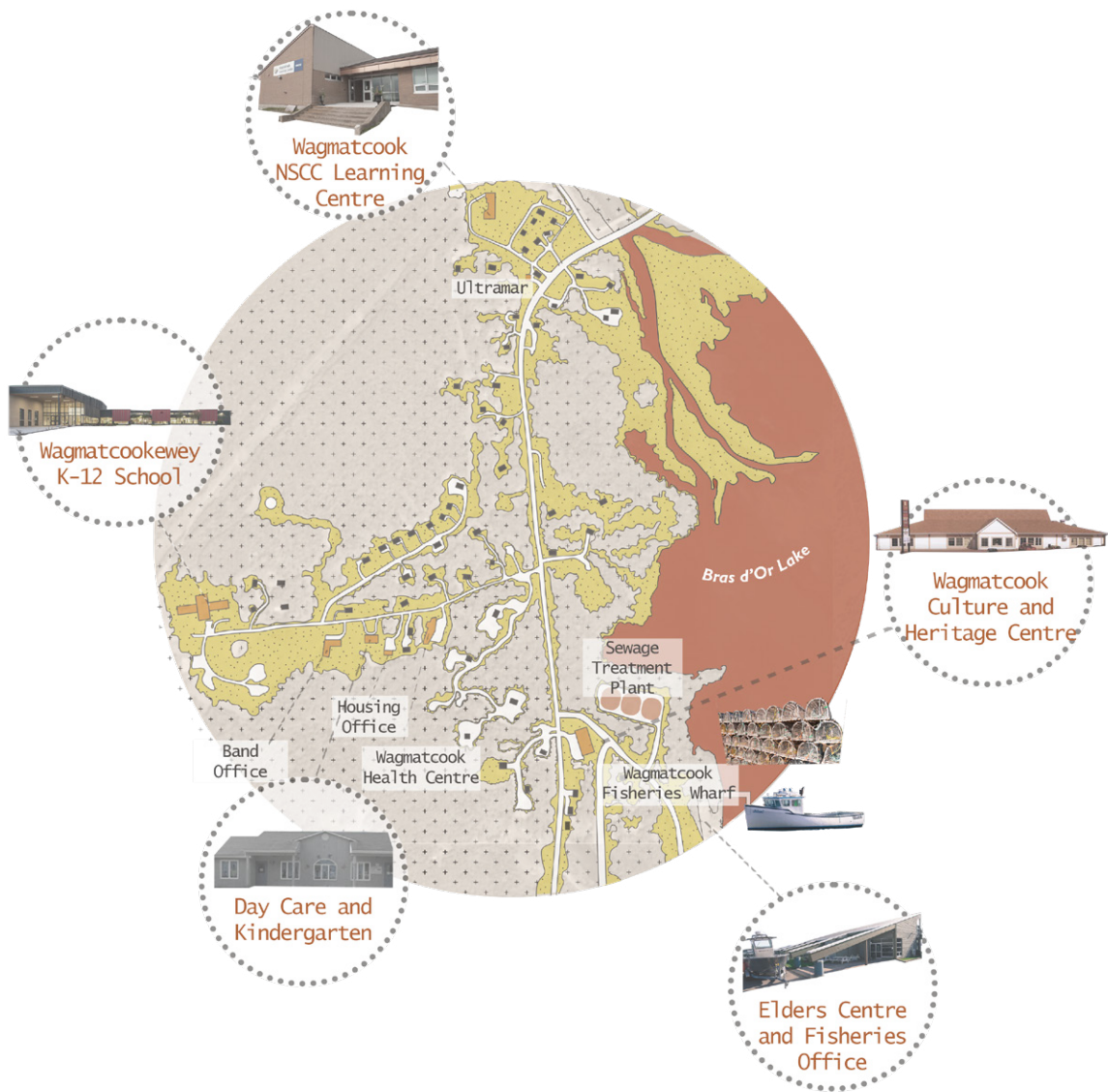
Wagmatcook First Nation

This project is located in Wagmatcook First Nation, one of five Mi'kmaq communities on Unama'ki, or Cape Breton Island. The Wagmatcook community is tucked between the Acadian forests of the Cape Breton Highlands and the shores and estuaries of the expansive Bras d'Or Lakes.

The Bras d'Or Lakes region is incredibly rich in biodiversity given the unique location of the lake system at the center of Cape Breton Island, fed by sea water. The lakes are a large estuarine body of interconnecting bays, barachois ponds, channels and islands. Formed 10,000 years ago, the lakes have undergone significant regional climatic shifts, resulting in the presence of warm and cold water species from arctic and sub tropic regions (Denny et al. 2016). The Bras d'Or Lakes also host the coexistence of salt and freshwater species in the brackish waters. The lake is culturally significant to the Mi'kmaq of Unama'ki, serving as grounds for harvesting eel and oyster, both a substantial component of the traditional and contemporary Mi'kmaq diet (Denny et al. 2016).

The location of Wagmatcook First Nation along the Bras d'Or Lake provides the community with revenue from lobster fishing, a large source of employment. The community also hosts a cultural center, restaurant, health center, Kindergarten to Grade 12 school, Elders Center and a Learning Center in conjunction with Nova Scotia Community College.
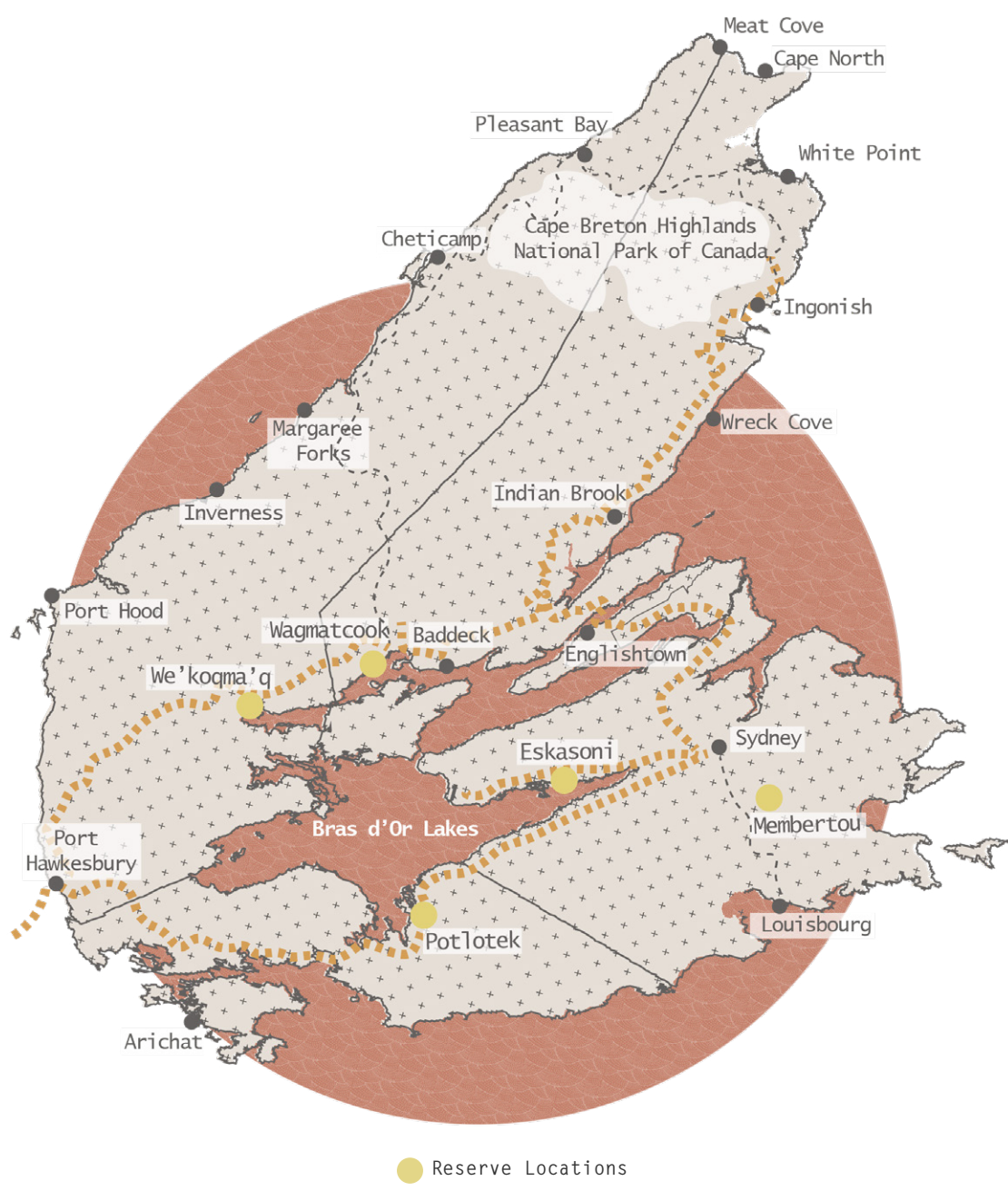
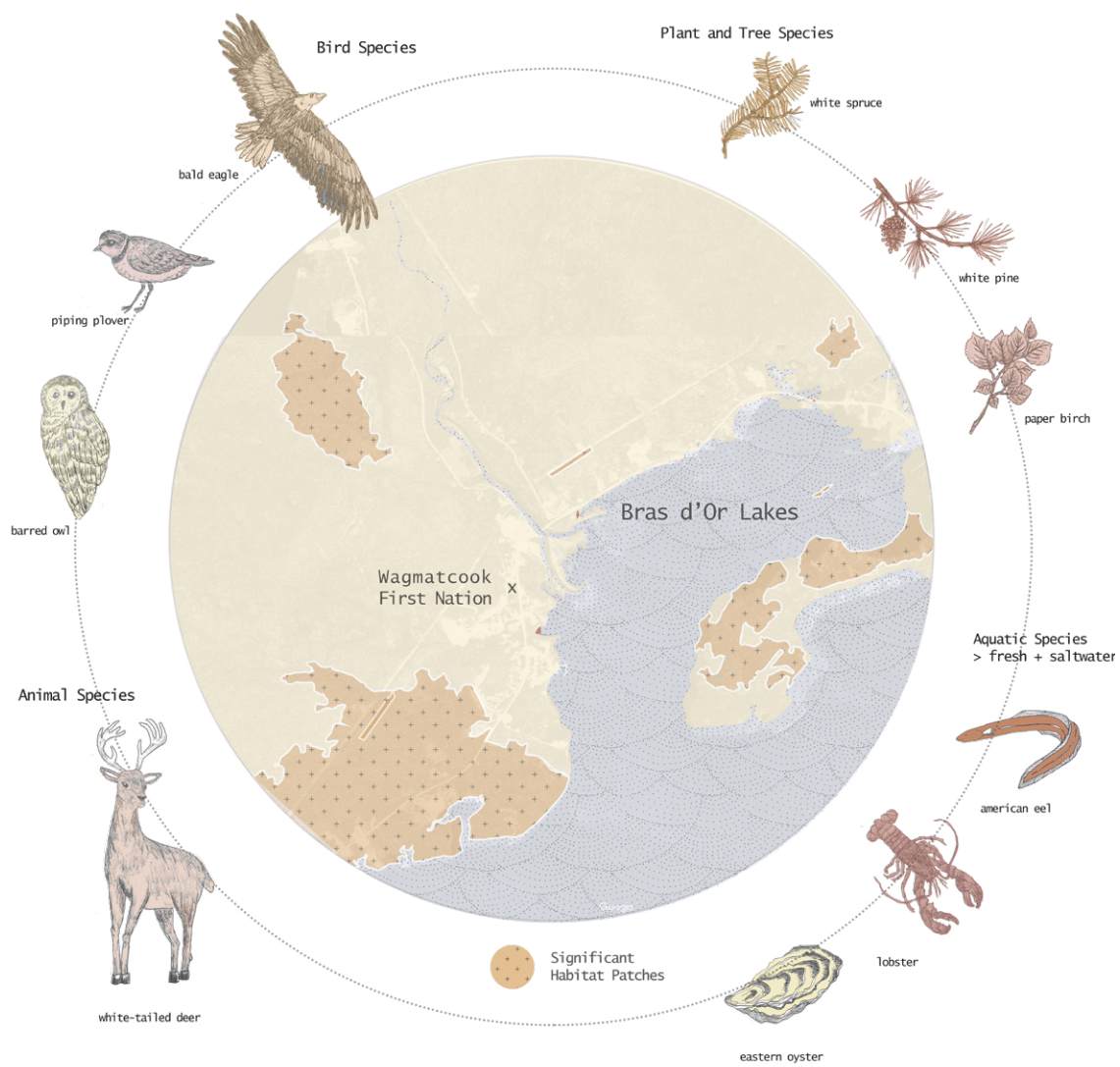Map of Mi'kmaq communities on Cape Breton Island, Nova Scotia

Map of Wagmatcook First Nation and community amenities

Habitat and Biodiversity

The Bras d'Or Lakes biodiversity region is home to a huge variety of aquatic and terrestrial species. As inhabitants of the site for centuries there is a great deal to learn from ways of dwelling and community building illustrated by species such as the white-tailed deer, the eastern oyster, the barred owl and the American eel. Given it's forest edge location, Wagmatcook is a significant wintering habitat for deer, while large birds of prey nest on the conifer trees at the edge of the Acadian forest. As the community extends towards the brackish waters of the Bras d'Or, more species are found, including piping plovers nesting on the shore line, salmon, herring, flounder and many more fish species emerging from the estuaries. The preferred habitats of these long established community members can tell us of the various modes of dwelling that have adapted over time to meet the challenges of the harsh and dramatic climate of Cape Breton.

Lessons from the Oyster

Of all the inhabitants of the Wagmatcook community, one in particular provides compelling evidence of a mode of dwelling that promotes community building, collectivity and resilience. This inhabitant is the oyster. The oyster provides a model for community building as it aggregates over time, building layers of inhabitation that allow for the overall community to thrive. Resulting from this aggregated community is the provision of vital habitats for neighbouring species. Oyster beds provide shelter for various aquatic species such as the blue crab, shrimp, lobster, herring, flounder, and an array of invertebrates (Denny et al. 2016).

Bird Species

Plant and Tree Species

white spruce

bald eagle

white pine

piping plover

paper birch

barred owl

Bras d'Or Lakes

Wagmatcook
First Nation ×

Aquatic Species
> fresh + saltwater

Animal Species

american eel

lobster

Significant
Habitat Patches

white-tailed deer

eastern oyster

Inhabitants and habitat patches of the Bras d'Or Lakes region

The crevices between shells allow smaller species to hide out from prey while the shell structure facilitates the growth of barnacles and anemones. Oysters are also stewards of the environment, providing a valuable service to the surrounding ecosystem through a built in water filtration system to cleanse water of contaminants. This enhances the habitat for surrounding species and embodies important values of reciprocity and stewardship. The oyster is also largely self sufficient, requiring minimal inputs and capable of constructing its own environment. In these many ways the oyster represents an important symbol of resilience and collectivity that the ensuing design seeks to embody.

FILTERED WATER

HABITAT PROVIDERS

CONTAMINATED WATER

ENVIRONMENTAL STEWARDS

LESSONS FROM THE OYSTER

COMMUNITY BUILDING
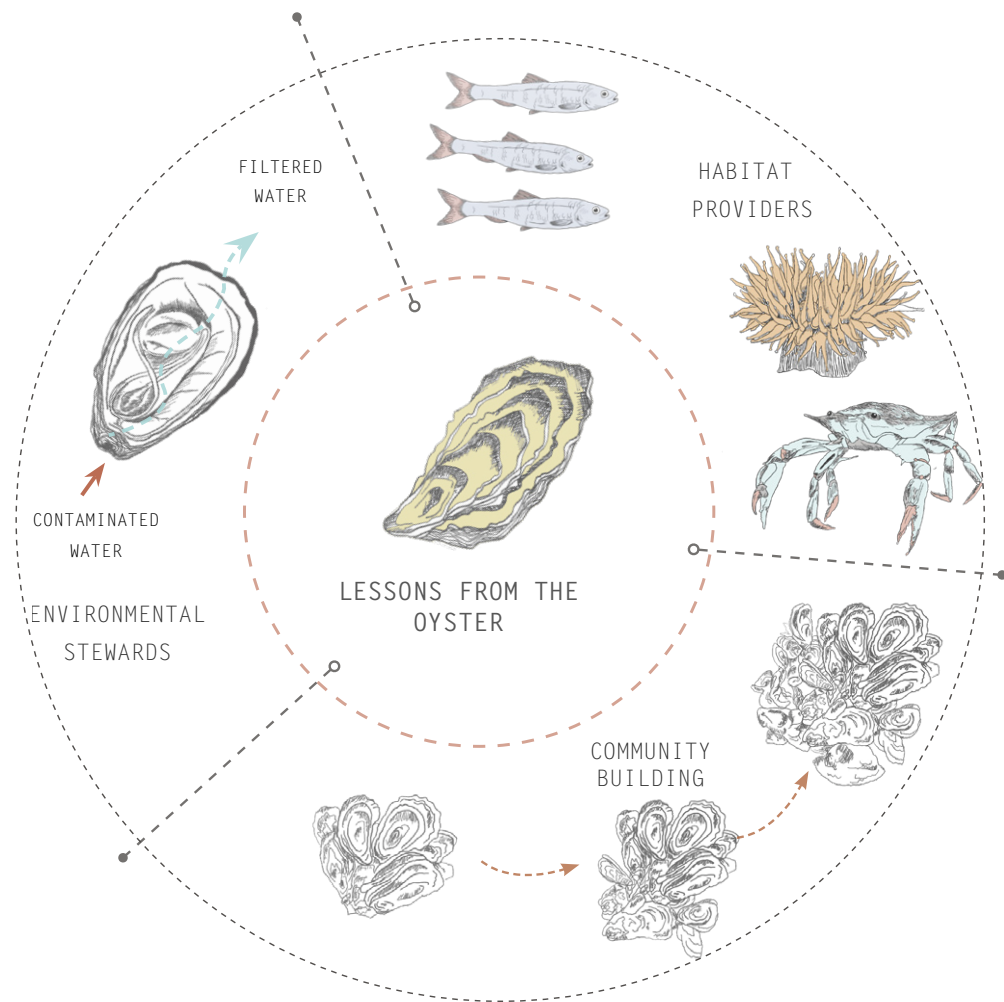
Lesson learned from the Oyster

Housing in Wagmatcook First Nation

Common on reserve housing types. Cape Breton, Nova Scotia.

Wagmatcook First Nation is a growing community and shares many of the same challenges that are faced on reserves throughout Nova Scotia and across Canada. Overcrowding linked to housing shortage is a significant challenge in the community, with a population of 800 people and only 200 houses (Turnbull 2020). In many cases there are 12-14 people living in one home, or multiple families dwelling together in a house intended for one. One resident of the community illustrated the extent of housing shortage, stating she had lived with 24 people in one house. She joked that with the amount of kids in the house there was a birthday party every day (Turnbull 2020). The housing director in Wagmatcook explained that with the current funding and capacity, about three to four new homes are built per year (Turnbull 2020). The majority of existing houses are 20 to 30 years old, with some in need of major repairs and most requiring general upkeep.

The housing director is enthusiastic about new housing developments featuring simply designed, minimal housing types in a new rural suburb (Turnbull 2020). Though important for meeting the needs of families on the housing waiting list, there is a need for more diverse types of housing solutions for individual adults, single parents or elders. The community is working to develop an Elders complex that could free up some homes to pass down to families while accommodating Elders with additional care needs. Another approach to comfortably housing Elders that hasn't been formally undertaken is the construction of one bedroom Elder suites, allowing the family to remain close to their parents and grandparents while offering autonomy and privacy for the Elders. Additional challenges in Wagmatcook

that I learned about while visiting the community include extremely high operating costs. The housing department is working to improve this through partnering with Efficiency Nova Scotia to audit homes, outfit Elders residences with heat pumps, insulate basements and check old appliances (Turnbull 2020). Despite the inherent challenges of on reserve housing as a result of funding and policy, the community of Wagmatcook is making positive steps towards improving housing inequality, presenting several opportunities for a Two Eyed Seeing approach to theoretically imagine new housing outcomes.

Family

Single Adult

Elders

building quality

29% in need of major repairs
42% in need of minor repairs
29% in need of regular maintenance

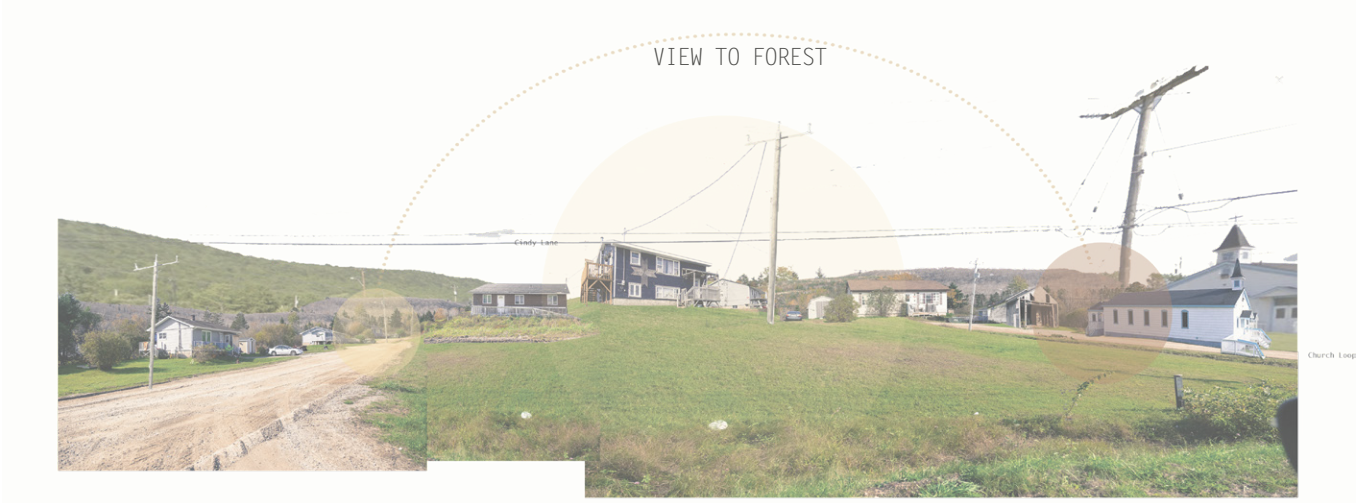housing tenure

17% privately owned
83% band owned

housing shortage

800 people living on reserve
200 houses

Housing wait list candidates

Housing conditions in Wagmatcook First Nation.
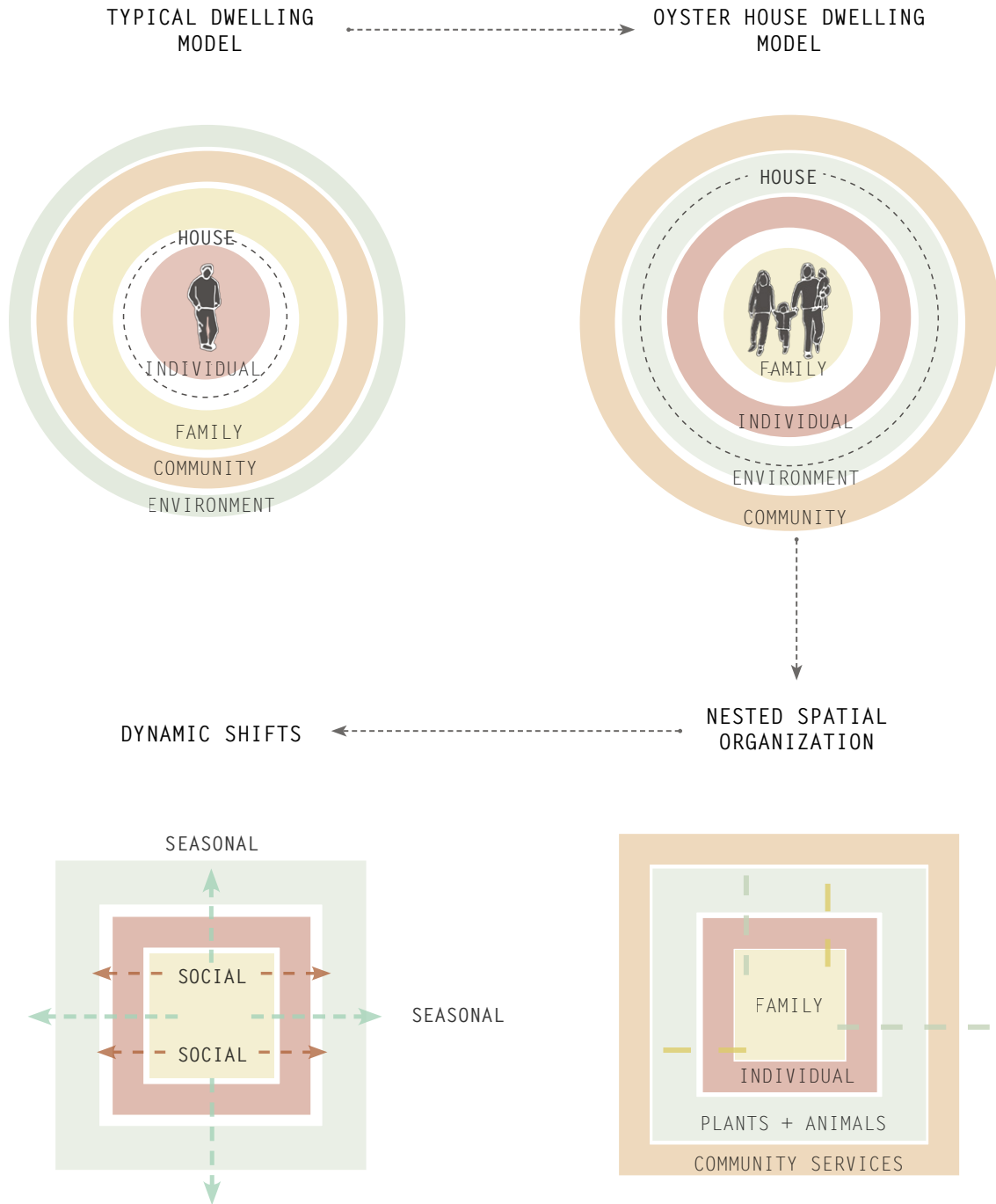(Data from Statistics Canada 2020 and Turnbull 2020)

VIEW TO FOREST

VIEW TO LAKE

Wagmatcook First Nation community collages

Modes of Dwelling

This project will explore alternative modes of dwelling to break from typical configurations that separate the individual from various scales of community. This mode of dwelling treats the individual home as an isolated unit, sealed off from the surrounding environment and community. After spending time listening and learning about the lifestyles of Wagmatcook residents, it became clear that this form of dwelling does not align with commonly held values that prioritize family and collectivity. Therefore this project will propose a different model of dwelling that is in no way a new concept but is tied to past traditions reimagined in the present context. This approach represents a single idea around how housing can foster small scale community and reintegrate the inhabitants with the surrounding environment and community.

This mode of dwelling places the shared space at the center of the housing configuration allowing for individual units to grow around the central space. This represents the changing social dynamics accommodated by the dwelling model, allowing for familial or household growth while remaining linked to values of community and collectivity. Surrounding the social spaces are the environmental or seasonal spaces that are linked to the dynamics of the place and people. These spaces can perforate the central space, allowing the central living space to fluctuate with the seasons. These two axes of shifting dynamics, social and seasonal, provide a way of anticipating future growth and accommodating changing needs of the inhabitants.

TYPICAL DWELLING
MODEL

OYSTER HOUSE DWELLING
MODEL

HOUSE

INDIVIDUAL

FAMILY

COMMUNITY

ENVIRONMENT

HOUSE

FAMILY

INDIVIDUAL

ENVIRONMENT

COMMUNITY

NESTED SPATIAL
ORGANIZATION

DYNAMIC SHIFTS

SEASONAL

SOCIAL

SOCIAL

SEASONAL

FAMILY

INDIVIDUAL

PLANTS + ANIMALS

COMMUNITY SERVICES

Existing and proposed modes of dwelling

Chapter 7: The Oyster House

This section will explore how the Two Eyed Seeing design methods that emerged out of the gathering of perspectives and bridging of guiding principles may be applied in the context of a housing project in Wagmatcook First Nation. As has been discussed, on reserve housing is a complex issue that cannot be addressed solely through design. The project, titled the Oyster House, provides one possible way, out of many, that housing on reserves could be imagined through a Two Eyed Seeing approach.

The site of the design project is located on an undeveloped, waterfront area. This site is just across the road from a well established portion of the community, consisting of the local church, NSCC Learning Center and the Ultramar Gas Bar, the closest place to pick up household groceries. I chose an undeveloped site as a way to propose a new approach to housing and relationship to nature. Given that this project is intended as an idealized, demonstrative approach to housing on reserves, the site was chosen as a blank slate upon which to explore novel housing strategies. This specific site is rich in opportunities for connections with nature, given its location along the Bras d'Or Lakes estuary to the South- East and forests to the North-West. The site is bound on the north side by the Trans Canada highway, providing access to nearby community amenities. From this site, one has views to both the wooded hills beyond and the dynamic Bras d'Or Lakes. It was important to select a site such as this that is rich in opportunity, both in terms of community building and connection to the landscape. The following section will explore how the Two Eyed Seeing design methods are applied in the context of this site.

OYSTER HOUSE
PROPOSED SITE PLAN

Winter Winds

Summer Winds

Sun Path

Proposed site plan for the Oyster House
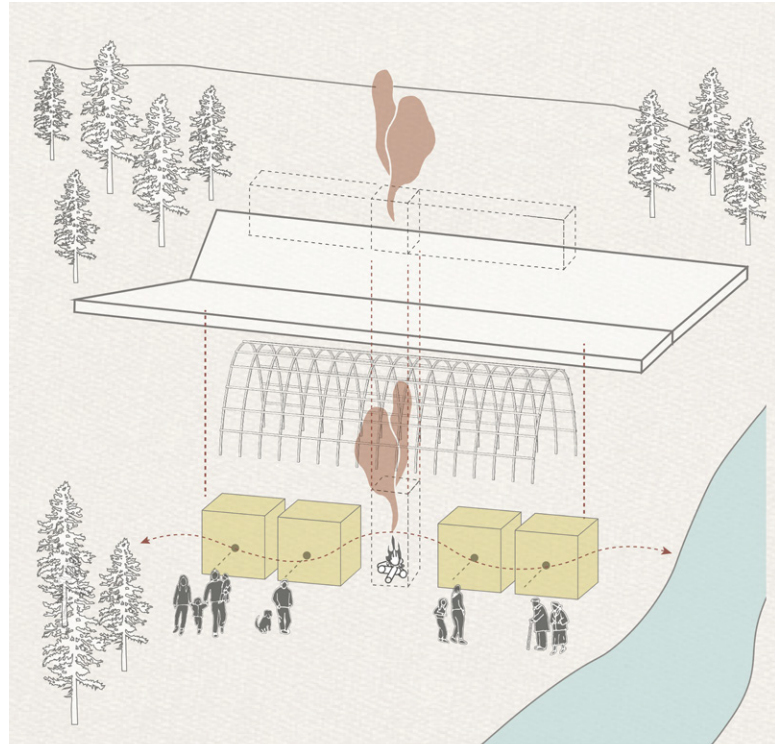
Design Method 1: Responsive Building Form

Responsive Building Form

As a response to place, culture and values, the form in this context is responding to climate conditions, the unique location nestled between the forest and the lake and the ideals of the community. In beginning to develop the form, it was important to consider past forms of housing that were born out of lifestyle necessity and traditional values. As discussed in the previous sections, these precedents are not intended as a way of symbolizing past building forms but rather a way of identifying the values embodied by the building type and imagining ways of integrating these values and systems. Traditional forms of housing in Unama'ki include the winter and summer wigwam, both examples of exceptional building science application and intrinsic knowledge of the surroundings. The summer wigwam is an elongated form of the winter wigwam and illustrates

values around multiple family dwelling and burden sharing. Set up along the shores of the Bras d'Or Lakes in summer months to accommodate fishing and oyster harvesting, the summer wigwam is grounded by a central hearth around which multiple families would sleep. This form of dwelling provides a rich example of how community values are embodied by housing types. The Oyster House borrows the concept of one shared roof organized around a central hearth. In the summer wigwam this hearth is an open fire pit acting as a centralized system that distributes heat for the entire dwelling. The form of the Oyster House responds to the values of the community through this type of spatial organization: a centralized hearth, the distribution of family units around the central space and continuous form of shelter protecting the dwelling.

The Oyster House responds to the specific landscape and context through the form of the roof which is extended to gesture out towards the landscape and imply future growth and interconnection. The roof form emerged out of studies of daylighting, solar access and rainwater collection, factors that are important for the reserve context in which access to housing related infrastructure is a challenge. This will be further elaborated in Design Method 4: Decentralized Systems.
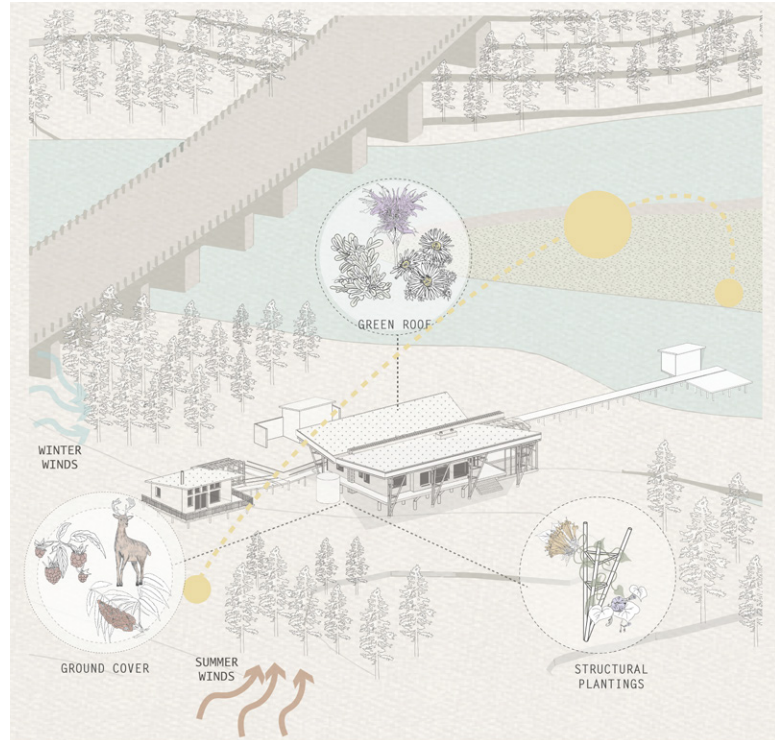
Design Method 2: Interconnected Landscape

Interconnected Landscape

In the context of the Oyster House, interconnected landscape influences the design through connection to the ground, connection to surrounding environment and site planning. The Oyster House is raised on timber piles to accommodate fragile understory species and minimize disruption to the existing site. This form of reciprocal habitat is echoed by the construction of the roof as an extensive green roof planted with hardy, native plant species. This provides a habitat for smaller bird species, bees and other insects that are central to the functioning of the ecosystem as a whole. The primary structural elements that vertically connect from ground to sky are also integrated in this ecosystem web. The composite timber columns supporting the green roof are designed as a three dimensional frame to accommodate climbing

plant species and provide food and shelter for local bird species. The large masonry core spanning the length of the Oyster House provides a structure for aerial rootlet climbing species that also attract pollinators. The Oyster House connects the inhabitants to the surrounding landscape along an east-west axis, connecting the home from forest to water. The walkway connecting these ecosystems provides opportunities for seasonally adaptable spaces that take advantage of the southern exposure. Site planning and orientation are also critical aspects of the Oyster House as part of an interconnected landscape. Planting of species to the north west and south west provide shelter from winter and summer winds, increasing outdoor comfort and activity. Buffering species include a mix of deciduous and conifer trees to ensure seasonal performance while also providing habitat and food sources for species throughout the year.
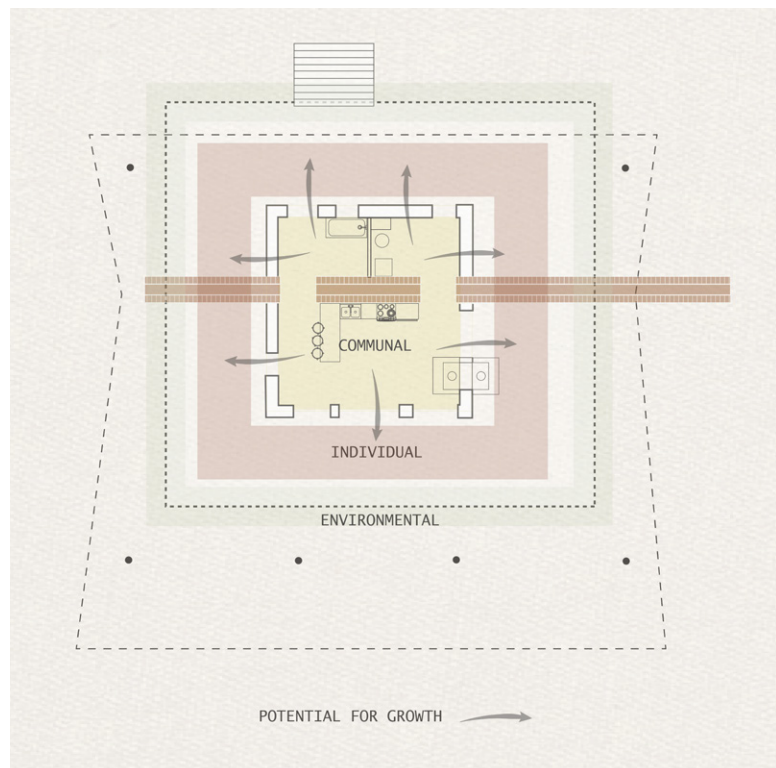

Design Method 3: Flexible Spatial Composition

Flexible Spatial Composition

As illustrated in the previous section on modes of dwelling, the Oyster House is designed to accommodate shifting seasonal and social dynamics. Social dynamics include changing family structure and addition of sleeping and living spaces to adapt to these changes. Seasonal dynamics refer to the use of spaces at different times throughout the year, accommodated through adaptable outbuildings connected to the main house. The way in which the Oyster House facilitates flexible spatial composition and potential future growth is through the separation of structural systems. The expansive roof sheltering the Oyster House is independent from the walls of the house, supported by composite timber columns and the masonry core. This allows aggregation of rooms and spaces to occur under the roof more freely.

The layout of the central living space allows for flexible use and growth of the house by situating services in a central core along the north wall, including the bathroom, utility room and kitchen. This allows for freedom in the configuration of spaces surrounding the services to the west, south and east. In the *Handbook of Contemporary Indigenous Architecture*, renowned Indigenous architect Douglas Cardinal discusses the importance of designing flexible spaces as a way of indicating authority and a sense of ownership (2018). He argues that it is essential for Indigenous people to be in control over their own lives and destiny through design (Cardinal 2018). Providing spaces that can easily be adapted to grow and change with the needs of the inhabitant is one way of handing control over to the occupant.
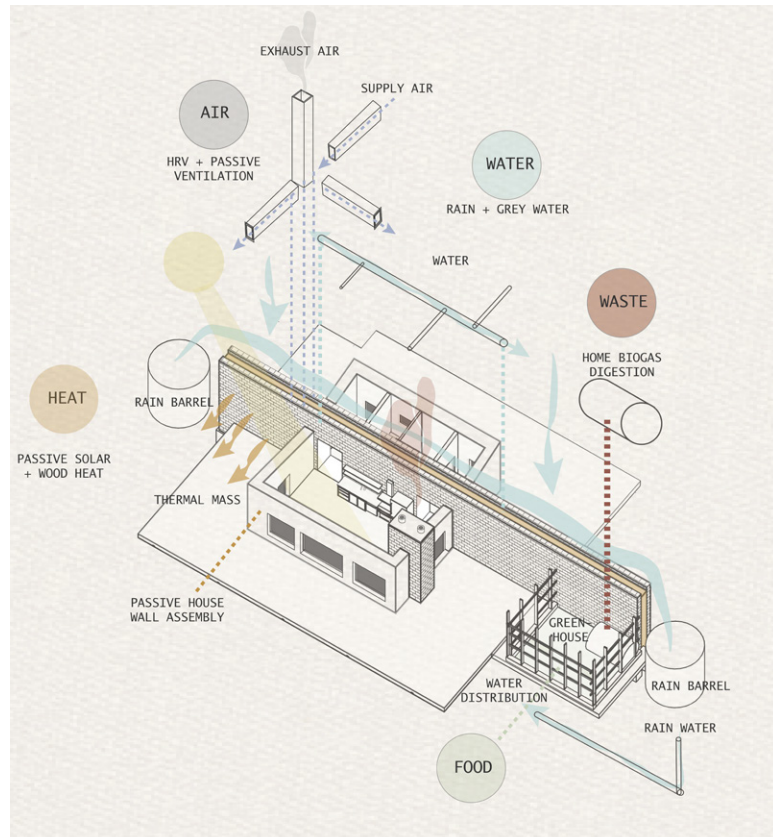
Design Method 4: Decentralized Systems

Decentralized Systems

A major challenge linked to on reserve housing throughout Canada is the provision of adequate housing related infrastructure. Housing related infrastructure includes power, heat, water and waste. This is linked to previously addressed ideas around passive survivability and resilience. This is an important concept in the context of Indigenous communities as Canada's colonial legacy has stripped communities of authority over their own policy, governance and infrastructure. One way in which housing can promote independence is through the provision of decentralized infrastructure. Decentralized infrastructure does not rely on central power grids and water authorities but in this case, utilizes the house as a means of harnessing vital systems

and services. The Oyster House provides an example of how decentralized systems can be integrated at a housing scale to reduce pressure on overburdened band operated infrastructure while improving access to essential services. The Oyster House seeks to integrate systems that decentralize the provision of water, air circulation, waste treatment, heating and food production. Together these elements contribute to the overall resiliency of the house and the autonomy of the inhabitants. The systems that have been integrated are intended to be simple, low-tech solutions that require minimal maintenance and expertise. The decentralized systems integrated in the Oyster House are closely linked to the natural cycles of the site, seeking first to harness passive approaches.

The architectural element utilized to harness and deliver these services is the core wall. The core wall is a large masonry cavity wall that acts as structure for the butterfly roof and also houses and distributes systems throughout the house. Plumbing and ventilation run through this core and can easily branch into new spaces added onto the wall. The core is a composite masonry construction consisting of concrete masonry unit blocks on the interior of the wall clad with local clay bricks on the exterior. The thickness and materiality of the wall allows it to function as thermal mass that stores and distributes heat.

In addition to the wall as an element for heat storage, the walls are constructed to Passive House standard to reduce the heating requirements of the house. This method employs passive solar design principles, orienting the house to the south while preventing overheating through the large overhangs of the roof. The butterfly configuration of the roof

extending upwards to the north and south allows for light to penetrate the space even as the form grows.

The design of the Oyster House roof facilitates the collection of rainwater for use within the house. Water flows from drains running along the roof to large cisterns on the east and west. Rain water is utilized as part of an integrated grey water system in which rain water is cycled through a grey water treatment system after first use.

In a Passive House standard building, adequate ventilation is critical. Ventilation has been a challenge in reserve housing leading to extreme moisture issues and mould. An HRV system in the utility room introduces one of few mechanical systems applied in the Oyster House, but serves an important role for supplying fresh air and exhausting air from high moisture areas such as the bathroom and kitchen. Passive ventilation is integrated through operable windows located on all sides of the envelope allowing a cross breeze in the summer months.

A HomeBiogas system is added as a means of decentralizing waste infrastructure and reducing tension on existing services. This low-tech system treats human waste and food waste through a small scale solar anaerobic digestion process in which the waste is converted to a methane gas that can power a small stove element. Liquid waste is collected as a valuable fertilizer. The Home Biogas system is linked to a BioToilet that is decentralized from the main water authority and saves up to 40,000 litres of water a year through a manual flush pump (HomeBiogas n.d.). This system is housed in a greenhouse to provide year round solar access and protection from cold weather in the winter. The greenhouse provides space for year round food production

and maintains close proximity between the biodigestion system and the compost. The Home Biogas system can connect to the main bathroom by way of the core wall which also offers thermal heat storage for the greenhouse.

Together these systems demonstrate pathways to self sufficiency at the scale of the house. As this is a significant challenge in on reserve housing, the Oyster House strives to provide an extensive example of the many ways in which housing related infrastructure can be harnessed and distributed through the house itself, promoting independence and resilience through a mix of passive and active systems.
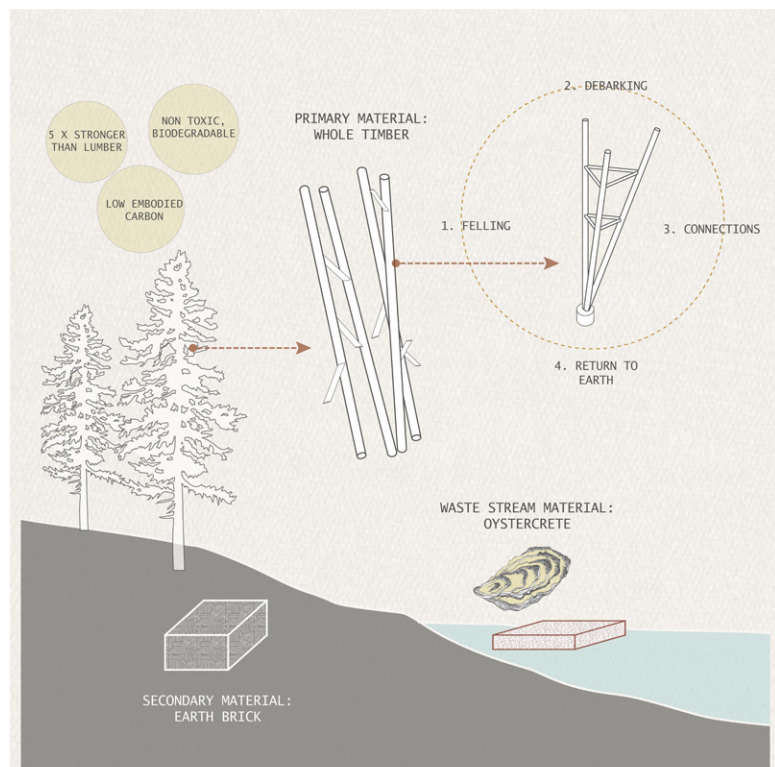
Design Method 5: Carbon Storing Materials

Carbon Storing Materials

The selection of materials for the Oyster House began with an inventory of natural materials found within a local range. As the Oyster House is located in the Acadian forest region, research into the most efficient and sustainable ways to utilize timber led to a discovery of the benefits of using whole timber in its natural round form. Research has been conducted on the application of small diameter whole timbers in place of large scale dimensional lumber, finding whole timbers to have a structural capacity five times that of dimensional lumber of the same size (Bukauskus 2015, 5). In addition, whole timber has lower embodied carbon than any other structural material, encompassing the energy required to harvest, process and fabricate building components (Bukauskus 2015). Structural timber has the capacity to sequester atmospheric carbon within the members and store it until the end of its life cycle at which point it can be recycled, left to decompose or be burned. Forests throughout North America are overstocked with small diameter trees, posing threats to the overall health of forest ecosystems (Wolfe 2000). These small timbers, ranging from 4 to 10 inches in diameter, can be utilized as structural elements in their whole form, requiring less processing energy associated with sawing and drying lumber (Bukauskus 2015). Processing a whole timber structural element requires felling the tree, debarking and cutting for connections- all of which may be carried out by hand to further reduce the use of fossil fuels.

Secondary materials that emerged out of a regional material inventory study include materials for forming bricks and pavers. The area surrounding Wagmatcook is rich in clay and shale substrates capable of structural masonry

applications. Clay bricks or earth bricks are commonly utilized as a natural building material all over the world, utilizing different types of locally available clay. Earth bricks have a very high thermal mass capacity and offer the added benefit of moisture control. The Oyster House utilizes local clay bricks as the outer layer of the masonry core wall.

The third material identified in the region is not only a naturally derived material, but also a waste stream material. Given the prevalence of oyster fishing in the Bras d'Or lakes region, a conceivable material that is hyper local to the site is oyster shells. Oyster shells can be crushed and used as aggregate in non structural concrete applications often called "oystercrete". This material is applied as permeable pavers in the greenhouse as well as outdoor areas to absorb water and further connect the Oyster House to its surroundings.
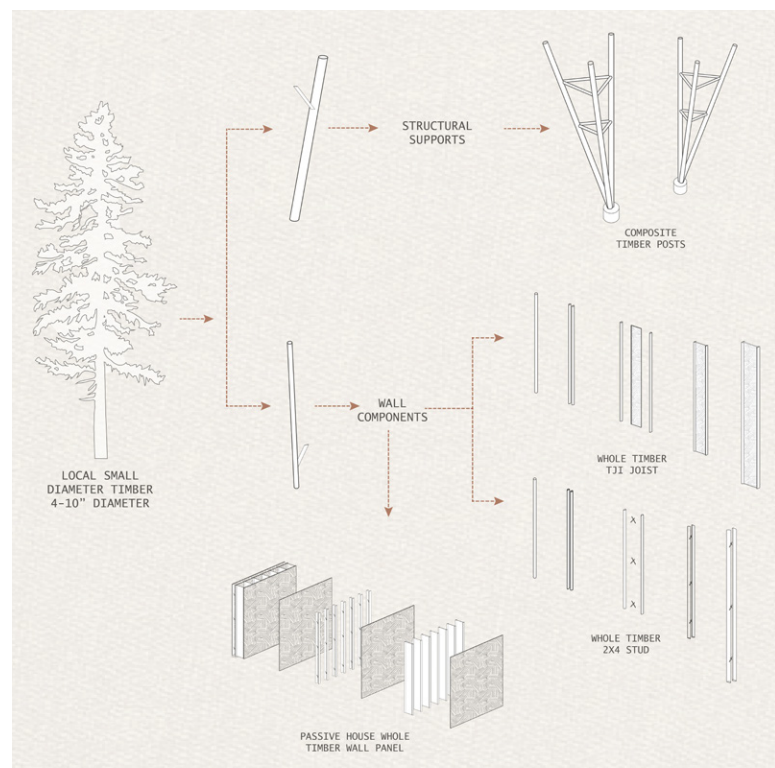
Design Method 6: Resourceful Construction

Resourceful Construction

Resourceful construction methods act as a continuation of the ethic behind materials selection for the Oyster House. One of the man barriers to whole timber structural applications is the complexity of custom designs and cost of connections (Bukauskus 2015). One method identified for reducing these barriers is to create a standardized kit of parts for building with whole timbers. This represents a Two Eyed Seeing approach to construction, utilizing unconventional, natural, unprocessed materials in conjunction with conventional, prefabricated construction systems. Resourceful construction in this way encompasses both the materials and the fabrication, minimizing waste at all phases of the building process. Following these recommendations, the Oyster House utilizes a kit of conventional construction components fabricated from small diameter whole timbers. These components include whole timber rafters, wall studs, joists and whole timber composite columns to support the roof structure. Joists can be utilized for floor structure as well as for wall structures to accommodate more insulation within a passive house assembly. The panelized system allows for ease of construction when adding onto the main building and facilitates community capacity building as construction methods are streamlined.

Components of the Oyster House

Each element of the Oyster House is designed to serve a purpose. The floor provides a platform for modules to be built upon while the large roof provides shelter, habitat and water collection. The masonry core is the only element that touches both ground and sky, connecting inhabitants with

essential services. The panelized system and standardized components allow for ease of construction and provides opportunity for connection within the community, utilizing the nearby NSCC Learning center as a home base for fabrication.

3. ROOF

5. MODULES

2. WALL

4. SYSTEMS

1. FLOOR
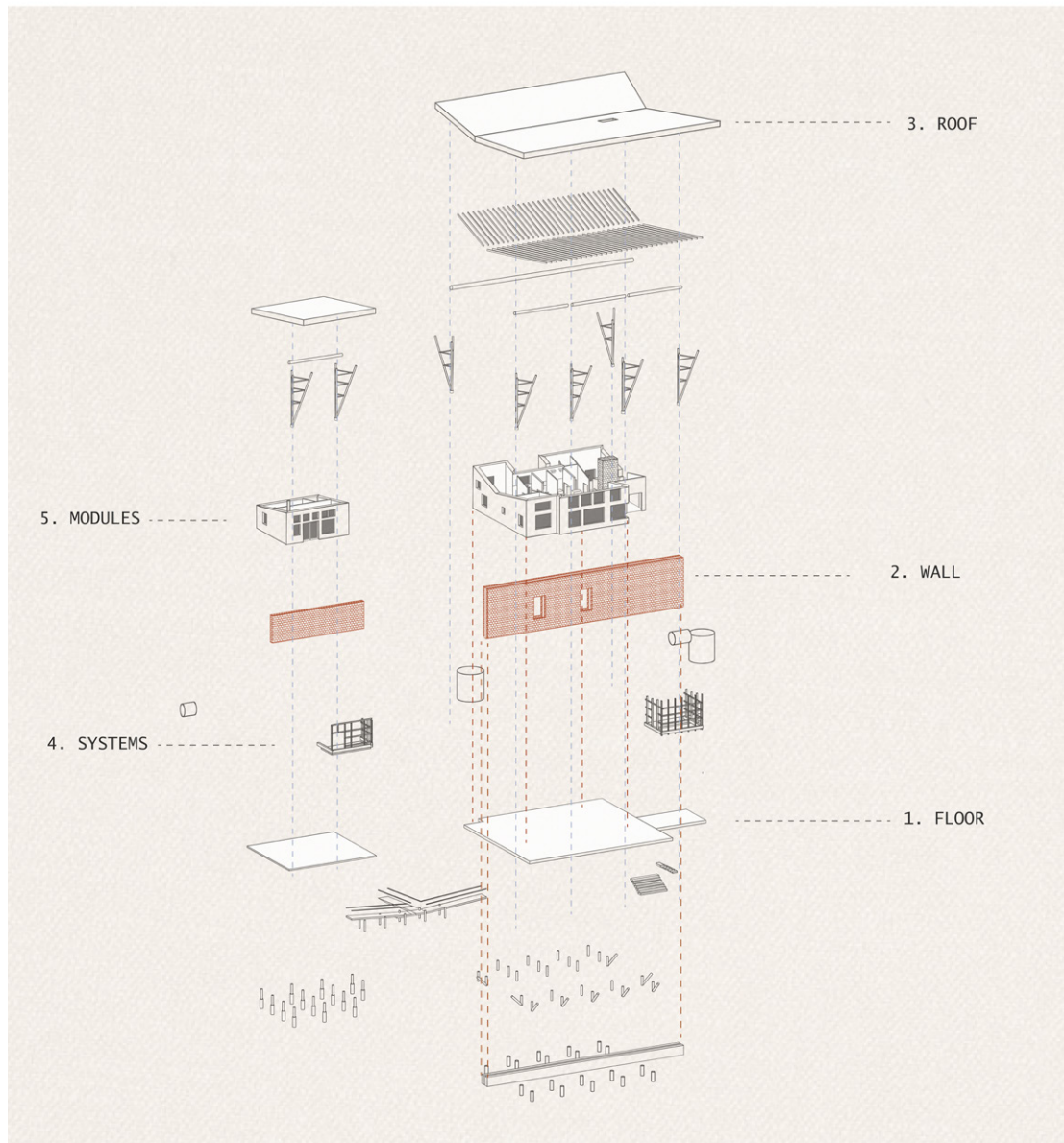
Exploded components of the Oyster House
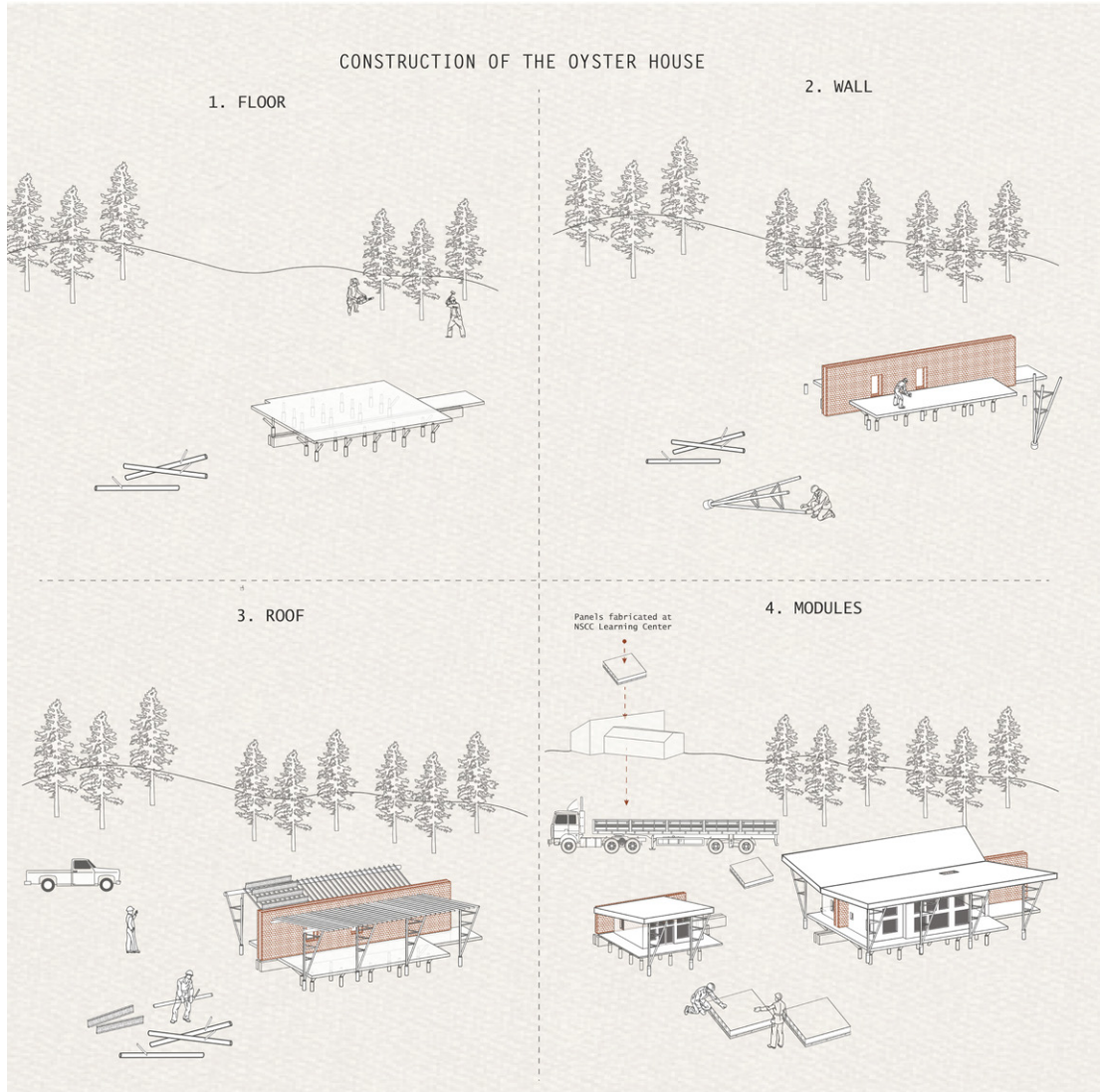
Construction of the Oyster House

The Story of the Oyster House

This section will explore the growing and changing of the Oyster House throughout its life cycle, telling the story of inhabitation of the house and the landscape. Storytelling has the ability to sequentially share a narrative while also holding meaning as a method of presentation, communication and knowledge sharing in Indigenous communities. A story approach allows for the project development to be configured as a journey, which is "the way in which experiences unfold" (Bartlett et al. 2012, 3). Storytelling has been utilized in academic settings as a means of decolonizing institutional conventions of the argumentative format, and making information more accessible (Bartlett et al. 2012). In her book *Indigenous Storywork*, Jo-ann Archibald describes how research conducted under an Indigenous research paradigm often begins with a research question and then becomes storytelling (2008).

The story is divided into four chapters that link the life cycle phase of the house with a corresponding seasonal cycle. Inspired by the Mi'kmaq medicine wheel that teaches of the changes we experience as we age and the lessons learned along the way, the telling of the story of the Oyster House follows cycles of birth and death, night and day, winter and summer, design and deconstruction. This is a form of weaving paradigms through the representation and communication of the project.

LIFE CYCLE OF THE OYSTER HOUSE
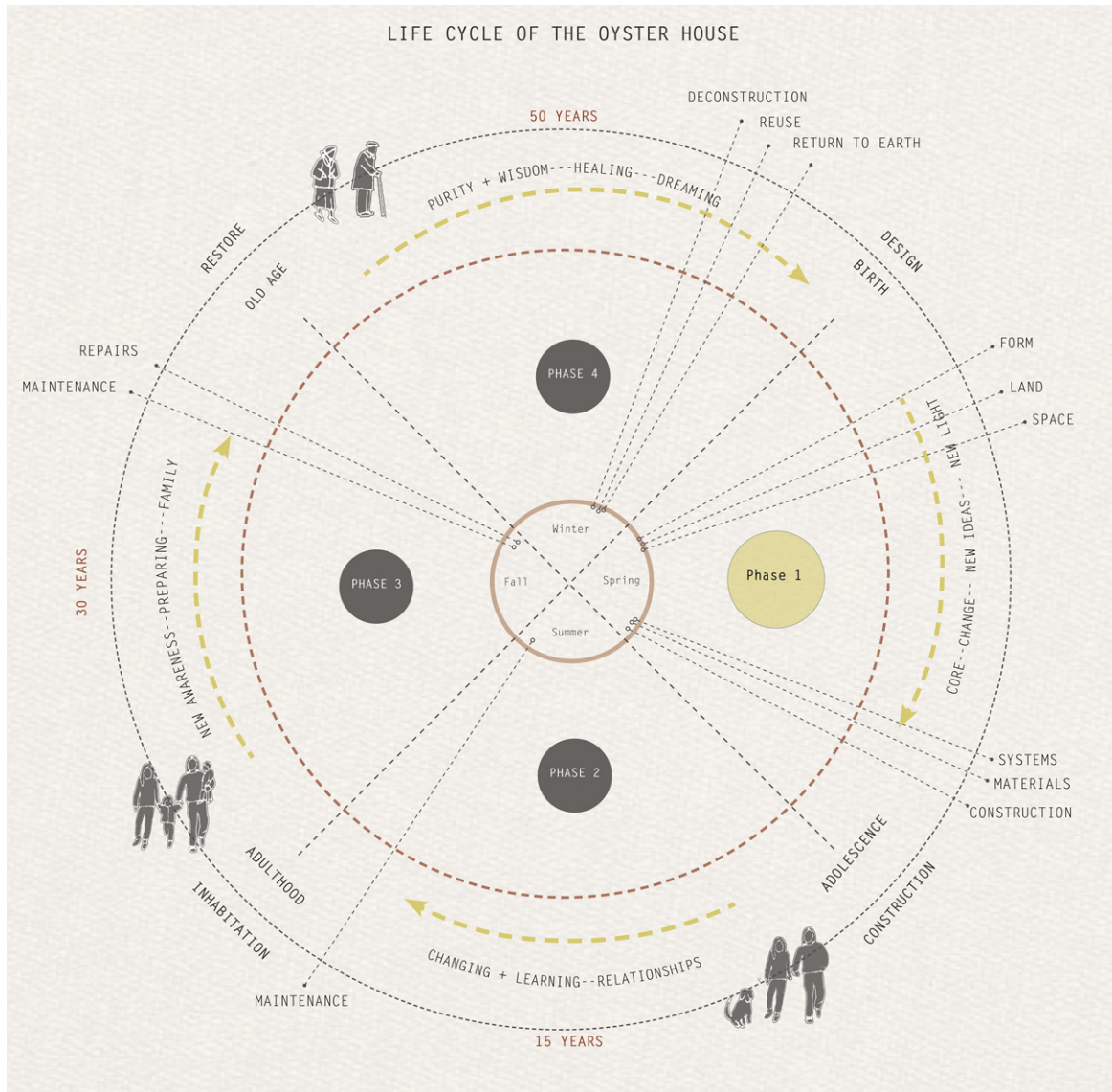
The life cycle of the Oyster House

Spring: Construction
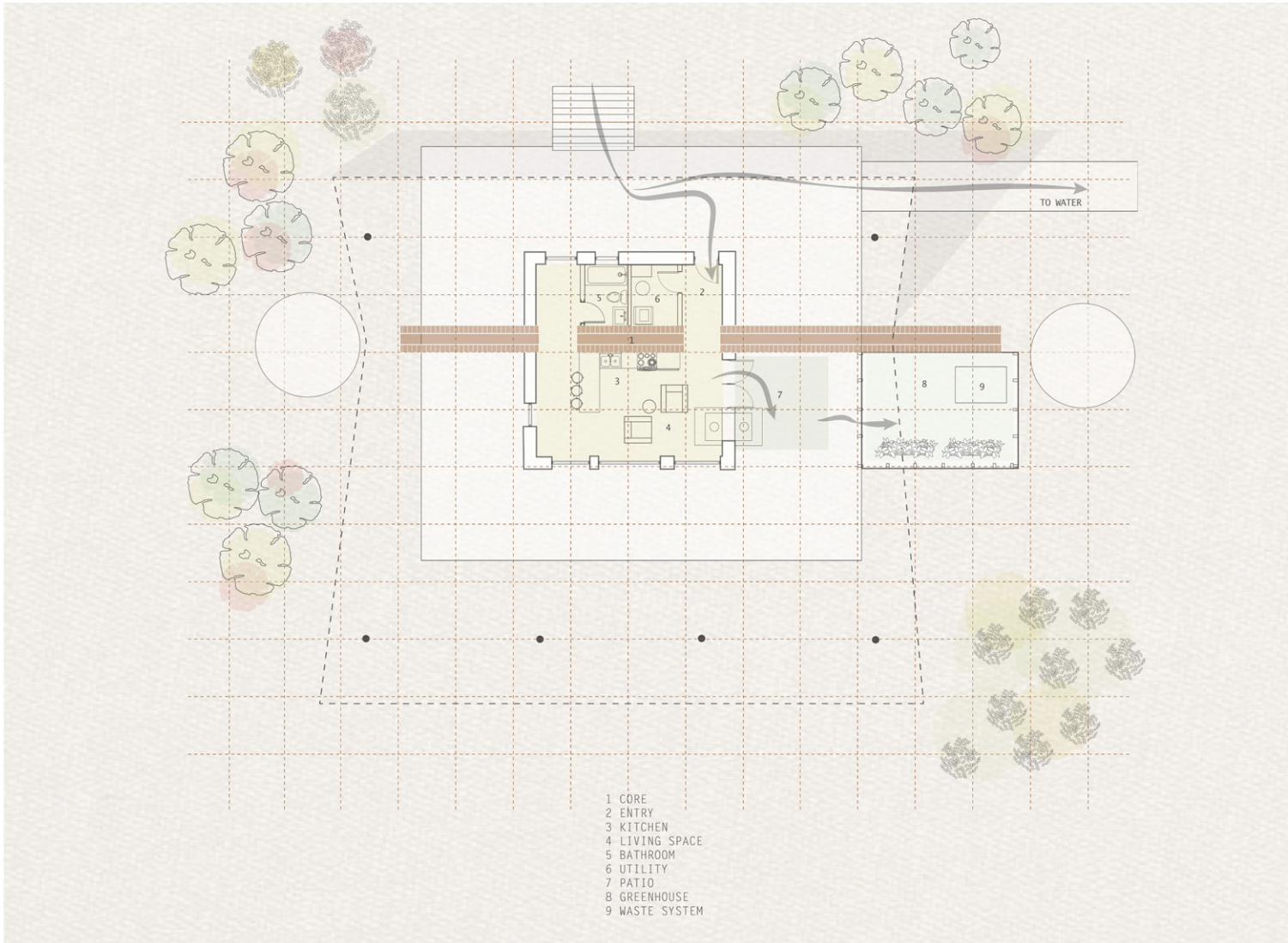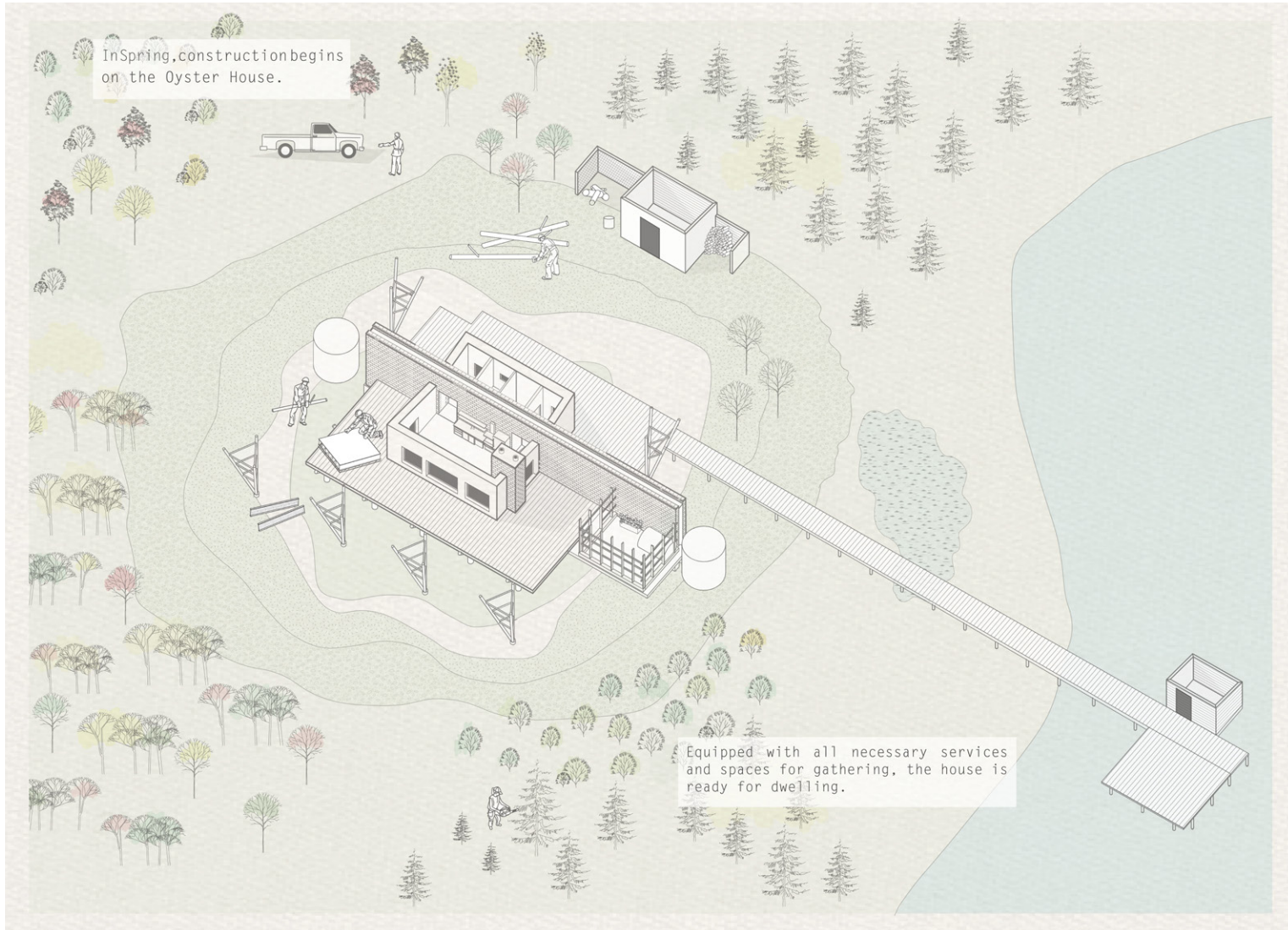
Ground Cover Plants

Clover

Chicory

Bunchberry

In Spring the trees are selected and harvested from the surrounding forests. Each is selected so as not to disturb the surrounding ecosystem but rather to bolster the well being of the forest understory. The logs are stripped of their bark and prepared for fabrication at the nearby NSCC Learning Center. Some will support a new ecosystem atop the roof of the Oyster House and others will be sawn in half to create wall components. The designated construction crew on the reserve begins construction on the platform of the Oyster House, establishing a base for subsequent building to take place without disturbing the neighbouring plants and animals. The masonry wall is built from concrete blocks and locally sourced clay bricks, providing an opportunity for local construction workers to engage with a new trade in masonry work. Following this, the walls of the house are constructed from the standardized components at the Learning Center and assembled on the platform. A small greenhouse is constructed alongside the platform to house the biodigestion waste system in winter months.

Habitat provision begins by planting the site with supportive species for nearby inhabitants. Plantings include fast growing ground cover such as clover and chicory, small fruiting trees and larger deciduous and coniferous trees to someday form a canopy. Agroforestry stands are also established to support future construction needs in the community and ensure sustainable forestry practices. The Oyster House is equipped with a space for cooking and gathering, a bathroom and utility room. It is ready for inhabitation.

TO WATER

1 CORE
2 ENTRY
3 KITCHEN
4 LIVING SPACE
5 BATHROOM
6 UTILITY
7 PATIO
8 GREENHOUSE
9 WASTE SYSTEM

Spring Phase 1 Plan

InSpring,constructionbegins
on the Oyster House.

Equipped with all necessary services
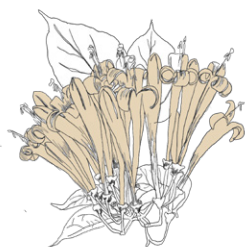and spaces for gathering, the house is
ready for dwelling.

Spring Phase 1 Axonometric View

Summer: 3 Months Later
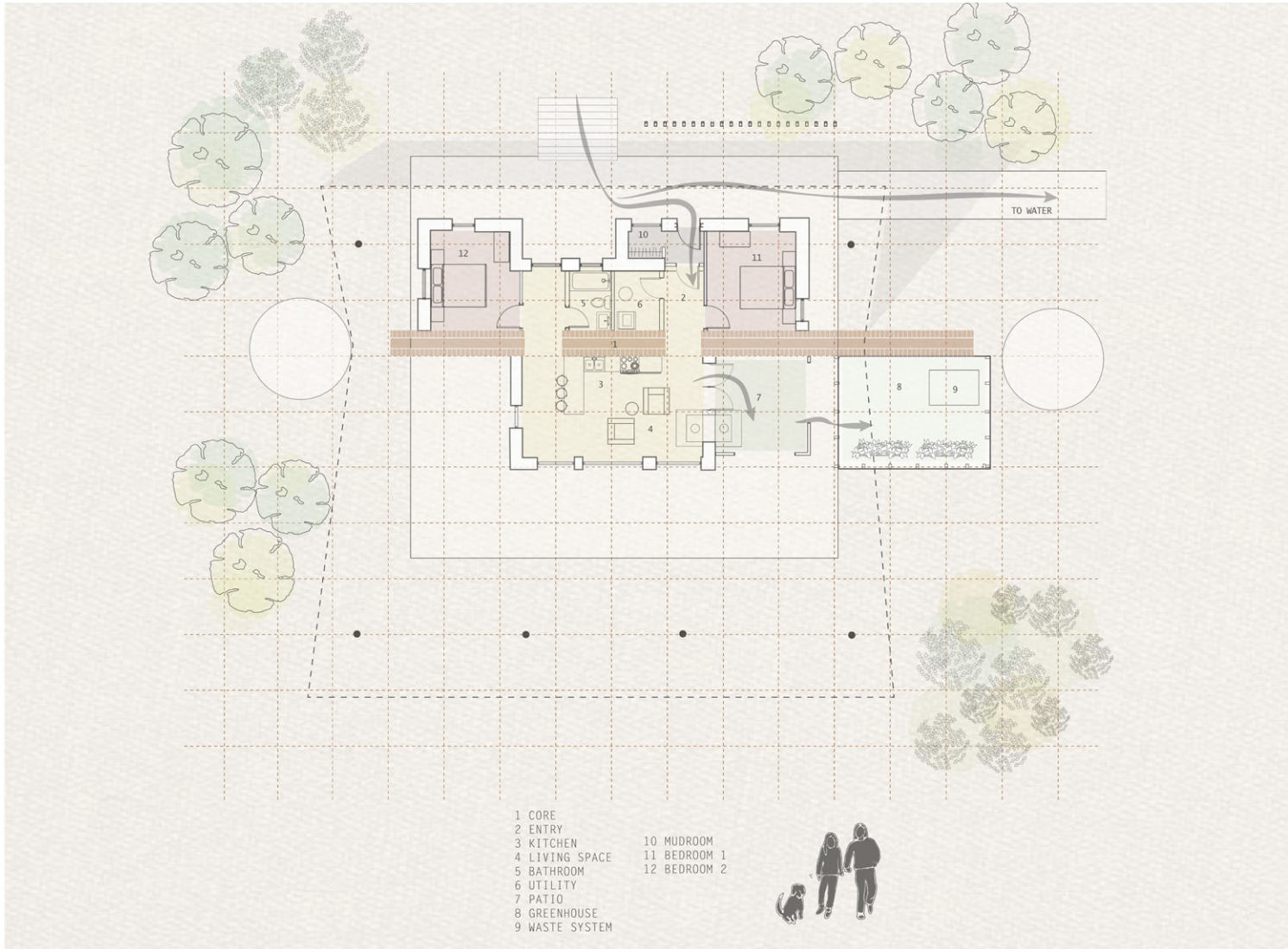
Climbing Plants

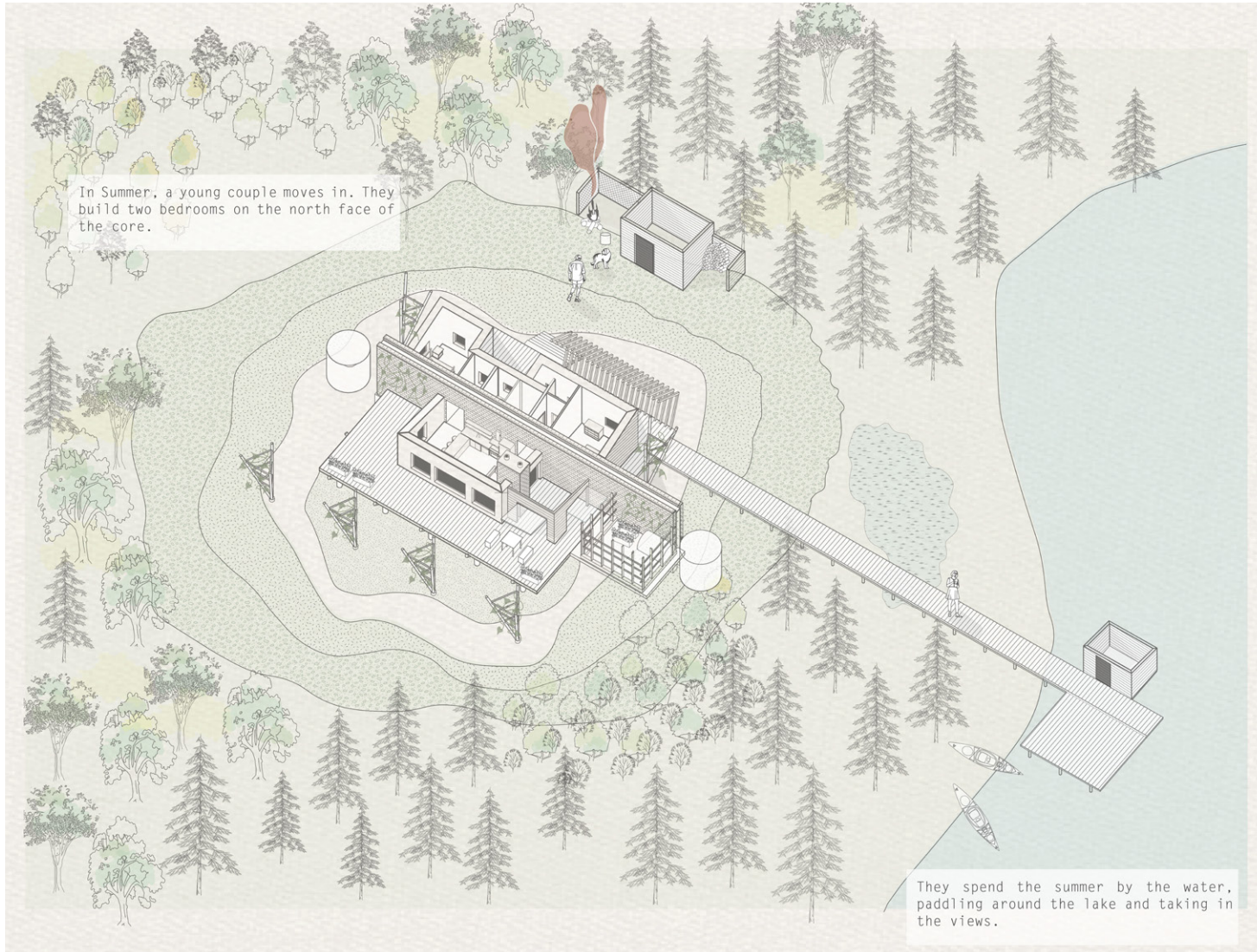Virginia Creeper

Trumpet Creeper

Morning Glory

In Summer, a young couple moves into the Oyster House, seeking independent housing while staying in close proximity to family on the reserve. They choose to build two bedrooms to the north face of the masonry core to keep the south access open for future growth and communal gathering. Trees are selected from established agro-forestry stands for further construction of the house. The walls are fabricated by the Wagmatcook construction crew in two sets of panels, lower walls and upper walls fitted with clerestory windows where appropriate to take advantage of the upward reaching butterfly roof design. Once fabricated, the panels are brought to site and assembled on the platform. An additional entry point is added to provide extra storage for outer gear and improve thermal comfort.

The vines planted on the core and the composite columns have begun to flower and attract various birds and bees to the house. The leaves help to shade the south facing deck and keep the main living space cool. The couple constructs an outdoor kitchen to the east, inserting operable panels to allow the space to open and close with the seasons. This provides a space to cook outside, helping to keep the interior of the house cool. The couple takes advantage of the walkway to the water, spending long summer days on the dock. They utilize the fishing shack as a space to launch canoes and kayaks and paddle around the Bras d'Or Lakes.

TO WATER

1 CORE
2 ENTRY
3 KITCHEN
4 LIVING SPACE
5 BATHROOM
6 UTILITY
7 PATIO
8 GREENHOUSE
9 WASTE SYSTEM

10 MUDROOM
11 BEDROOM 1
12 BEDROOM 2

Summer Phase 2 Plan

In Summer, a young couple moves in. They build two bedrooms on the north face of the core.

They spend the summer by the water, paddling around the lake and taking in the views.

Summer Phase 2 Axonometric View

Fall: 15 Years Later
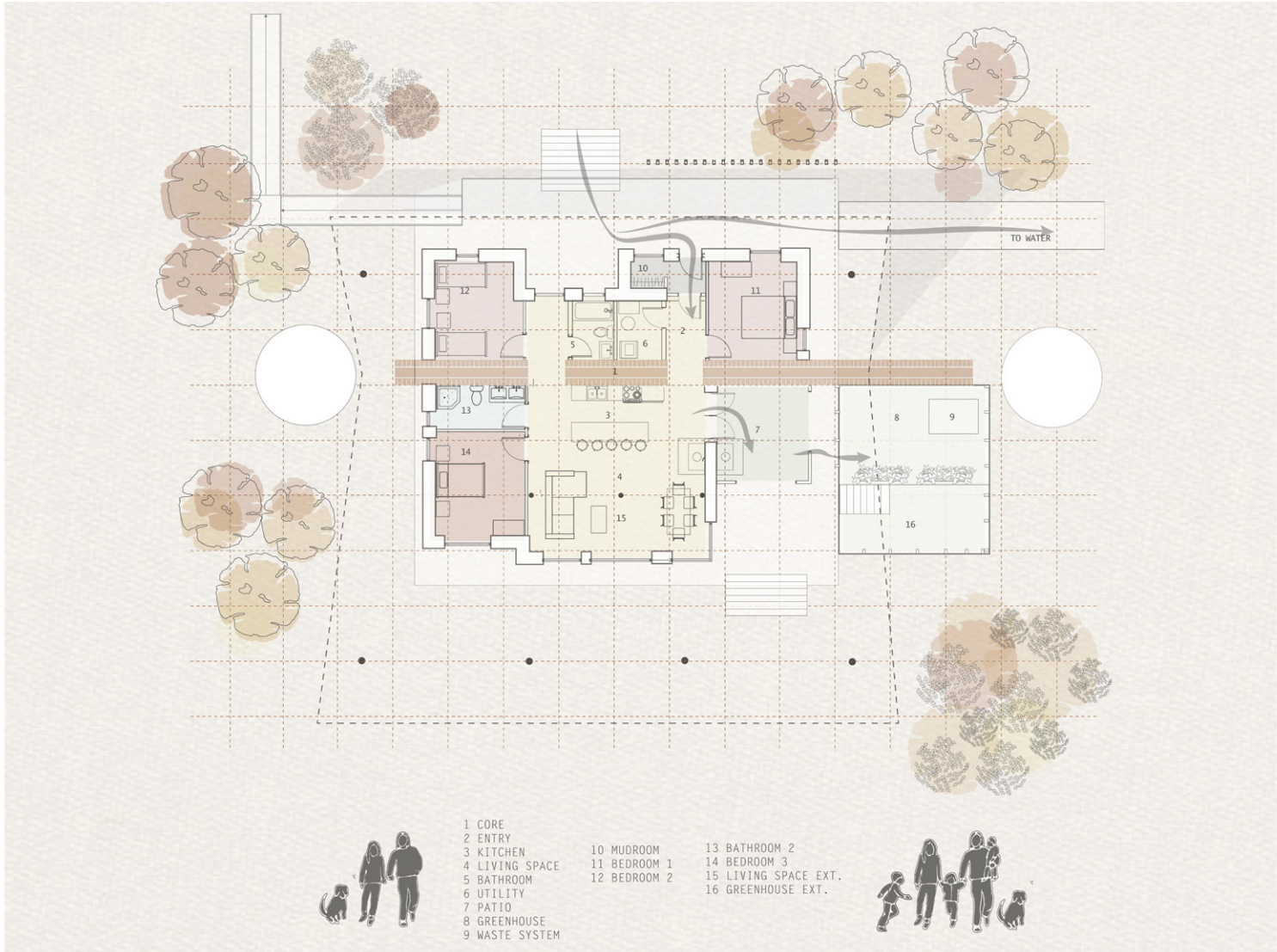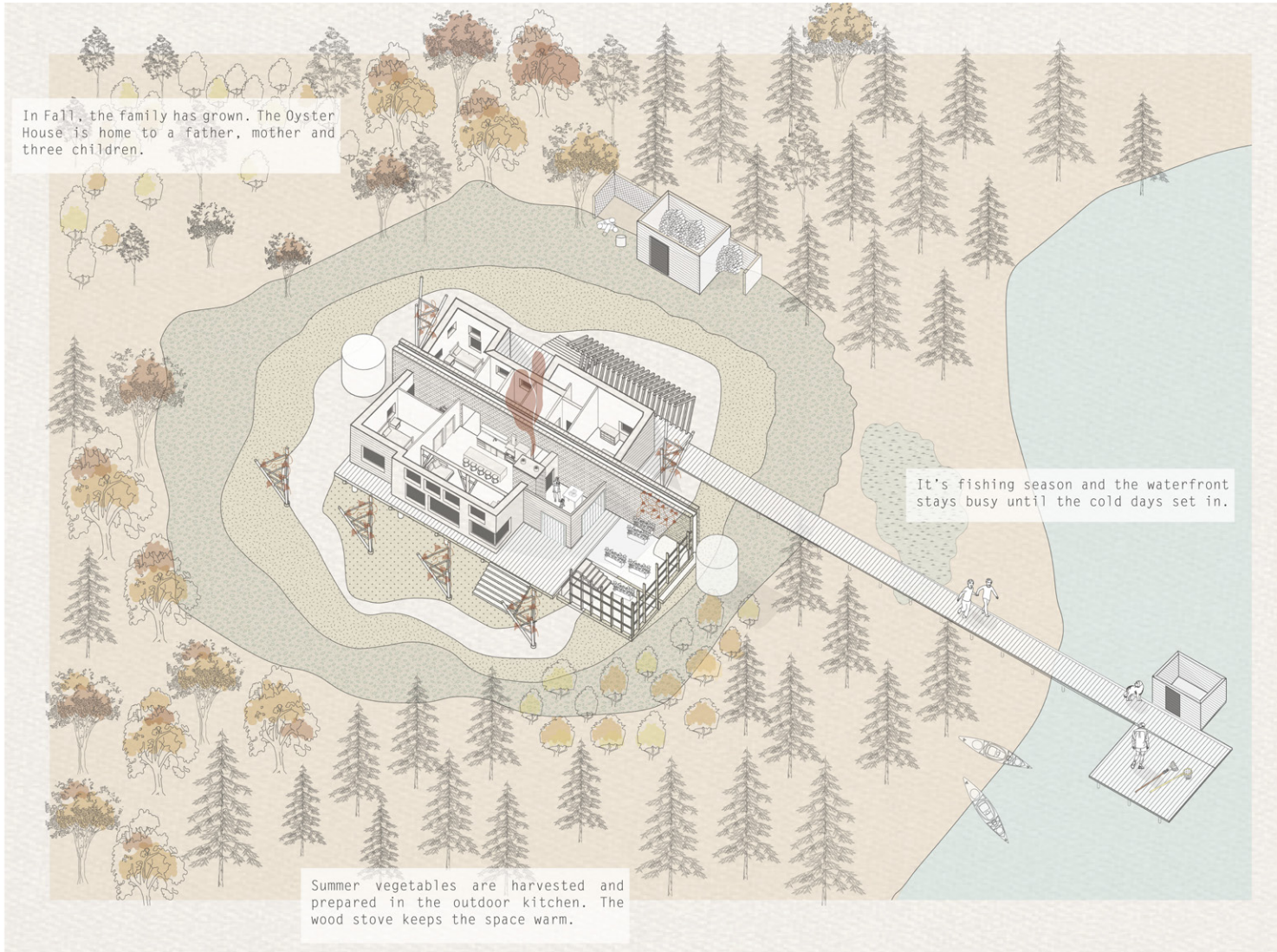
Green Roof Plants

Bee Balm

Beach Wormwood

New York Aster

In early fall, the eels begin making their way out of the open waters of the Bras d'Or Lakes and back to the barachois ponds. The Oyster House is now home to a father, mother and three children. The construction methods are now well established and construction of the new panel elements occurs quickly with a larger construction team now operating out of the Learning Center. An additional bathroom is constructed south of the core, allowing for easy integration of plumbing and ventilation. A third bedroom is built south of the bathroom creating a western bedroom wing for the children. The parents inhabit the eastern sleeping quarters of the Oyster House with views to the estuary and changing fall colours. With the growth of the family comes the growth of gathering spaces. The living room is extended to the south, providing more space for family activities and sharing meals. In addition, the greenhouse is extended to accommodate the growing food needs of the family.

The surrounding tree canopy is maturing and soon trees will be selectively harvested for winter fire wood. The flowering species on the Oyster House roof are fading as the plants prepare for the long, cold winter ahead. Fishing of eels and other fish of the Bras d'Or Lakes is in full season, equipping the fishing shack with various rakes, spears and nets. As the outdoor growing season comes to an end, food is harvested from the gardens and brought into the outdoor kitchen to prepare. Some outdoor plants are brought to the greenhouse for the upcoming winter. The days are getting colder and the panels of the outdoor kitchen are closed more frequently, allowing the space to function more as an extension of the kitchen.

TO WATER

1 CORE
2 ENTRY
3 KITCHEN   10 MUDROOM   13 BATHROOM 2
4 LIVING SPACE   11 BEDROOM 1   14 BEDROOM 3
5 BATHROOM   12 BEDROOM 2   15 LIVING SPACE EXT.
6 UTILITY   16 GREENHOUSE EXT.
7 PATIO
8 GREENHOUSE
9 WASTE SYSTEM

Fall Phase 3 Plan

In Fall, the family has grown. The Oyster House is home to a father, mother and three children.

It's fishing season and the waterfront stays busy until the cold days set in.

Summer vegetables are harvested and prepared in the outdoor kitchen. The wood stove keeps the space warm.

Fall Phase 3 Axonometric View

Winter: 30 Years Later

Deer Friendly Plants

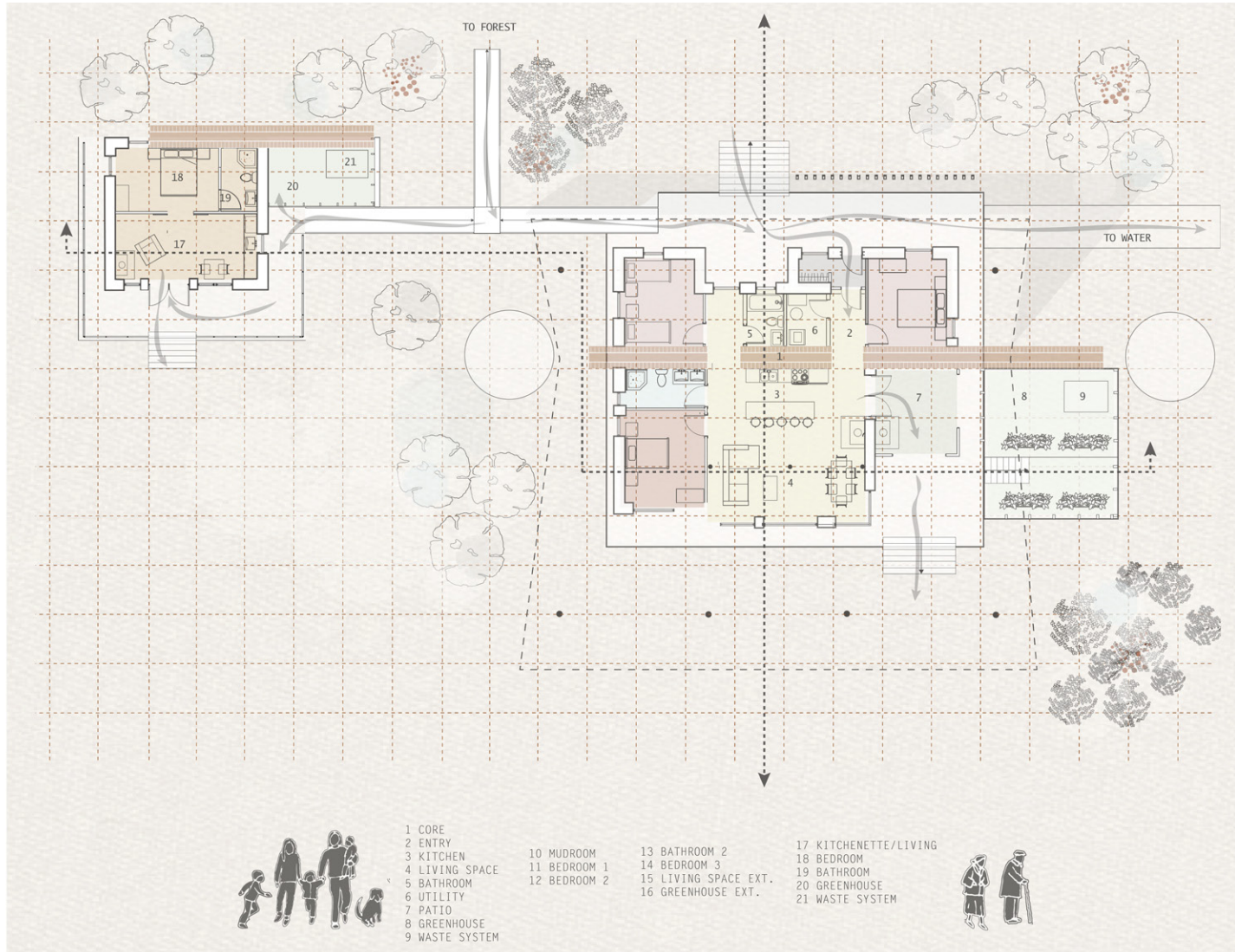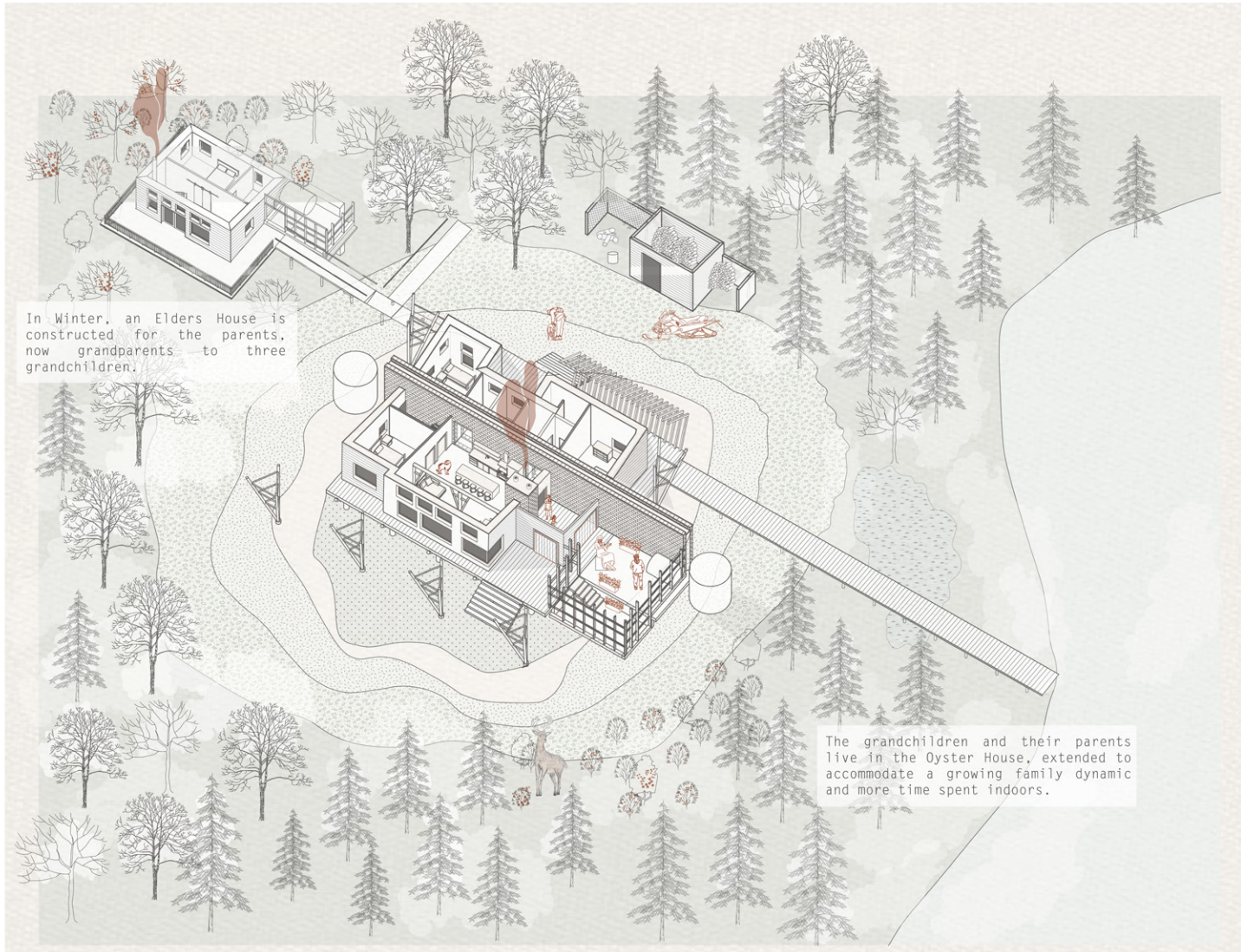American Mountain Ash

Staghorn Sumac

Wild Raspberry

In Winter, the deer are searching the land for a source of food. The berries of the American Mountain Ash draw wintering deer to the Oyster House where the bark of the sumac trees provide additional sustenance. The Oyster House is blanketed in snow, under which the green roof provides extra thermal insulation. The north wall of the house is lined with fire wood that has been split in the wood shed to protect against bitter north west winds. The family has grown and changed. All but one of the children have grown up and moved to their own houses in or around the community. The youngest now grown up, lives at the Oyster House with her new family. Her parents are aging and are in need of more support and care. A walkway and ramp is constructed to the west where a small Elders House is built to house the parents, now grandparents. This allows the grandparents to have their own private space while remaining connected to the family and the central gathering spaces.

At the Oyster House, the outdoor kitchen functions as a winter garden with the panels closed and the wood stove going. This space, as well as the greenhouse, provide a place to sit and enjoy much needed winter sun and reflect on the changes of the landscape. The grandchildren often spend their days in the cozy living room of the Elders House, where their grandparents look after them while the parents work. In the evenings, the grandparents and grandchildren join their parents in the main living room of the Oyster House to share meals and spend time together.

The Oyster House, now home to three generations, has reached its full potential, filled with spaces for sleeping, gathering, teaching, cooking and growing.

TO FOREST

TO WATER

1 CORE
2 ENTRY
3 KITCHEN   10 MUDROOM   13 BATHROOM 2   17 KITCHENETTE/LIVING
4 LIVING SPACE   11 BEDROOM 1   14 BEDROOM 3   18 BEDROOM
5 BATHROOM   12 BEDROOM 2   15 LIVING SPACE EXT.   19 BATHROOM
6 UTILITY   16 GREENHOUSE EXT.   20 GREENHOUSE
7 PATIO   21 WASTE SYSTEM
8 GREENHOUSE
9 WASTE SYSTEM

Winter Phase 4 Plan

In Winter, an Elders House is constructed for the parents, now grandparents to three grandchildren.

The grandchildren and their parents live in the Oyster House, extended to accommodate a growing family dynamic and more time spent indoors.

Winter Phase 4 Axonometric View

Family congregates in the living room around the wood stove until warmer weather comes.

The berries of the American Mountain Ash draw wintering deer to the Oyster House, now blanketed in snow.

Cross section through final Oyster House configuration

The Oyster House, now home to three generations, has reached its full potential.

The grandparents, parents and grandchildren enjoy the house and its connections to the forest and the lake throughout the seasons
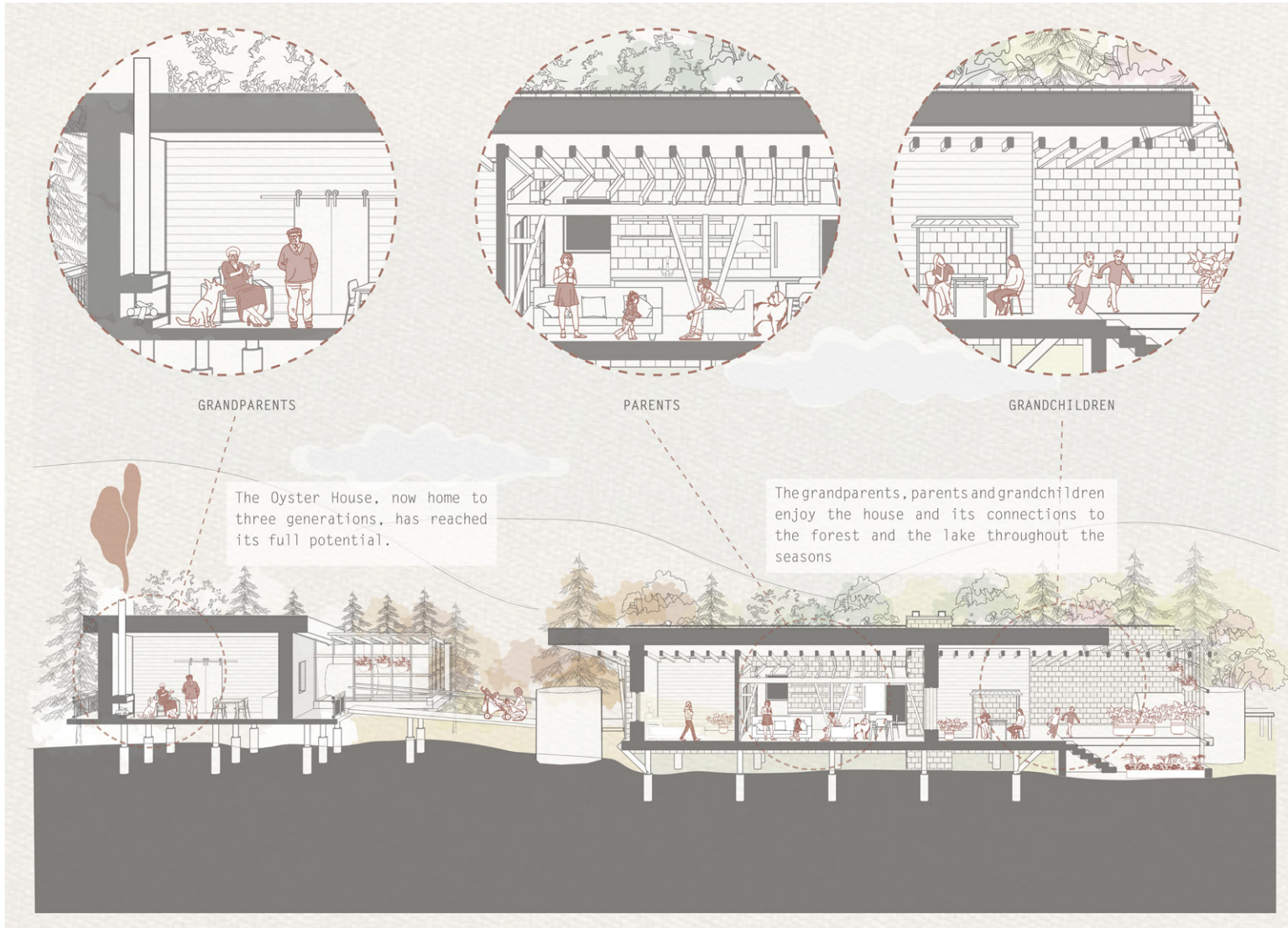
Multi-generational housing: three generations in the Oyster House

"sunny days by the water"

Perspective View: The Waterfront

"enjoying the last of the warm fall days"
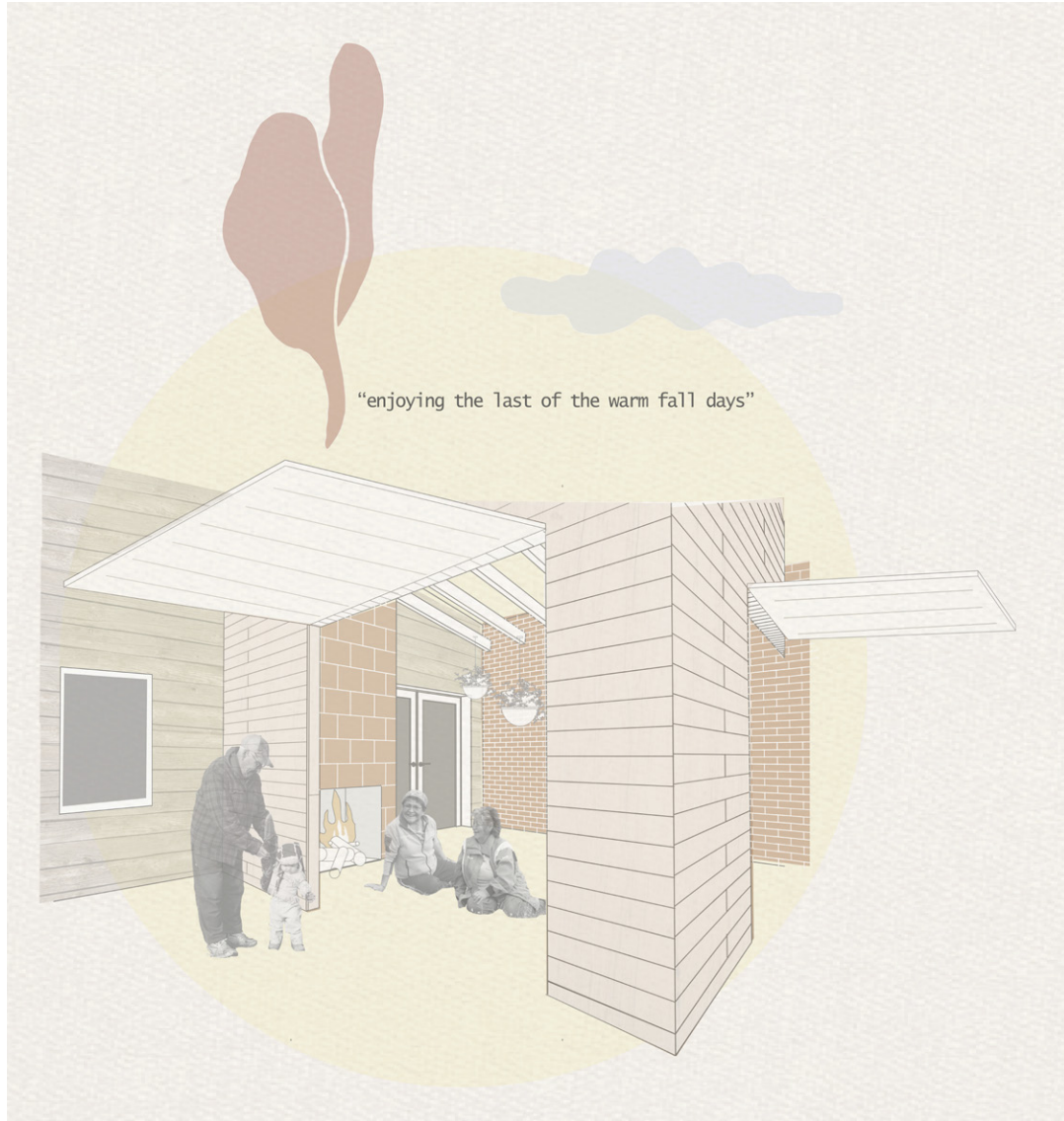
Perspective View: The Outdoor Kitchen

"spending the day with Grandma while Dad goes to work"
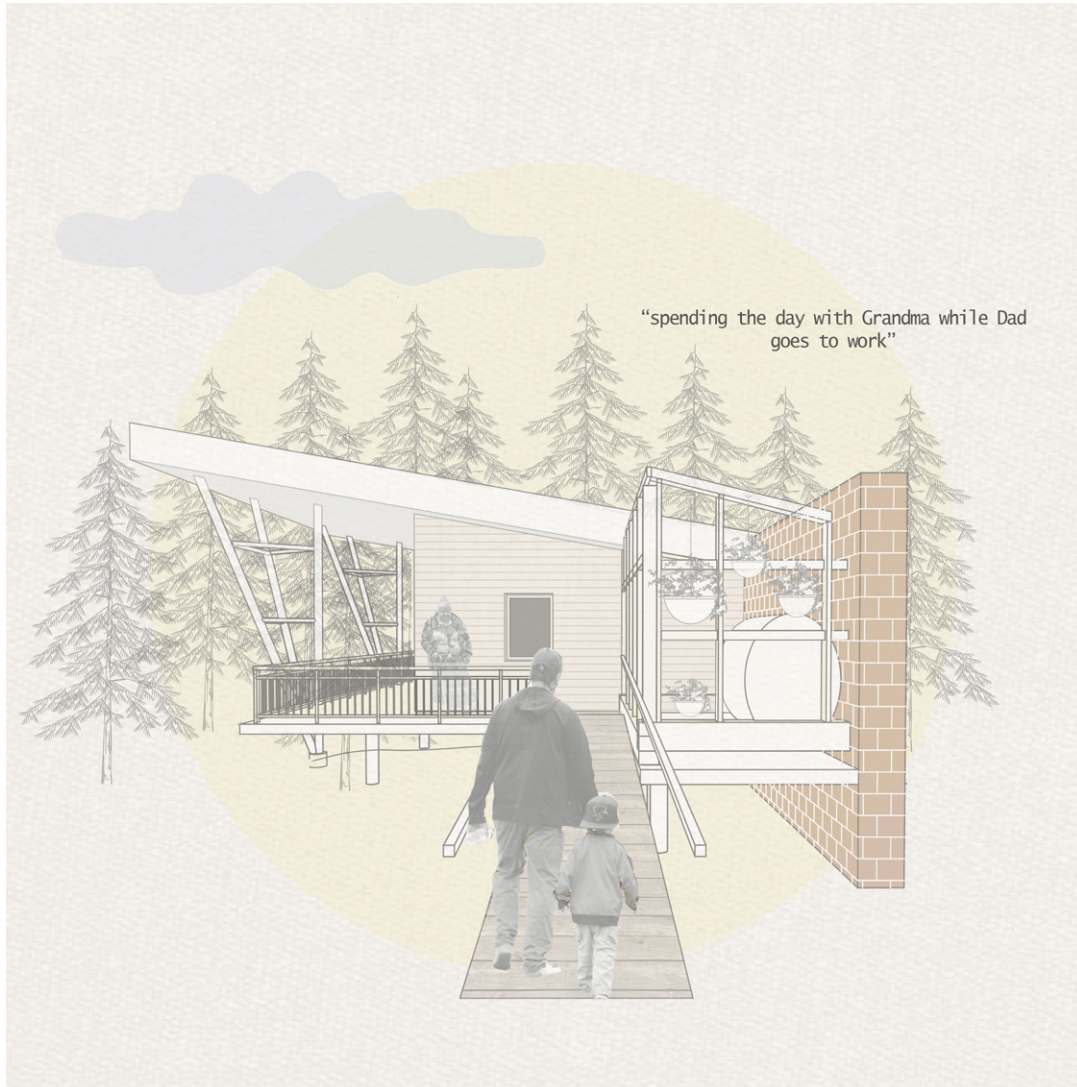
Perspective View: The Elders House

Analysis and Reflection

In the *Handbook of Contemporary Indigenous Architecture*, renowned Indigenous architect Wanda Dalla Costa describes architectural catalysts that reflect knowledge systems and values of Indigenous communities in North America. In this work, four catalysts are identified to describe Indigenous perspectives on architecture. These catalysts are intended to help guide the design process while simultaneously serving as a way to analyse existing projects. The four catalysts are: architecture as place, architecture as kinship, architecture as transformation and architecture as sovereignty (Dalla Costa 2018). Architecture as place asks designers to acknowledge regional and cultural specificities of design sites. Architecture as kinship recognizes the importance of designing for social cohesion as a precursor to individual and community well being, utilizing kinship as a "central ordering device". (Dalla Costa 2018, 196). Architecture as transformation implies the transformative capabilities of design on both people and the environment. This means giving back to the community through economic and political architectural strategies such as local construction, traditional building techniques and promotion of self determination (Dalla Costa 2018). Finally, architecture as sovereignty builds off of catalyst three, exploring the expression of culture and local tradition through design. Through these catalysts, Dalla Costa describes the role of architecture as a storyteller, a translator of individual and community values and stories. The architectural catalysts are valuable for assessing the ability for a design project to engage with Indigenous knowledge systems and worldviews (Dalla Costa 2018). Additional metrics for assessing engagement and authenticity throughout the design process consist of three phases: inspiration, ideation

and implementation (Dalla Costa 2018, 200). Inspiration "motivates the search for solutions" while ideation puts the solutions into practice through testing and generating (Dalla Costa 2018, 200). Implementation leads the idea from a hypothetical project stage into peoples lives.

In reflecting on the design process of the Oyster House, Dalla Costa's metrics for engaging with Indigenous epistemologies provide useful grounds for analysis. The inspiration in this context was the question of the role of architecture in reconciling disparate worldviews. In uncovering answers to this question, ideation took the form of gathering, bridging and weaving perspectives from the distinct worldviews, while seeking answers to a complex challenge regarding the context of on reserve housing. The Oyster House can be seen as the ideation phase of this research process, providing a way of testing the ideas and solutions gathered during the inspiration phase. Implementation is not something a thesis project typically has the power to address, however we can speculate on the impacts and implications. To reflect on the Oyster House, we can explore how it addresses Dalla Costa's architectural catalysts for engaging with Indigenous worldviews. If this project were implemented in a real world setting, perhaps this analysis would take place in the form of community discussion. However, as an academic pursuit, utilizing the metrics established by an experienced Indigenous architect seem fitting.

The Oyster House addresses the first catalyst, architecture as place, by responding to the natural systems and cycles of the place as well as the vales it holds. As described through the design method of Responsive Building Form, the Oyster House acknowledges the sensibilities of place through the

design of the roof form, harnessing necessary elements for life: water and sunlight. The Oyster House responds to place through acknowledging traditional forms of dwelling and the values embodied by the construction and siting of these dwelling types.

The Oyster House addresses architecture as kinship through the spatial organization of the house that seeks to build community at the scale of the family. While conversing with Wagmatcook residents, spaces for family gatherings and cooking were identified as the most important components of the house. The Oyster House seeks to build kinship through the anchoring of these communal spaces at the center, with individual spaces organized around the periphery.

Architecture as transformation, exhibited through giving back to the surroundings, is addressed both ecologically and socially through the construction and components of the Oyster House. The Oyster house gives back to the surrounding ecosystem through the design method of Interconnected Landscape. Meanwhile, community capacity building is promoted through the use of local materials and connection to community building practices. Creating streamlined, standardized building components can build existing construction capacity while extending the construction season and allowing houses to be built and assembled year round. This could have significant positive impacts on the delivery of on reserve housing, given the current capacity in Wagmatcook of three to four houses per year (Turnbull 2020).

Finally, architecture as sovereignty is addressed through the decentralized approach to housing related infrastructure the Oyster House exhibits. Reducing dependence on

government operated infrastructure is an important way for Indigenous reserves to regain authority over their lands and communities.

Wanda Dalla Costa's architectural catalysts provide important metrics for both designing and assessing architectural interventions in an Indigenous context. However, these catalysts should be included as part of general design practice whether for Indigenous clients or not given the consideration of individual, community and ecological well being inherent in this approach.

Chapter 8: Dream

In the final stage of the co-learning journey, we explore the implications and outcomes made possible through a Two Eyed Seeing approach to architecture.

Oyster House Configurations

Given the nature of the Oyster House as a set of components, it is possible to conceive of a variety of configurations designed to suit different occupant needs. The Oyster House is designed to act as a dynamic and flexible space that can adapt to the changing needs of the inhabitant. Within the context of Wagmatcook First Nation, the lack of diversity in housing types could be addressed through a variety of Oyster House configurations. The Oyster House approach could be applied to accommodate Elders in the community that require additional care. Individual rooms can surround a central space for gathering and sharing meals, to counter loneliness and provide a space for family to visit. Additional units can be inserted to accommodate care workers while the integration of a greenhouse and garden space can provide a low impact activity for residents. The Oyster House could also be configured for young adults or students in the community seeking independent housing from their families. Multiple dorm style rooms and work from home spaces could be arranged around the central space to provide a communal living arrangement. The Oyster House could also be arranged for an extended or multiple family living arrangement as east and west wings of the house could be constructed to house each family, providing a central space for children to play together while accommodating sharing of house work such as cooking and laundry.
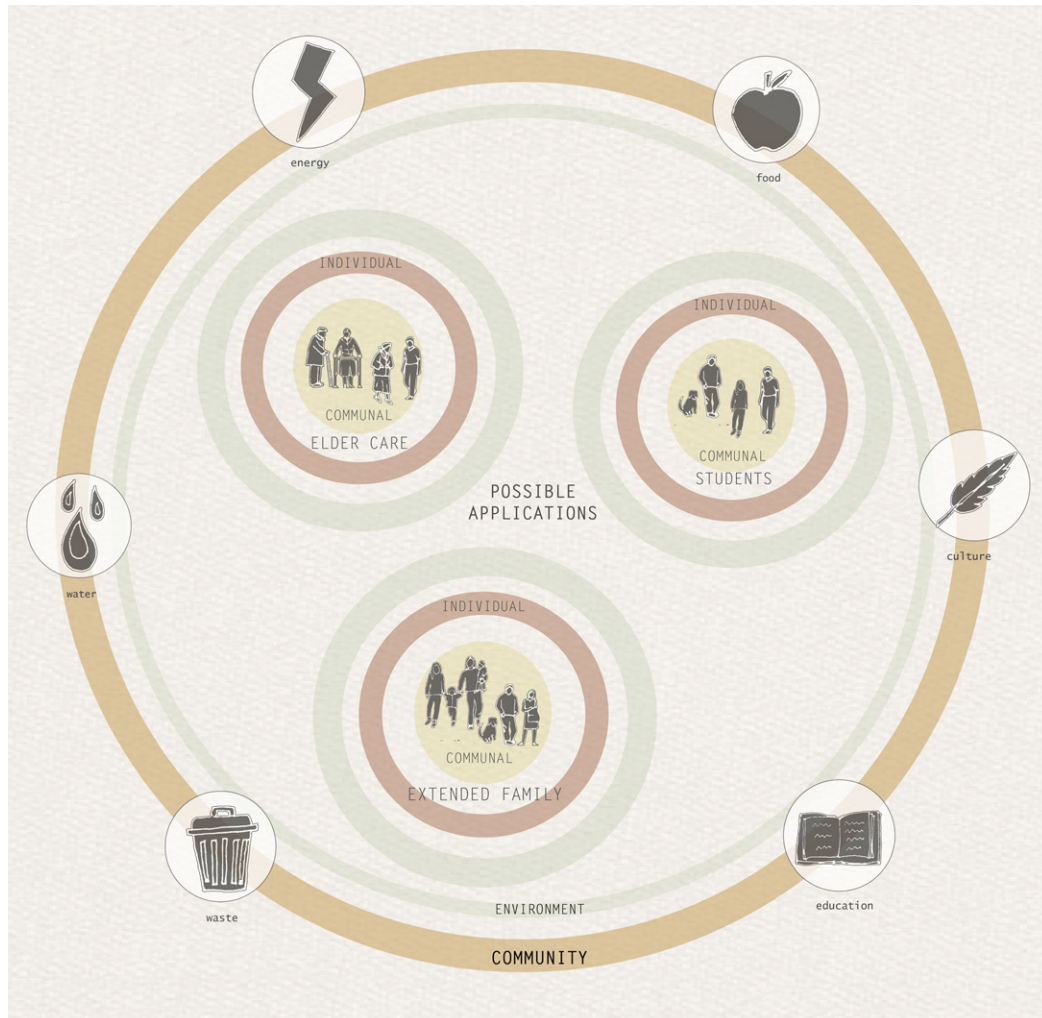
Dreaming: Extending the applicability of the Oyster House to different groups of inhabitants and beginning to explore the implications of the approach at a community scale.

Community Design

Following the notion of nested spatial organization, the next possible area for intervention is at the scale of the community. In one idea of how this community might be imagined, larger scale systems for energy, water collection and food production are integrated as a means of promoting community resilience and independence. Larger scale water towers scattered throughout the reserve improve access to water, while a community greenhouse provides additional gathering and productive spaces. Additional variations of the Oyster House can add onto existing housing stock to accommodate elders or be built new for different groups of inhabitants as discussed.

This introduces another potential area for research to take place, asking what a Two Eyed Seeing approach to community planning might look like. This thesis focuses largely on the implications of Two Eyed Seeing on architecture and design as a practice. Community based planning on reservations has been explored in several contexts throughout Canada, including Wagmatcook First Nation. In *Reclaiming Indigenous Planning*, authors Mannell, Palermo and Smith identify what planning means in Indigenous communities and how it can impact living conditions on reserves (Mannell, Palermo and Smith 2013). The authors argue that planning in Indigenous contexts must be community based, rooted in past and present values and aimed towards goals for the future. Community based planning seeks to address the challenges and opportunities in the community and build local capacity accordingly. Comprehensive and community based planning rejects the current approach to planning in reserve communities that is short sighted and reactive to day to day crises (Mannell, Palermo and Smith 2013).

Comprehensive planning "enables communities to anticipate and direct change rather than react to it" allowing for more long term goals to be set and achieved (Mannell, Palermo and Smith 2013, 115). Often approaches to planning and housing on reserves are designed with a different context in mind, creating a disconnect between the needs of the resident and the imposed form of housing (Mannell, Palermo and Smith 2013).

Without opportunity to determine the goals of the community as a whole for the scope of this thesis, the approach in stead strives for flexibility as a means of assigning more authority to the inhabitants to anticipate and adapt to changes within their family structure. Housing scale interventions seek to build local capacity through standardized, locally sourced building components that can be scaled up to suit the housing demand in the community. Further research on the implications of the design methods and the Oyster House approach on the larger scale growth and dynamics of the community would be a valuable next area of study.
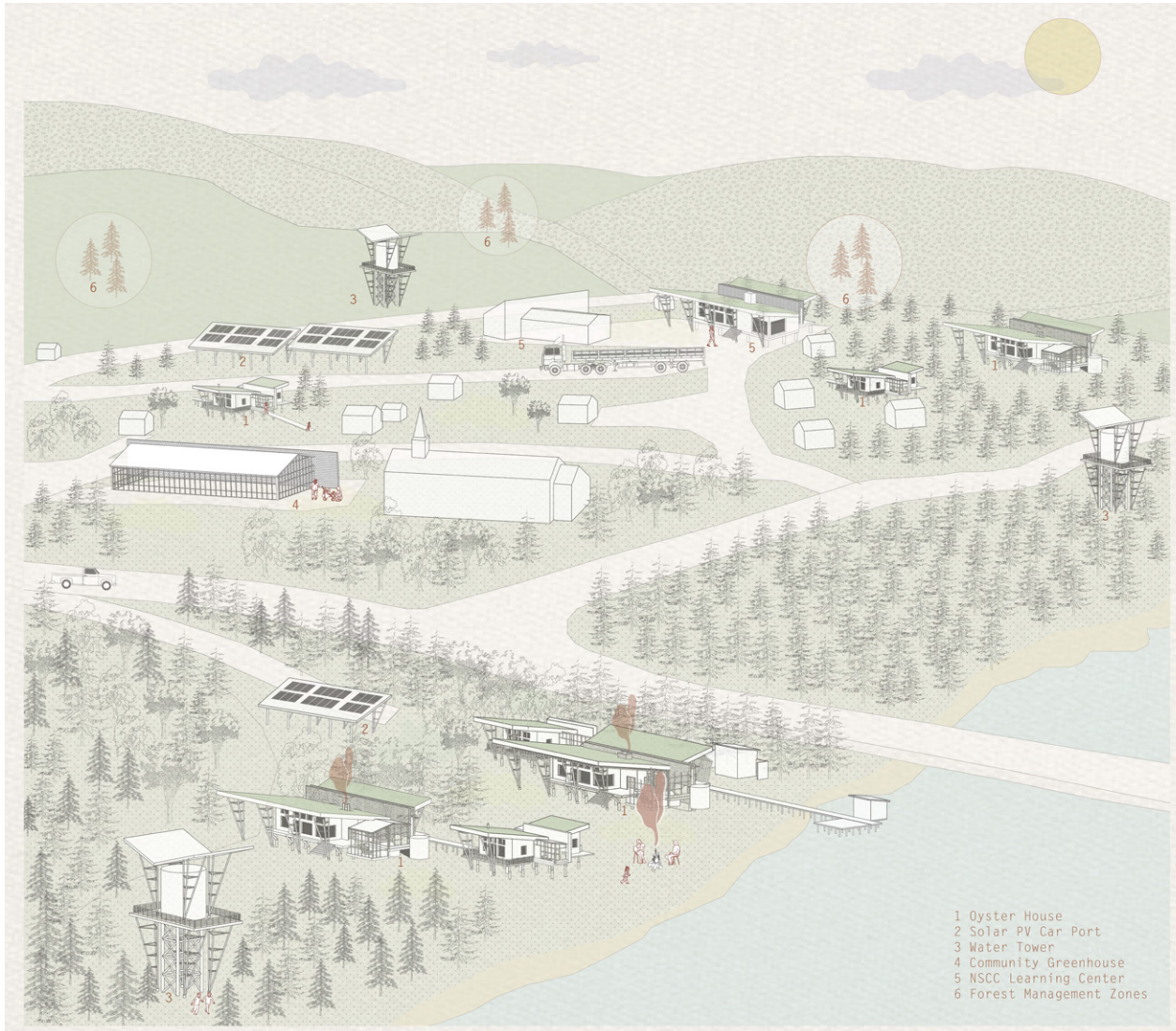
Dreaming: An Idea about Community Resilience
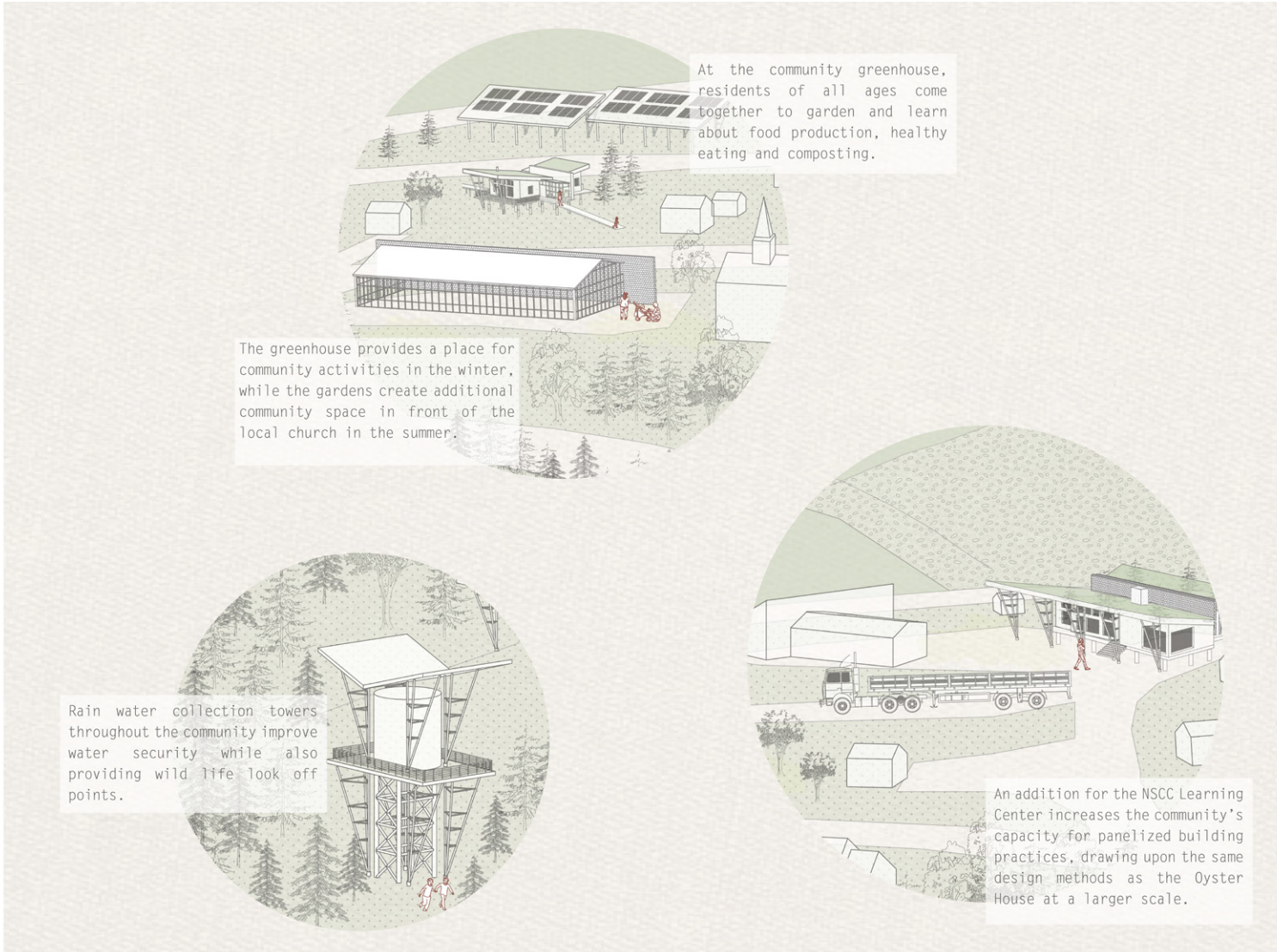
At the community greenhouse, residents of all ages come together to garden and learn about food production, healthy eating and composting.

The greenhouse provides a place for community activities in the winter, while the gardens create additional community space in front of the local church in the summer.

Rain water collection towers throughout the community improve water security while also providing wild life look off points.

An addition for the NSCC Learning Center increases the community's capacity for panelized building practices, drawing upon the same design methods as the Oyster House at a larger scale.

Dreaming: Community infrastructure and amenities

Applicability

We have explored the possibilities of the Oyster House within the community of Wagmatcook First Nation. However, as the design methods underpinning the Oyster House emerged out of a Two Eyed Seeing approach rooted in both the mainstream discourse of sustainable architecture as well as Indigenous worldviews, we can also imagine how the principles embodied by the Oyster House may be applied in a non-Indigenous context.

This can be facilitated through exploring the implications of the six design methods in a new context. Design methods draw upon the values of people and place, the natural and human systems at play, the available materials and the capacity of the community. The Oyster House designed in the context of Wagmatcook First Nation specifically responds to the complex challenge of on reserve housing. As Two Eyed Seeing was developed as a method for responding to complex challenges, we might apply the approach in the challenging context of affordable housing in the city of Halifax. We can imagine what the Two Eyed Seeing design methods developed through my co-learning journey could mean in an urban context and how this might differ from the reserve approach.

Affordable Housing in Halifax

In a study published by the Affordable Housing Association of Nova Scotia, increasing the range of choices available to households in Halifax Regional Municipality is a major factor in reducing housing poverty (Wanzel 2017). In this way, the Oyster House typology can provide opportunities for the introduction of diverse housing types. Housing poverty in Halifax is defined by failure to meet one or more of the
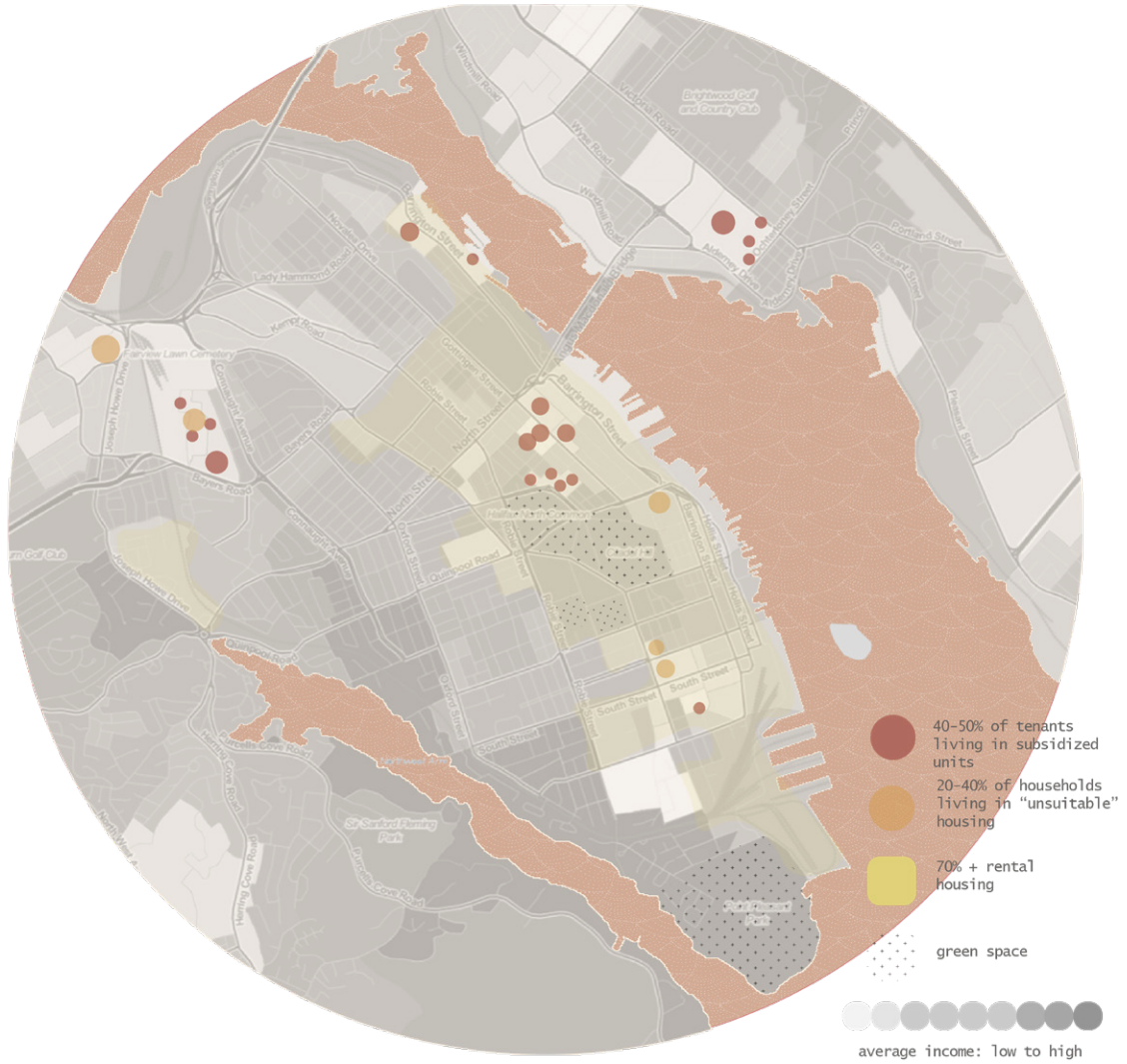
Exploring housing affordability in Halifax, Nova Scotia.
(Data from Statistics Canda 2016)

standards of "Affordability", "Suitability" and "Adequacy". Similar to on reserve housing, these factors are multifaceted and not easily resolved (Wanzel 2017, 40).

We can imagine what the Two Eyed Seeing design methods could imply in this context, starting with Responsive Building Form. A responsive building form is linked to the needs of inhabitants and the surrounding community, the climate and intricacies of place. Affordable housing in Halifax must respond to factors such as occupant health and comfort, connection to the community and resident interaction. A building form that responds to these factors could integrate shared indoor and outdoor spaces that provide space for interaction throughout the seasons. The centralized configuration and shared roof form of the Oyster House could accommodate these functions and provide a sense of belonging in urban areas.

Interconnected landscape seeks to provide habitat while connecting inhabitants with the environment. In Halifax, this could also utilize a green roof as a means of improving urban wildlife biodiversity, creating habitat patches and reducing urban heat island effect. Often affordable housing options are lacking in the provision of green space, making it difficult for residents to feel connected to their surroundings. An accessible shared green roof or terrace could provide this space while functioning as a site for food production.

The same principles of flexible spatial configuration could be applied to an affordable housing project in Halifax in the form of a co-housing community. Gathering, cooking and dining spaces can be provided at a larger scale at the center of the housing project with individual housing units arranged around the center. This type of organization could

conceivably take place vertically as well to accommodate smaller urban lots.

Decentralized systems in an urban setting refers to infrastructure which is lacking or linked to destructive practices and fossil fuel use. In Halifax, the obvious area to improve is energy infrastructure due to the reliance of the province on coal power. A Two Eyed Seeing approach to housing in Halifax could contribute to the greening of Nova Scotia's energy infrastructure through integration of grid tied solar energy. Additional infrastructure could include urban agriculture at the housing and community scale to improve access to food for residents in affordable housing projects. Systems for reducing reliance on fossil fuels, reducing operating costs and improving occupant comfort can be integrated through passive house assemblies.

With less access to natural building materials in an urban setting, utilizing carbon storing materials may take the form of up-cycled and reclaimed materials from demolished buildings. Reclaiming materials and diverting them from the waste stream is an effective form of carbon capturing as materials are given a new life in stead of prematurely deteriorating in a landfill.

Similar ideas around modular, prefabricated construction methods could be applied in an urban housing project. This could provide employment opportunities and perhaps be integrated as part of the co-housing community program.

This example illustrates one way in which a Two Eyed Seeing approach to architecture might be applied in a non-Indigenous setting. There are multiple ways that these methods could be applied as means of promoting resilience and community independence generally. This illustrates

the underlying theme of this thesis, arguing that pathways towards resilience require the "talking and walking together" of both Indigenous and western worldviews (Bartlett, Marshall and Marshall 2012). Both examples focus on housing as this is our way of mediating our relationship with each other and with the environment. Access to housing is an essential precursor to the well being and functioning of a community overall, representing "a major part of our various realms of experience: social, psychological, environmental and cultural" (Wanzel 2017, 42). Providing adaptable and dynamic housing approaches is important for ensuring the comfort and safety of urban and rural communities and laying the groundwork for resilience to be achieved at larger scales.

Chapter 9: Conclusion

At the end of *Research is Ceremony*, Wilson reflects on an insight offered during his research. "If research doesn't change you, you're doing it wrong" (Wilson 2008, 83). Reading this quotation at the beginning of my co-learning journey made me wonder about the impacts of my own research. Now, at the end of this part of the journey, I can reflect on how this research did change me and my view of the world. Prior to beginning my thesis, I felt afraid of engaging in a subject in which I am an outsider. Wilson and many others warn of the dangers of outsider research in Indigenous communities over the years and how this research can enforce negative stereotypes of Indigenous people. However, the ideology of Two Eyed Seeing helped me understand that maintaining the dualistic divides in academia, and in Canada in general, perpetuates barriers to progress in terms of both sustainability and reconciliation. As a non-Indigenous Canadian, I am responsible for bearing the burden of reconciliation, as are other non-Indigenous Canadians. We cannot expect Indigenous people to bear this burden in addition to the intergenerational trauma inflicted by the Canadian government. This is where the concept of ethical space and Two Eyed Seeing helped to shift my understanding of what reconciliation can mean. These concepts allowed me to realize the importance of discerning common goals and building a shared understanding as an essential foundation for meaningful collaboration and co-learning.

While on the journey of uncovering the ethical space between the dominant worldview of my discipline and the world view of Indigenous communities in Nova Scotia and

across Turtle Island, I learned about the importance of values as a precedent for design. A built environment tied to the values of people and a connection to the landscape is more important than the symbolizing of a place or style. Rather, we should look to Indigenous cultures and natural inhabitants that have found ways to peacefully coexist with the landscape and constantly adapt to its changes. This dynamic adaptability is tied to values of interconnectedness and knowledge of the natural world that the dominant worldview of sustainable development continues to work against. Throughout this journey I have learned that architecture can be an embodiment of these values, rather than a symbol. Furthermore, as stated by Wanda Dalla Costa, architecture can act as a translator and storyteller of these values, not just as a conduit for traditional practices but as a way of demonstrating respectful and responsible relationships to the western world (2018). The role of sustainable architecture then, is to help execute community values in the built form, embodying a consciousness that prioritizes the health and well being of humans and the environment.

Traversing the space between worldviews is a difficult task that never really ends. However, it is an exercise that is worth taking on in any and all disciplines to build a shared understanding and continue the ongoing process of reconciliation. Through establishing this common ground perhaps we can imagine a new approach to architecture that is built upon diversity, shared values, connection to nature and to each other.

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