Environmental Education Network: Developing a Frame to Grow Ecological Literacy In Edmonton, Alberta

by

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Contents

Abstract

This thesis explores environmental education as a network that connects urban and natural environments to encourage transformation towards a more inquisitive and nature integrated society. A study of environmental education, focusing on barriers to change and pedagogical methodologies, provides a foundation to formulate an architectural response. In this response architecture becomes an intermediary binding culture and environment, acting as both scaffold and frame for ecological learning within Edmonton, Alberta. An architectural framework, informed by place and its specificities, is developed supporting educational moments of experience, reflection, research, and participation. These qualities are then developed into the seeds for an educational network consisting of a nature resource center, markers, and a restoration landscape that encourage curiosity, discovery and connections.

Acknowledgements

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To my wonderful family, thank you for your unconditional love, friendship, wisdom, and infinite encouragement and support. And for teaching me to create, imagine, and discover.

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Chapter 1: Introduction

Overview

The dominant social paradigm of modern society is motivated by growth and prosperity where consumer markets are a dictating force transforming land and its inhabitants into commodity to sustain not only needs but overly materialistic values and wants (Martusewicz 2009, 256). This paradigm is one of disconnect, and has diminished modern society's relationship to place, environment, and the impacts of our actions. These actions have shifted and modified natural cycles at global scales, leading scientists to suggest that we have entered a new epoch, the Anthropocene, due to our significant impact upon the planet (NG 2019).

Environmental movements, media and the scientific community have attempted to educate society on the resultant environmental damages, but this has failed to generate necessary traction and change in behaviour (Lakoff 2010, 73). Messages are often framed with tragedy and ignorance which can polarize or dissuade public opinion as they neglect to account for the complexities and underlying components within society (Blackmore 2013, 15) (Gruenewald 2003, 7).

Environmental education strives to address these issues by repairing the disjointed human-nature relationship by establishing critical pathways between humans and the environment. Since its establishment in the 1960's, environmental education has developed into a wide-reaching pedagogical field that investigates the complexities of learning and how to dismantle barriers to education and change. Many studies focus on educational approaches

and methods of framing information considering how values, beliefs, feelings, and experiences are imperative to how information is processed and understood. In 1972, The United Nations formally acknowledged the importance of environmental education stating that:

> Education and training on environmental problems [were] vital to the long-term success of environmental policies because they are the only means of mobilizing an enlightened and responsible population and of securing the manpower [sic] needed for practical action programmes. (Gough 2013, 14)

Almost 50 years after this declaration, environmental education continues to seek effective ways to improve environmental literacy and behavioural change. As the field has expanded, hybrid learning and the consideration of various actors has sparked new opportunities encouraging "permeability between disciplines, generations, cultures, institutions, and sectors" (Wal 2013, 544). One opportunity is to engage architecture as a framework in situating and supporting environmental learning.

Ecological Literacy and Democracy

An ecological democracy involves participation of an informed public, one with ecological awareness and an understanding of interconnectivities within the world. It is based upon David Orr's concept of ecological literacy which is a "capacity to observe nature with insight" that empowers individuals to make informed decisions and effectively participate in a democratic society (Orr 1992, 86). Driven by wonder, ecological literacy is the "comprehension of the interrelatedness of life grounded in the study of natural history, ecology, and thermodynamics" (Orr 1992, 93). This knowledge is essential for an effective democracy, as David Orr states:

> Wise public choices about environmental issues depend

largely on the extent and breadth of public knowledge … If large numbers of people do not understand the environmental facts of energy, resources, land, water, and wildlife, there is little hope for building sustainability at any level. (Orr 1992, 137)

In moving towards an ecological democracy, Randolph Hester emphasizes the need to 'relearn' how to take part in community through participation, cooperation and sharing; it is a movement away from autonomy, towards one of community and civic environmentalism (Hester 2006, 332).

This thesis is inspired by and employs concepts and ideas of ecological literacy and ecological democracy.

An educational network is proposed that links culture and environment to generate ecological literacy. The network encompasses a nature resource center, markers and a restoration landscape that explore how the built environment can support public environmental education and active engagement. An architectural framework is used to test translations of environmental education and pedagogical methodologies.

Hybrid Wish Image of Ecological Literacy and Experiential Learning

Chapter 2: Perspectives

Our perspectives are the ways in which we view the world, they guide our actions and determine how we perceive information and develop knowledge. They provide a framework that influences our values, goals and how we relate to the people and things around us. Perspectives are developed throughout one's life, both influencing and being influenced by the society in which one is situated. In considering the human impact upon the world it is important to understand the perspectives that have led to these actions, what the barriers to change are, and what alternative perspectives can guide us in moving forward.

The Dominant Social Paradigm

It can be argued that detachment from place and the perceived separation between humans and the natural world has contributed to wide scale modification and degradation of the natural systems that sustain life. This perceived disconnect from nature is a construct of the dominant western worldview in modern societies. It is a worldview that educational researcher Rebecca Martusewicz states is:

> Founded on deeply embedded cultural assumptions that define humans as in charge of and outside of all natural systems, and cultural progress as a creation of autonomous individuals seeking material accumulation, this practice claims everything and anything to be up for grabs for the market and private profit. (Martusewicz 2009, 259)

This paradigm is built upon enlightenment that deeply rooted into society frameworks that categorize the world "into a naturalized system of hierarchical oppositions" (Martusewicz 2009, 256). It is a system that divides and places value of reason over emotion and culture over nature rationalizing

the dominant opposite as having "the 'natural' right to define, control and even exploit the other" (Martusewicz 2009, 256).

This worldview has contributed to physically and mentally separating humans from nature by simplifying it into objectified and compartmentalized subjects. Resultant technologies have provided ease and efficiencies that directly influence how we sustain our needs and wants which often remove direct interactions with the environment and its processes. While these foundations have contributed amazing accomplishments and discoveries, the general public has been increasingly excluded from having direct engagement with nature, becoming removed from experiences that generate wonder, insight and relationships. James Corner states, that this social framework has led to "the emergence of a largely disembodied culture struggling to find meaning and continuity in community, environment and time" (Corner 2014, 78). These frameworks have led to the creation of an "excessively 'hard' world" that undervalues the poetics of place and disregards the body, spirit, and nature (Corner 2014, 79, 81). It is a culture that is unaware or incapable of seeing the threads that connect themselves to the world and each other. Individuals have been reduced to internalized perspectives- bound by the skin - which has led to a demeaning way of thinking of the world as separate, "mindless and therefore not entitled to moral or ethical consideration" (Bateson 1972, 436).

By undervaluing nature, we have developed barriers that have psychologically removed modern society from a greater system of relations, where matters outside of our own individual considerations are otherized, commodified and ripe to exploit (Bateson 1972, 436). It is a destructive perspective that influences individuals' values and ways of

living and is tightly woven into to a system of feedback loops that preserves a cycle of profit, consumption, waste, and destruction.

Barriers to Change

Efforts to inform society of the damages inflicted by humans have been unsuccessful in influencing necessary changes in behavior. Information is often delivered in linear, transmissive way, with the belief that information / facts create knowledge which then influence behaviours.

Knowledge $\longrightarrow$ Attitude $\longrightarrow$ Behaviour

Early model for creating pro-environmental behaviour (data from Kollmuss and Agyeman 2002, 241).

This educational method was developed in the 1970's and though it has been proven to be a vast oversimplification, this linear approach is still widely used today (Kollmuss and Agyeman 2002, 241). Educational theorist, David Kolb, notes that "negative emotions such as fear and anxiety can block learning, while positive feelings of attraction and interest may be essential for learning" (Kolb and Kolb 2013, 22). As environmental information has become linked to political platforms and movements, the oversimplification of information delivery has contributed to the polarization of issues due to required actions threatening individuals' values and familiar ways of life. This polarization has led to divisions within communities and a stifling of productive dialogue around issues such as transitioning energy sources to cleaner alternatives. Kollmuss' study of barriers to pro-

environmental behaviours depicts numerous variables that are involved in motivating behaviour, these include, but are not limited to, external factors such as institutions, economics and culture, and internal factors such as motivation, knowledge, values, and emotions. These factors combine into a complex system that impacts how we see the world and act within it (Kollmuss 2002, 248-256). If these factors are not considered they can become barriers to change with environmental issues failing to resonate
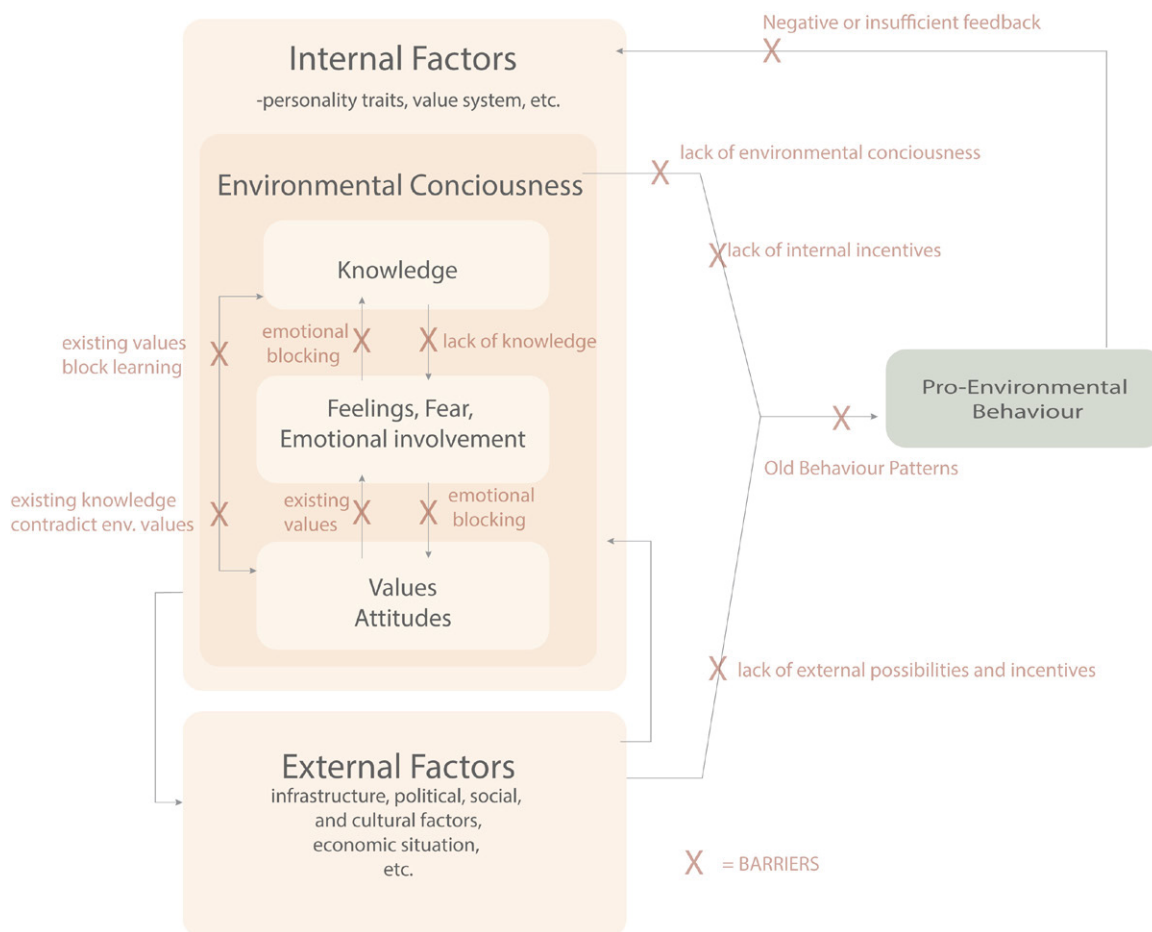
Complexities in creating pro-environmental behaviour (diagram recreated from Kollmuss 2002, 257).

with people, resulting in non-action, indifference, and denial despite scientific consensus on our need to act upon issues.

In addition to the above-mentioned barriers, there is also a disparity in approaches towards issues. Environmental issues when acknowledged, are often considered a problem to be solved through science and technology despite scientists' warning that this is not enough. The science community has insisted that technology is not the only part of the solution as environmental issues have been intensified by cultural interactions, all members of the community must be considered part of the solution (Gough 2013, 14). By defaulting to technology and expert science as a solution we fail to recognize the underlying factors of the issues, such as behaviour and attitude toward environment. It is an approach that continues to take an anthropocentric perspective that seeks to consume our way out of our problems (Sijmons 2020).

DOMINANT SOCIAL PARADIGM
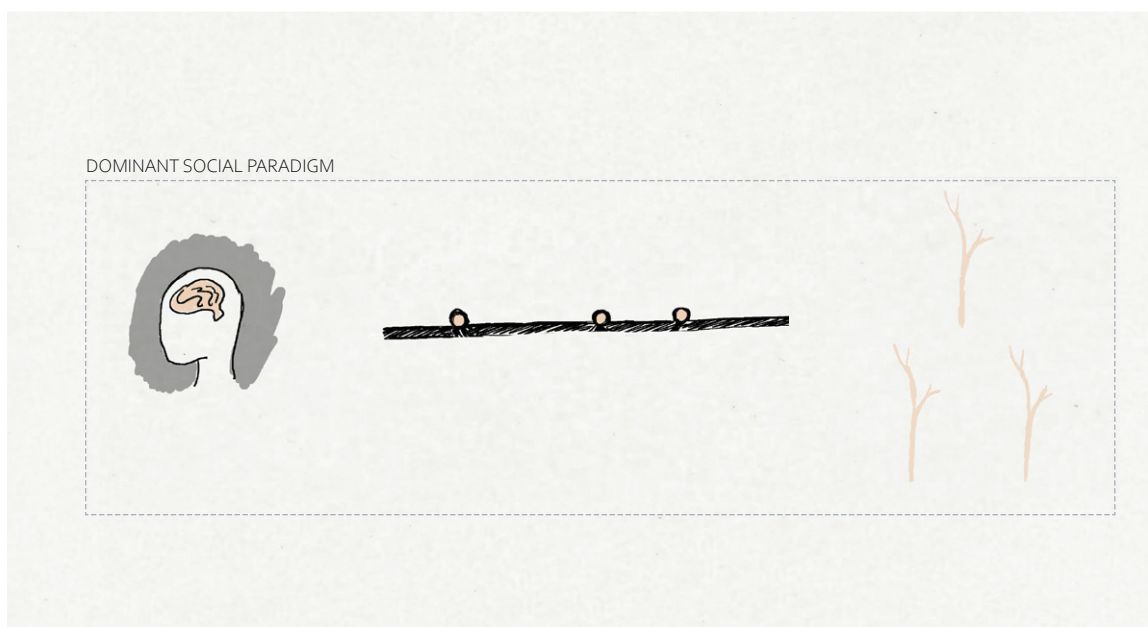
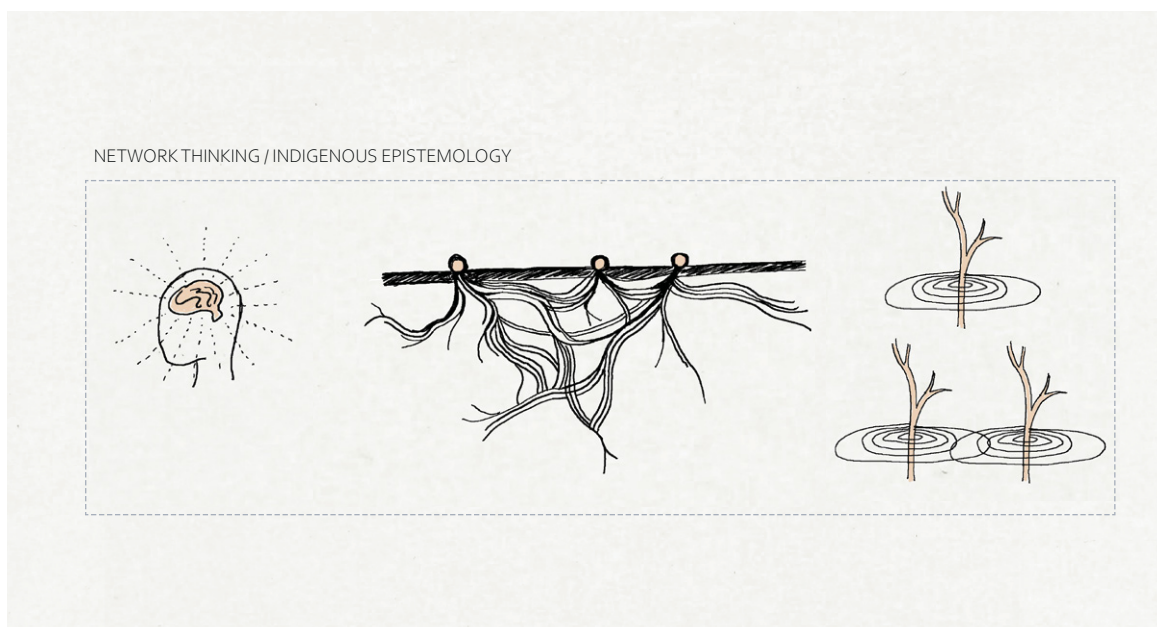Conceptual drawing depicting perspective of the dominant social paradigm.

Guiding Perspectives

Network Thinking

In addressing the western 'disembodied culture' scholars have suggested the need for alternative perspectives that reconsider how we interact with the world. In *Steps to an Ecology of Mind*, Gregory Bateson reacts against the dominant paradigm of hierarchical thinking that values mind over body, thought over emotion, and the separation of self from experience. He argues that these sensations are vital processes that establish relationships and external connections with the world (Bateson 1972, 438). Through exploration of the concept of the 'Mind', Batson depicts a new approach that extends an individual's mind outwards from containment within the body through pathways and messages (Bateson 1972, 436). The 'Mind' becomes a metaphor for interconnectivity, it is a cognitive map in which an individual's 'Mind' becomes a part of a larger 'Mind' thus humbling ourselves and actions by assuming a small part in a much larger system of beings (Bateson 1972, 437). Counter to the anthropocentric view, Bateson's work seeks a "decentralization of the human subject" towards a more systemic form of thinking (Martusewicz 2009, 254). Bateson recognized the importance and difficulty in restructuring the dominant perspective and considered the most important undertaking was "to learn to think in a new way" (Bateson 1972, 437).

Indigenous Epistemology

Western systems of knowledge have long discarded and suppressed other cultures and their perspectives. Various fields are only recently rediscovering and acknowledging the importance of indigenous science and ways of knowing that are "guided by spirituality, ethical relationship, mutualism, reciprocity, restraint, respect, harmony and acknowledgment of interdependence" (Cajete 2020). Robin Wall Kimmerer, in her book *Braiding Sweet Grass,* advocates for new perspectives that are inclusive to nature which combine both scientific and spiritual thinking (Kimmerer 2013, 42). In contrast to the dominant paradigm, Kimmerer states that we are not in control of nature "what we are in control of is our relationship to the earth" (Kimmerer 2013, 336). Through reciprocity and experience with the world, compassion can be grown, threading connections between the living world and the individual, healing the fragmented relationship (Kimmerer 2013, 42, 239). Kimmerer's writings echo those of Gregory Cajete, a scholar who like Kimmerer has been


NETWORK THINKING / INDIGENOUS EPISTEMOLOGY

Conceptual drawing depicting guiding perspectives.

trained in both in western academics and indigenous ways of knowing. Cajete notes that Indigenous epistemology is a place-based view that operates by grounding and anchoring knowledge to the world in which we are situated (Cajete 2020). It is a worldview that is built upon interconnectivity, resonance and the wisdom that can be gained through observation of relations between entities. These relations can be visualized as symbol of concentric rings where each entity has its own concentric rings that radiate out from itself and interconnect with other's rings (Cajete 2017, 119). This symbology is a way of representing a system, similar to Bateson's Minds, where we can visualize "how one thing affects another, how one thing leads to another, and how one thing is connected to another" (Cajete 2017, 119).

Supporting Alternative Perspectives

Gregory Bateson, Robin Wall Kimmerer, and Gregory Cajete each explore and provide insight into perspectives that weave humans and nature into an interrelated and inseparable system. We must reconsider the ways in which we are living as the current perspective is both an underlying cause of environmental issues and a barrier of change towards more sustainable and reciprocal ways of living. Cajete looks at perspectives in evolutionary terms, similar to how forms of life have grown and changed overtime from more ancient forms, so must new forms of knowledge and learning be created (Cajete 2020). We have the capacity to evolve mentally to better fit our world. While Bateson speaks of the need to learn to think in a new way, Cajete complements his texts by speaking of the need to teach people to think in a new way. By seeking ways to teach, learn, encourage, and support relations of interconnectivity

between individuals, community, and environment we can attempt to overcome detached and isolated perspectives. Through education and the consideration of architecture as an influential artefact, both culture and environment can be weaved together enabling a discovery of the threads that connect us all within a greater system.

NTERCONNECTIVITIES
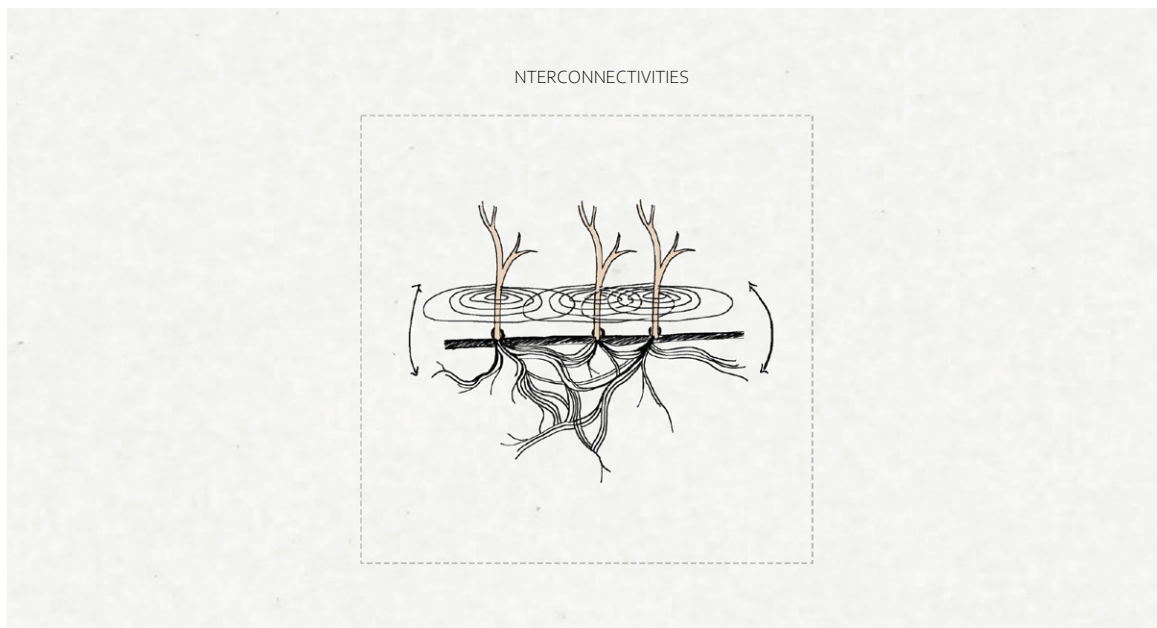
Conceptual drawing depicting interconnectivities within the world.

Chapter 3: Context

Situating

This thesis will be situated within Edmonton, Alberta, it is a city whose identity is tightly woven with the Albertan oil industry. Alberta is one of the most polarized provinces in Canada when it comes to climate change and human's role in causing it. As it is one of the larger producers of oil and gas in the world it is often targeted by environmental movements that condemn what has contributed greatly to Albertans' way of life (Marshall 2018, 51). Many Albertans are personally connected either directly or indirectly through friends and family to carbon industries of coal and oil; these harmful industries have supplied the province and its people's livelihood which makes it challenging to teach or even discuss environmental issues that threaten their familiar ways of life (Marshall 2018, 37).
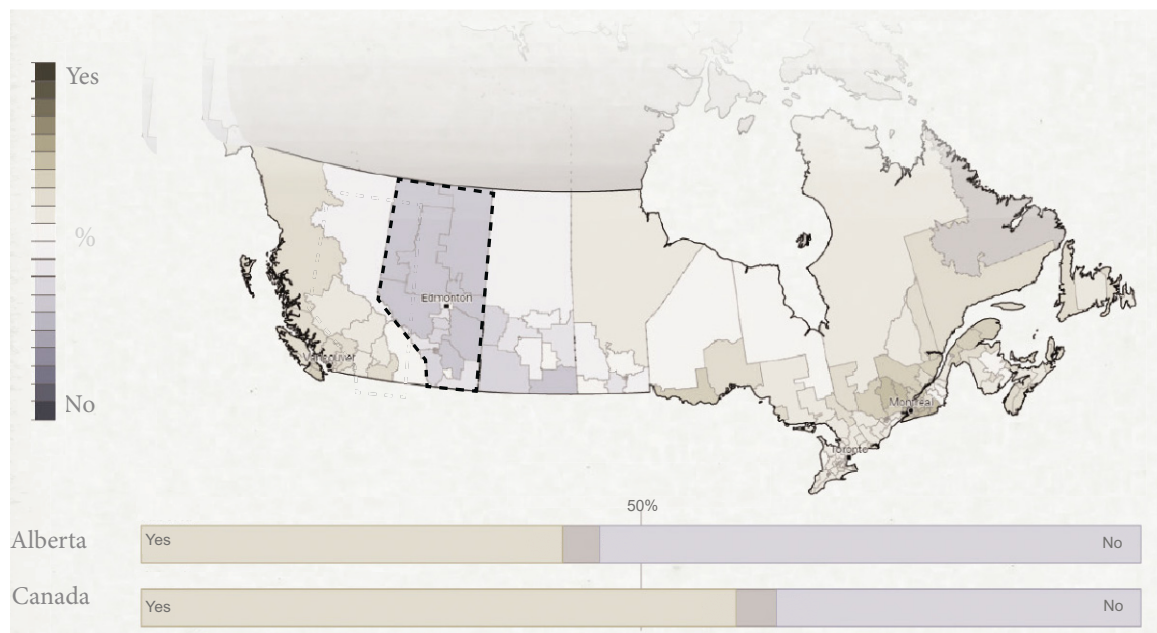
Survey of Canadian opinions that climate change is partly or mostly due to human activity (map modified from Mildenberger et al. 2019)

Within Alberta's formal educational institutes, curriculums are provincially determined and thus linked to the fluctuating politics that influence what and how things are taught within schools. Currently, environmental education is lightly integrated into curriculums and occasionally facilitated through day camps, visits with animals, and field trips. Environmental education is heavily dependant on the teacher to obtain their own resources and teach it. Other barriers involve reluctant or climate change skeptical teachers, parents, governments, administrators, and school board officials preventing environmental education projects (Medynski 2018, 37, 38, 39). A survey of Alberta teachers in 2017 noted barriers in teaching climate change which include: limited educational resources to provide authentic learning experiences; teachers having to seek out their own resources; lack of funding; and community skepticism that can even be threatening to a teacher that implements environmental issues in their lessons (Alberta Council 2017, 6). Teachers have noted a need for "resources; authentic, experiential, hands-on learning; [an] embedded curriculum; and buy in and support", some also stated that whole school integration and outdoor/environmental education approach was needed for environmental literacy (Alberta Council 2017, 11). While these studies look at formal public education, they highlight barriers that extend beyond the school walls- barriers of resources, community, and experience.

An integration of environmental education must be mindful of Alberta's social and political landscape. By supporting alternative forms of education, we can spark new connective ways of thinking and opportunities for change, opposed to criticizing a community for their actions. As Gruenewald emphasized, mutual connections and bonds

with nature are essential prior to motivating people to act on behalf of it (Gruenewald 2003, 8). Architecture supporting environmental education offers a possibility of a non-confrontational approach that can forge bonds between individual, community, and the environment. It has the ability to support and emphasize physical connections with the environment; it can create diverse opportunities for learning within and about nature and place; it can support mental connections by creating phenomenological and experiential constructs that engage a participant on a more meaningful level; and it can provide effective spaces that link to current values, connect community, and promote interactions and the sharing of stories.

Chapter 4:
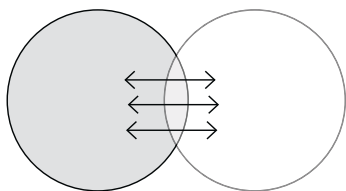# Educational Methodology

Educational Approach

It is important to first define education, as often what comes to mind when one mentions education is schooling that occurs within structured and scheduled institutions from preschool to college, featuring teacher and student. This thesis will be looking at education as a means of learning, a process that is continuous throughout life and is driven by an individual. By defining learning as continuous, knowledge development becomes a transformational process that is adaptive, created, and recreated; it becomes a lifelong process, as opposed to "an independent entity to be acquired or transmitted" (Kolb 1984, 38). By dissolving the compartmentalization of education, a more exploratory approach to environmental learning is enabled; where it can flood out into the community and offer new opportunities for both individual and collaborative learning, to not only those within classes but to the general public. This concept of decompartmentalization is informed by Tim Ingold's writings in his book *The Life of Lines*; where Ingold states that "knowledge is not classification but storied not totalising and synoptic but open ended and exploratory"; knowledge is not a collection of facts, but "grows along the paths [we] tread" (Ingold 2015, 48, 47).

Pathways to Learning

Environmental education is a vast pedagogical field that has branched into many overlapping methods such as scientific, value-centered, feminist, ethnographic, ecological, sustainability, etc. (Sauvé 2005, 13). These branches are

fluid and non-exclusive thus this thesis investigates methods that improve both ecological literacy and cultural bonds that anchor an individual to their community and environment. Investigated methods are sorted into three concepts, Hybrid, Place and Experiential. These approaches have overlapping and interacting elements that when utilized together bind and strengthen their concepts. In Chapter 5 these methods will inform an architectural methodology by translating them into programmatic and spatial discoveries that seek to address barriers to change.

Hybrid Learning

In proposing future directions for environmental education, scholars have advocated for an approach of 'hybridity' in which "opportunities for new types of learning expand with an increased permeability between disciplines, generations, cultures, institutions, and sectors" (Wal 2013, 545). Hybridity supports a network approach towards education, emphasizing interconnectivity and collaboration between different entities. It generates a moment of exchange, where "new spaces might open up that would allow transformative learning including intergenerational and intercultural learning to take place" (Wal 2013, 545).

By bringing together two entities, or concepts, an interstitial space is formed where new potentials, interactions and connections can potentially be sparked. It is a moment of contact where interaction and exchange occur. Hybridity can address barriers to change as it provides a bridge between the familiar and unfamiliar ways forward.

Conceptual diagram of hybrid learning.
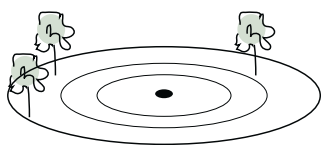
Conceptual diagram of place-based learning.

Place-Based Learning

Place-based learning looks to local phenomena to educate. It provides direct contextual learning experiences of processes and linkages within natural and social systems (Gruenewald 2008, xvi). Environmental educator, David Orr, notes that place "promotes the capacity not only to see but to observe with care, understanding, and, above all else, with pleasure" (Orr 1992, 136). Place offers opportunity to ground and inspire education through both beauty and wonder; this, as Environmental educator David A. Gruenewald states, leads to individuals establishing stronger mutual connections and bonds with place where they become aware of the impacts and forces that shape it (Gruenewald 2008, xx). Place is an ideal setting for learning ecology and natural history as it provides "direct involvement with nature…[a] firsthand knowledge of trees, animals, plant life, birds, aquatic life, marine biology and geology"; as David Orr states, "It is an antidote to the excessively abstract, overtly quantified, and computerized" approach to nature (Orr 1992,136).

Place-based education can be approached through a variety of methods, including but not limited to collection, identification, observation, drawing, growing, exploring, foraging, testing, fixing, building, naming, stories, journaling, and handcrafting; these all can be applied to the specifics of place and its distinct features. David Sobel, in his book *Childhood and Nature*, provides a system wide (and hybrid) example of place-based education by means of a regional treasure hunt: Where educators in New Hampshire and Vermont weaved curriculum, community, recreation, and ecotourism into a regional place-based quest. By involving students in its creation, they become the creators of content and adventure by exploring, "researching local history,

learning mapping skills, interviewing community elders, writing poetry, and discovering new corners of terrain in their own back yards" (Sobel 2008, 102). The treasure hunt forged collaboration between school, community, and place and introduced students to processes of civic engagement (Sobel 2008, 102). While Sobel focuses on children's education, this example's principles can be applied at a community scale; it is a precedent offering insight into how education can operate as a participatory network utilizing the concept of place by highlighting its specific qualities inviting one to interact with, learn from, and participate in.

Experiential Learning

Experiential learning is defined as learning through life, through direct interaction and sensing of phenomena (Kolb 2014, xviii). Unlike materials in media and texts with learning objectives framed by an author's perspective, experiential moments provide primary source information for an individual to interpret, analyse and infer upon. It is a non-confrontational "process of learning from direct life experiences that is controlled by the individual" and directed by self-discovery (Kolb 2014, xix). Kolb's Experiential Learning Theory (ELT) describes learning as a cyclical process involving experience through sensing which is then "enriched by reflection, given meaning by thinking and transformed by action" (Kolb 2013, 24). This cycle highlights essential moments to be supported in learning spaces- moments of experience, reflection, thinking and action (Kolb 2013, 20). As individuals have varying preferences for learning styles, ELT enables an individual to enter the 'cycle' at a preferred moment facilitating more accessible experiences (Kolb 2013, 23). ELT is largely applied to inform instructors, course work and course formats, by looking at

architecture as a facilitator of these experiential learning moments, learning becomes open, more accessible, and less confrontational.

Experience (Sense)

Participation

Reflection (Discuss/Interpret)

Research (Thinking)
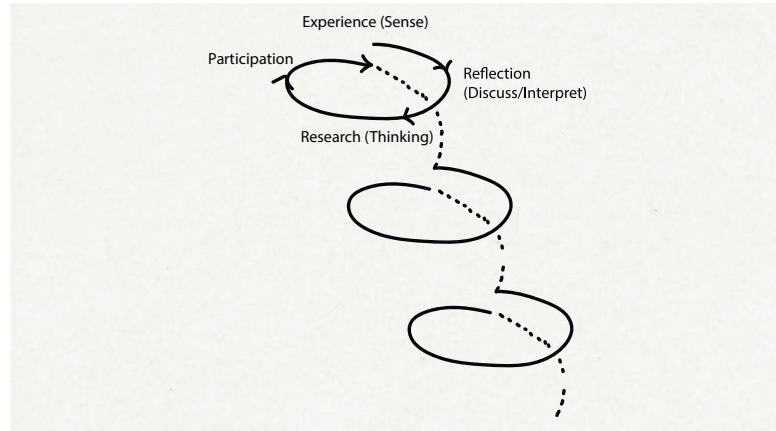
Interpretation of ELT's Learning Cycle (generated from Kolb 2013, 24)

Integrating Concepts

In devising an approach towards ecological literacy and participation, the concepts of hybridity, place, and experiential learning (experience, reflection, thinking, experimentation) are integrated into a nested cycle. Experiential learning, sparked by curiosity, provides moments of entry that draw an individual into the learning process. These moments are inspired and supported by hybrid relationships that pull in entities and features from place. This integration enables a processional network approach to design; where one moment can inspire and connect to the next. It facilitates a gradient of educational experiences and moments catering to each individual and their specific and varied comfort and skill levels. As an individual's knowledge base expands, so can their concept of place- facilitating an expansion of local to global learning. Architecture embodying this cycle creates a support system fostering and encouraging an individual's curiosity while providing inclusive and easily accessible opportunities for one to grow and learn.
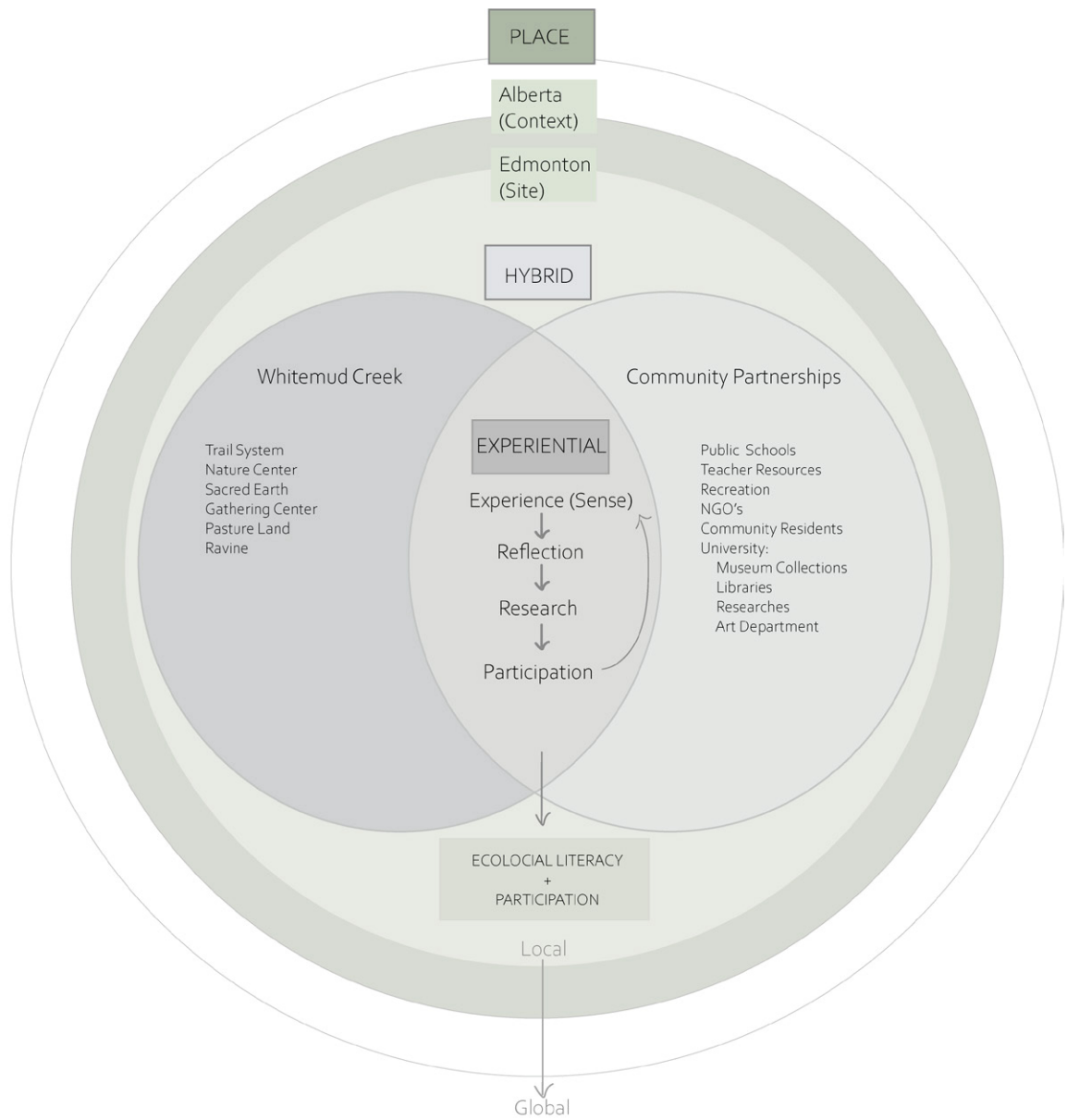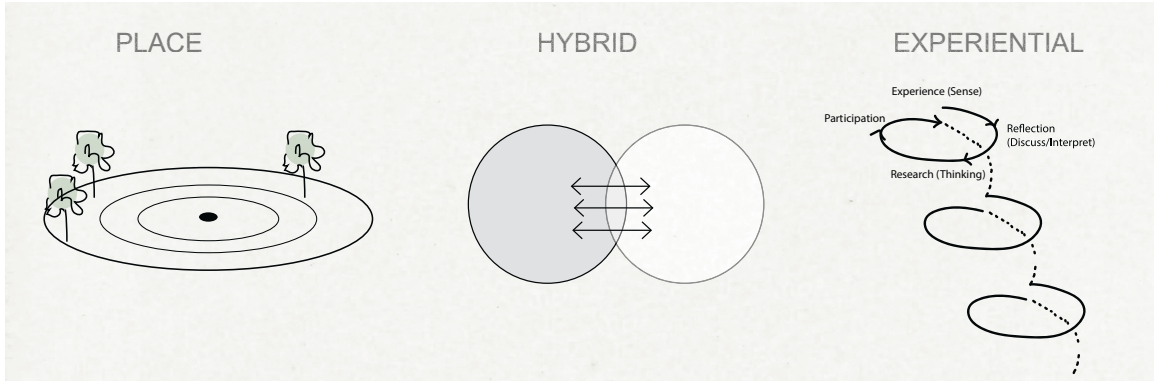
PLACE   HYBRID   EXPERIENTIAL

Experience (Sense)

Participation   Reflection
(Discuss/Interpret)

Research (Thinking)

PLACE

Alberta
(Context)

Edmonton
(Site)

HYBRID

Whitemud Creek   Community Partnerships

EXPERIENTIAL

Trail System   Experience (Sense)   Public Schools
Nature Center   Teacher Resources
Sacred Earth   Reflection   Recreation
Gathering Center   NGO's
Pasture Land   Research   Community Residents
Ravine   University:
                               Participation   Museum Collections
                                                                Libraries
                                                                Researches
                                                                Art Department

ECOLOCIAL LITERACY
+
PARTICIPATION

Local

Global

Diagram of Educational Methodologies Integrated.

Chapter 5: Design Methodology

Through network or 'ecological' thinking, an understanding of interconnectivities guides both the educational methodologies and design methodologies. Stan Allen quotes Bateson in saying an "ecological understanding… must be ecological", in other words, a methodology must be approached through systems thinking and principles; where boundaries are crossed exhibiting interconnected behaviours that cannot be reduced to static or independent categories (Allen 2009, 178). By looking to edges, flows, adjacencies, and relationships, a mosaic of interactions can begin to reveal the systems and patterns of place to inform an intervention. Landscape ecologist, Richard Foreman develops and expands upon these concepts in his book *Land Mosaics*. In his book, Foreman highlights how edges condition and porous / permeable boundaries influence ecological flows and movement across and along thresholds. He notes that convoluted and curvilinear edges promote exchange and flow between boundaries, while straight, linear edges decrease permeability and encouraging movement along boundaries (Foreman 1995, 106-107). These characteristics define how networks connect and interact and are essential for understanding how an intervention can integrate, modify, enhance, or support existing systems in place. Studies and applications of these concepts, at scales from region, to community, to building, to detail, provide a method of understanding and creating interconnectivities between elements, such as humans and nature.

With the above ecological concepts in mind, theory and educational methodologies are translated into a design

(a)

(b)

(c)
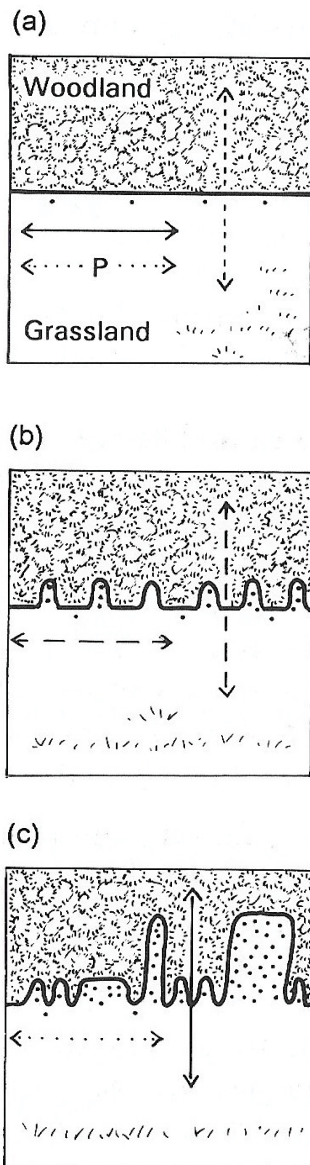
Foreman's edge conditions, comparing linear (a) to highly convoluted edges(c). Solid line indicates primary flow direction. (Image from Forman 1995, 107).

methodology that looks to Situating, the In-Between, and Phenomenology. This methodology guides architectural moves and moments by utilizing case studies as precedents. Similar to the educational methodologies, these design methodologies have overlaps and when utilized together their concepts strengthen one another.

Situating and Making Place

An understanding of place is essential for creating a place-based intervention and informing how other architectural methodologies become integrated and situated. Studies of place are explored through collage, layering and temporal mapping to understand its qualities, complexities, and interconnectivities. This approach becomes an experiential mapping and a discovery of patterns that can be utilized in designing a responsive architecture that highlights and reacts to place.

Through situating, a response becomes place-based and grounded, forging relationships with its surroundings and processes within. It looks to context and patterns of place, identifying adjacencies, edges and flows, such as ecologies and geomorphologies that influence how and why the patterns of place exist. An intervention can activate and highlight contextualized moments and generate interactions between different elements, such as: activating edge conditions to draw in new interactions and flows between; or providing physical experiences that influence more sustained observation and sensing of its temporal qualities. Place studies also identify potential partnerships that can be created through programmatic linkages, drawing in various parties to spark new relationships.
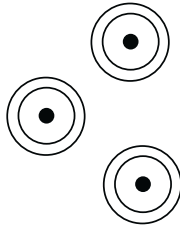
Conceptual diagram of Situating.

Place not only can be activated and inform an intervention but can also be generated by leaving room for participants to engage in the creation of place and becoming more emotionally bonded to it. As Herman Hertzberger states," Place is where you recognize yourself, something familiar and safe, specifically for you", it is space that is transformed by the "infill given to it by its occupants / users" (Hertzberger 2010, 24). These constructs, infills and interactions can be permanent or temporary, such as the movability of furniture, walking through a clearing and flexibility of space to fit ones needs.
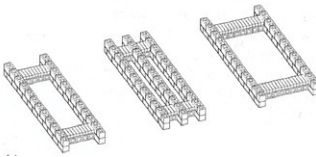
Herman Hertzberger exemplifies this in his Montessori School in Delft using walls, blocks, and hollows to engage
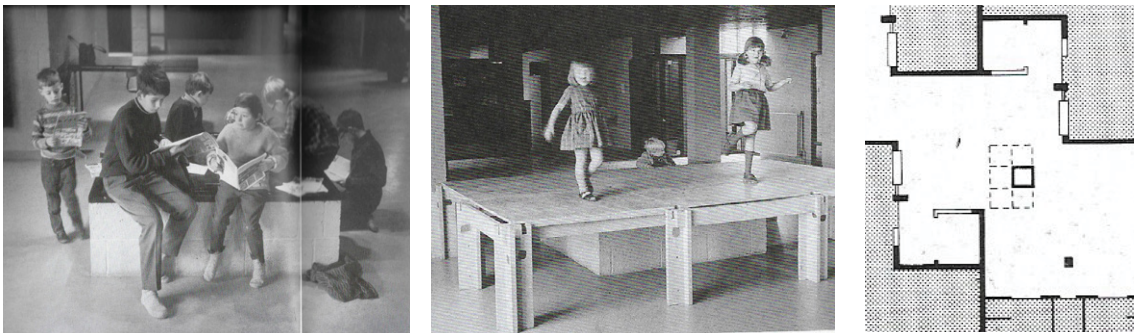
The block within Hertzberger's Delft Montessori School (Hertzberger 2008) and Plan of the block within Hertzberger's Delft Montessori School (Hertzberger 2009)
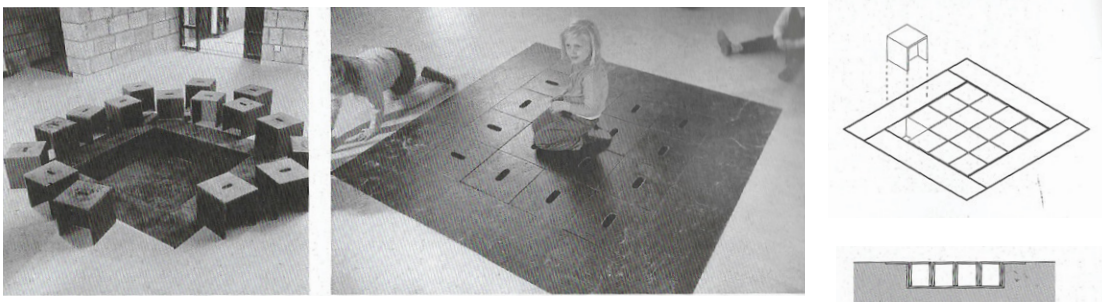
The hollow within Hertzberger's Delft Montessori School (Hertzberger 2008)

The concrete block masonry wall within Hertzberger's Delft Montessori School (Hertzberger 2008)

its users. An integration of a permanent block platform centered in a corridor became a focal point or "touchstone" that "contain[s] suggestions and incentives for response in each situation as it arises" (Hertzberger 2008, 93). This block's insides could be unpacked to expand its form, shifting from play space to workspace to gathering point to stage, for individual or assembly. Like the block, Hertzberger's Hollow could be unpacked to providing seating or create another level to embrace play (Hertzberger 2008, 93).

Lastly, Hertzberger's wall, constructed of concrete masonry blocks, framed space for interactions but also hosted interaction providing opportunities to be filled with plants, toys, and sticks for imaginative play (Hertzberger 2009, 155). These forms suggest imaginative possibilities giving the user choice and suggestions of how they interact and activate their environment.

An example of a more permanent engagement, an idea developed by Akelei Hertzberger, was that of an enclosing edge to a park consisting of stone tiles that could be filled in with mosaics created by children of the school. As Herman Hertzberger comments, her concept "fram[ed] and assembl[ed] so many individual contributions. [Which] gave a communal, public component that drew together the welter


Participatory Mosaic infilled path (Hertzberger 2008)

of individuality into a single entity" (Hertzberger 2008, 195). These interactive moments can be utilized to evoke a sense of belonging, familiarity and emotional ties that mentally and physically develop place.

The In-between

The educational method of hybridity and theoretical concepts of interconnectivity are translated by focusing on the point of connection between two separates- the threshold. The threshold establishes relationships by accommodating exchange within systems, moderating flows, and activating edges between differing entities / ecologies. Aldo van Eyck expanded this point of connection, utilizing architecture to "extend the narrow borderline" to empower, emphasize and inspire relations between things (Strauven 1998, 417). It becomes a moment "where a meeting between two realms takes shape, the place where two regions that retain their full individual integrity overlap, where they are simultaneously present" (Strauven 1998, 417, 356). It is where opposites interact with one another through a balanced tension, connecting and fortifying one another, and the space between them into a unified whole (Strauven 1998, 459).

Van Eyck's Sonsbeek Pavilion and Saucier + Perrotte Architectes' First Nations Garden Pavilion illustrate how architecture can mediate between inside and outside, nature and built, and connect parts as a whole. Interconnectivities generated by the built form can be embodied in material expression, such as an extension of materials from one space into another; through formal means, such as roofs or paths that connect / bridge individual pieces; the use of intentional barriers or markers to emphasize a moment of
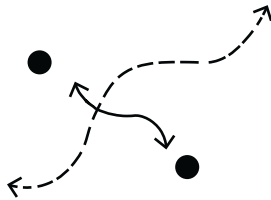
Conceptual diagram of the In-between.
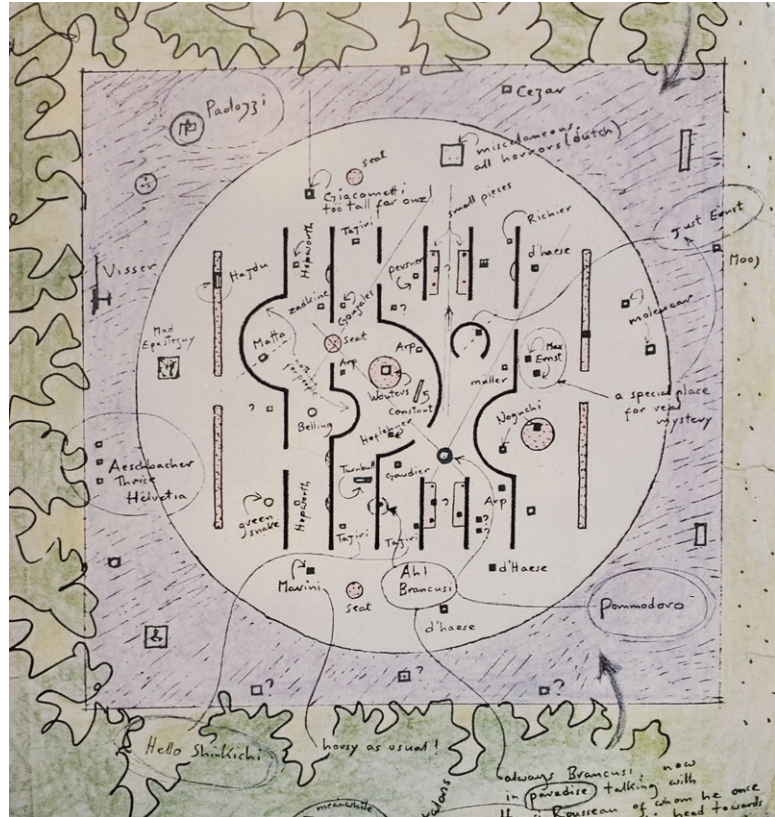
Plan of van Eyck's Sonsbeek Pavilion, Arnhem, 1965 (Eyck and Ligtelijn 1999, 134). Photos of van Eyck's Sonsbeek Pavilion, Arnhem, 1965 (Top Left Photo from Instagram @_hugopassos_, Bottom Left photo from Instagram @robynesome)

Saucier + Perrotte's First Nations Garden Pavilion (photos from Saucier + Perrotte Architects, 2009).

crossing; or through visual connections that creates a play / choreography between spaces, pulling one through and between. The threshold / in-between becomes a point, or edge condition, that can be expanded, punctured, and emphasized to test how architecture can dissolve barriers, both mentally and physically.

Phenomenology

Conceptual diagram of Phenomenology.

Phenomenology and consideration of "the world as lived" is essential for inspiring wonder as well providing experiences that connect individuals to place (Corner 2014, 97). James Corner states that

> The landscape is a setting of our lives, the sensual-intellectual perception of which constitutes meaning and value. By extension, things and places can be properly understood only through nearness and intimacy through bodily participation. (Corner 2014, 97)
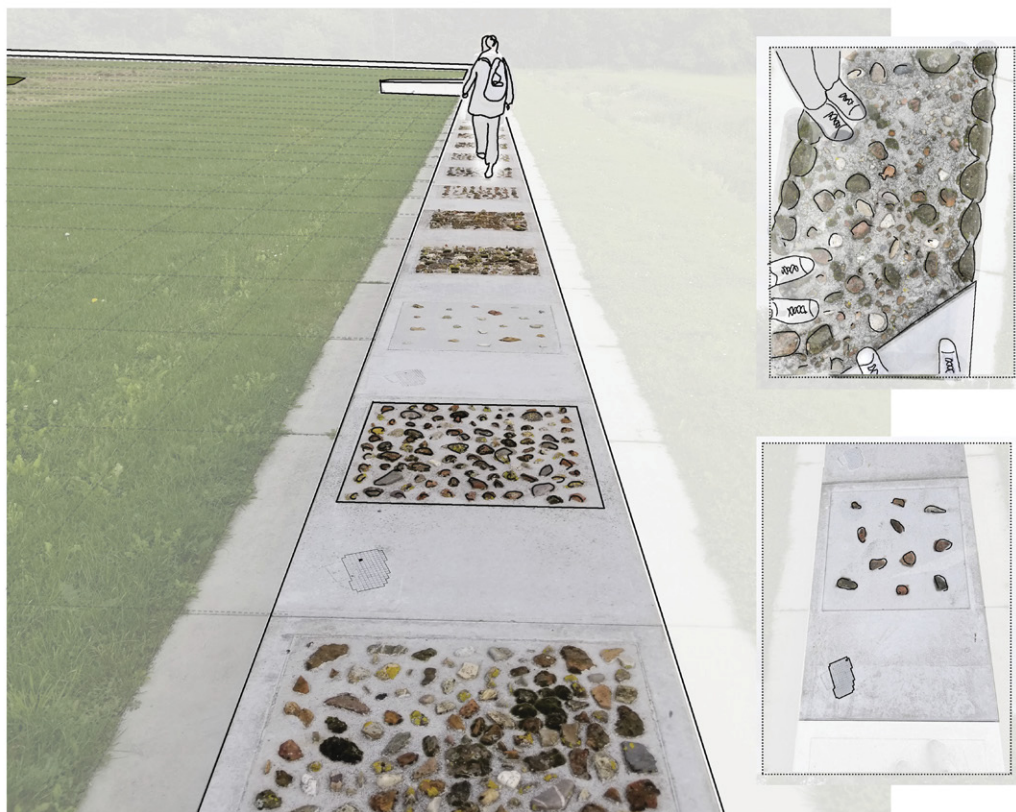
Museum wall with embedded artefacts from site. Experiential spaces at Fort Bij Vechten Waterline Museum, Netherlands.
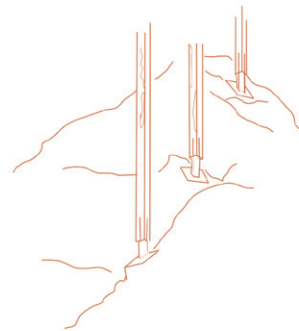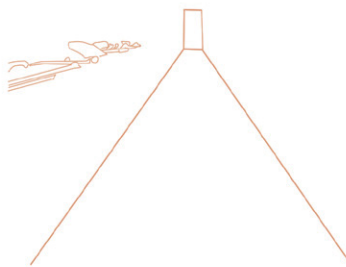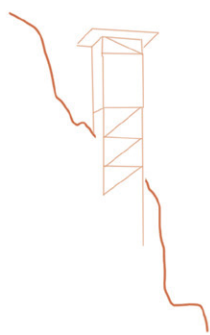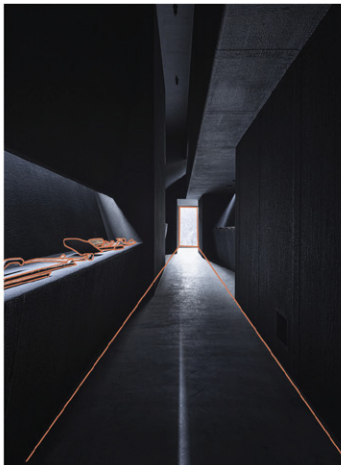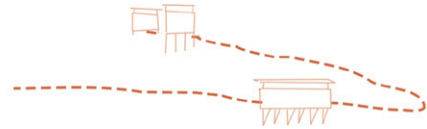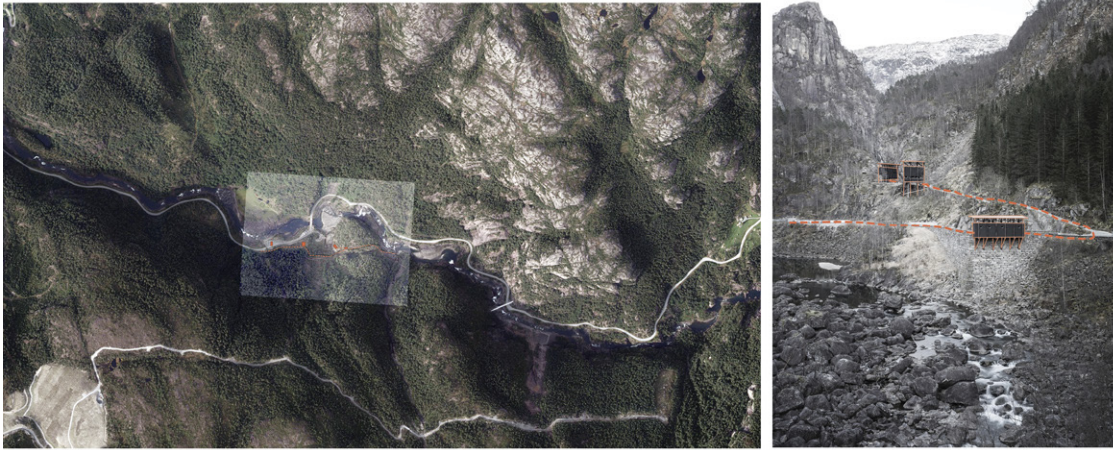
Experiential spaces within the land and integrated within a path, Zumthor's Allmannajuvet Zinc Mine Museum, Norway (base photos from Atlas of Places 2019).

In studying projects that emphasize these qualities, such as the Waterline Museum at Fort Bij Vetchten in the Netherlands, and Zumthor's Zinc Mine Museum in Norway, we can observe how an intervention integrated within the landscape can be a successful learning venture.

Concepts of path and bodily participation performed through movement; interaction on, through and between structures; as well as their material properties of texture, contrast, light, and embedded information provide unique learning experiences that intrigue the participant and submerge them into an experiential learning state. As Juhani Pallasmaa states we can "discover our neglected senses through a strengthened sense of materiality and hapticity, texture and weight, density of space and materialized light"(Pallasmaa 2005, 41).   Similar to the Waterline Museum, an educative landscape for the Museum of Natural History in St. Gallen, Switzerland demonstrates an alternative to direct pedagogical signage, utilizing fragmentation where "riddles of nature are strewn throughout the place" (Winogrond 2021). Moments of curiosity are created by integrating a rugged rubble landscape with fragments of architecture, and large stepping-stones (2 – 7 meters) embedded with information, such as quotes and fossil impressions (Winogrond 2021).

Educational fragments and riddles of nature, Studio Vulkan's Museum of Natural Hisotry Landscape, St. Gallen, Switzerland(Photos by Das Bild, n.d.)

Experiential spaces within the land at the Waterline Museum (base photo from Studio Anne Holtrop 2016).

These experiential moments are framed by architecture and draw the mind outwards, actively engaging participants in the world by guiding the body through space and involving one physically in the experience.

An Architectural Framework

Cabinets of Curiosity

Loosely defined as precursors to museums, Cabinets of Curiosity emerged as constructs to collect and contain natural specimens, photographs, art, and numerous other curious, natural or made, artifacts (Yanni 1999, 16). The cabinet was often a personal or privately-owned collection that varied in its form, from room(s) to furniture to even small boxes. Acting as a device framing and holding secrets of the world, they embodied enlightenment principles of collecting and compartmentalization, and were a physical representation of the collector's power and dominance over nature and its wonders. Bowry's research on cabinets of curiosities discusses the notion of the frames, boxes and containers of 16th and 17th centuries. Looking to the frame, while it is supplementary and external to the art it holds, she notes that "it is nevertheless integral to its meaning", as it contributes to "shaping the beholder's experience of art" (Bowry 2015, 167). Similar to the frame, cabinets and boxes are also framing devices, where "acts of concealment, containment, and revelation were perceived to uncover or heighten an object's significance and relationship to other objects within the collection" (Bowry 2020, 131). Cabinets formed a liminal space between collector, nature and the unknown, functioning as frame, "mirror and microcosm of

Interior of Ferrante Imperato's Cabinet of Curiosities, Woodcut from Historia Naturale Diferrante Imperato, Venice, 1672 (Yanni 1999, 18)

the natural world" (Bowry 2020, 130). As a frame, it directed and influenced how one viewed and interpreted nature and the world.
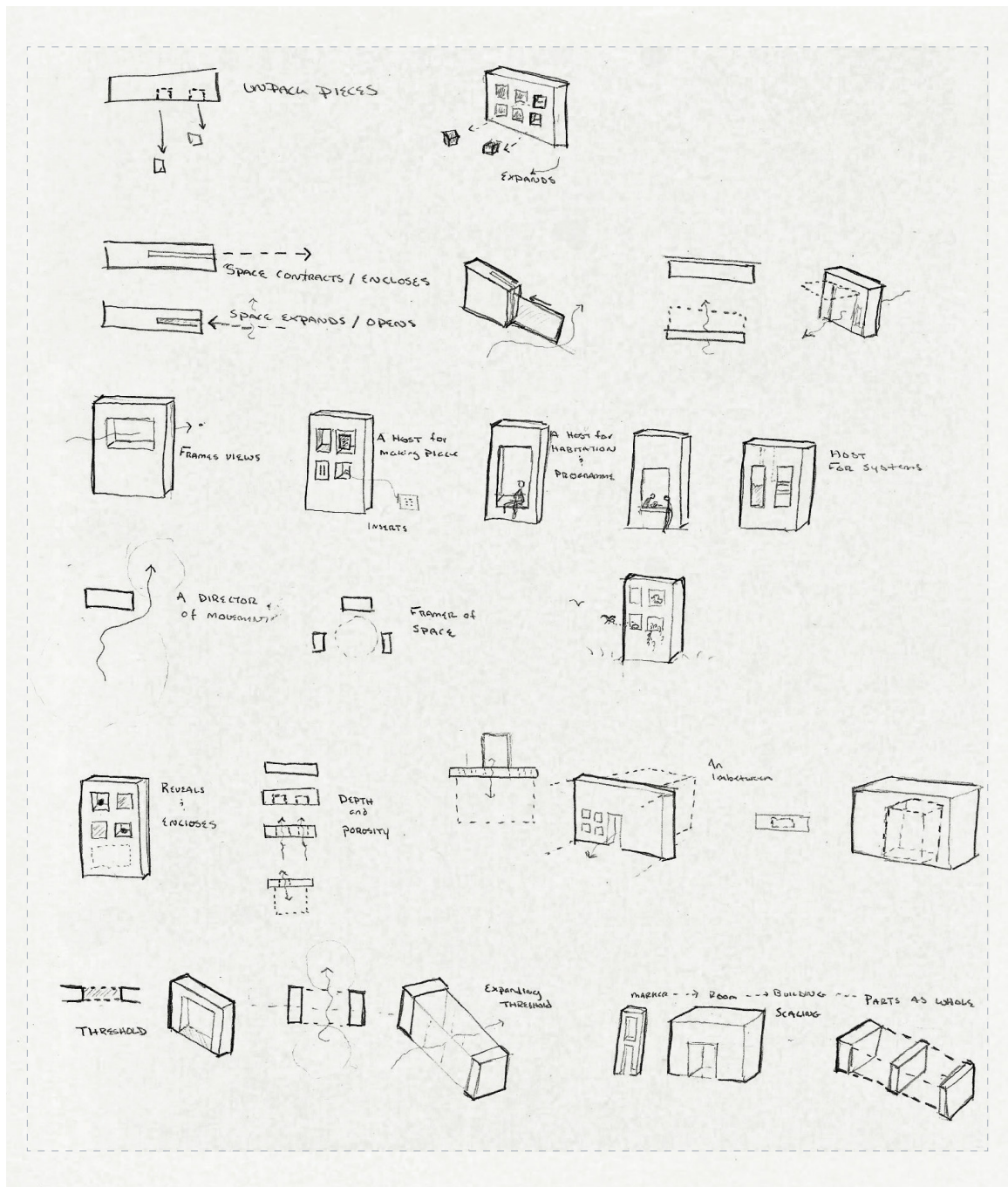
Proposed Framework

Defining Curiosity :

 "A strange or unusual object or fact"; or "A strong desire to know or learn something" (Oxford Languages, n.d.).

In looking towards the Cabinet of Curiosities an architectural framework is proposed by reinterpreting it into an architecture to support and encourage learning through curiosity and wonder. It is an architecture that, like the cabinet, forms a liminal space connecting user to the wonders of the world, inviting them to study and interact with it. In contrast to the 16th - 17th century cabinet, this reinterpretation is one that is open and connective, as opposed to being contained, compartmentalized and exclusive.

This framework creates a scaffolding for educational moments to occur, and connects architectural methodologies of situating, in-between, and phenomenology. It becomes an interactional architecture that is curated by the environment, the users, and partnerships of place. As a 'cabinet' the architecture responds by opening, enclosing, framing, expanding, contracting, and connecting. These temporal shifts create an experiential space that is inherently linked to place, highlighting its qualities, and peaking one's curiosity to know more.

Spatial Discoveries

In testing the concept of architecture as cabinet, explorations through sketching are undertaken to understand potentials of this framework hosting educational moments.

Sketchbook explorations of cabinet possibilities.

	SITUATING AND MAKING PLACE	IN-BETWEEN	PHENOMENOLOGY
3 SCALE EXAMPLES			
Ecological			Temporal Changes: wind, light, sounds, seasons, time, movement
Building			
Detail			
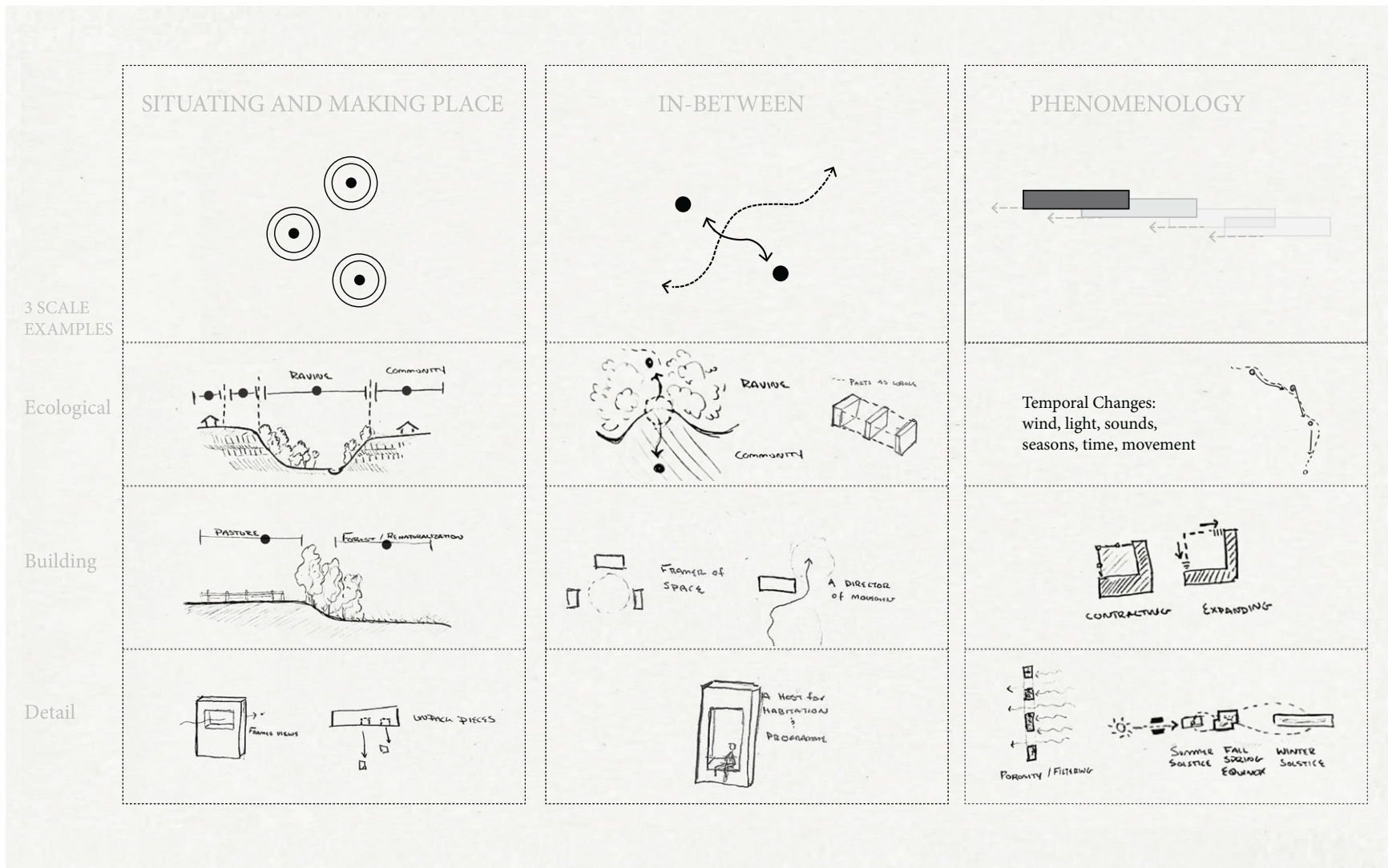
Diagramming how an architectural cabinet can embody architectural methodologies at three scales.
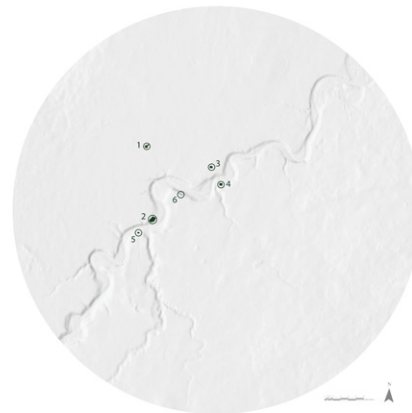
Chapter 6: Place

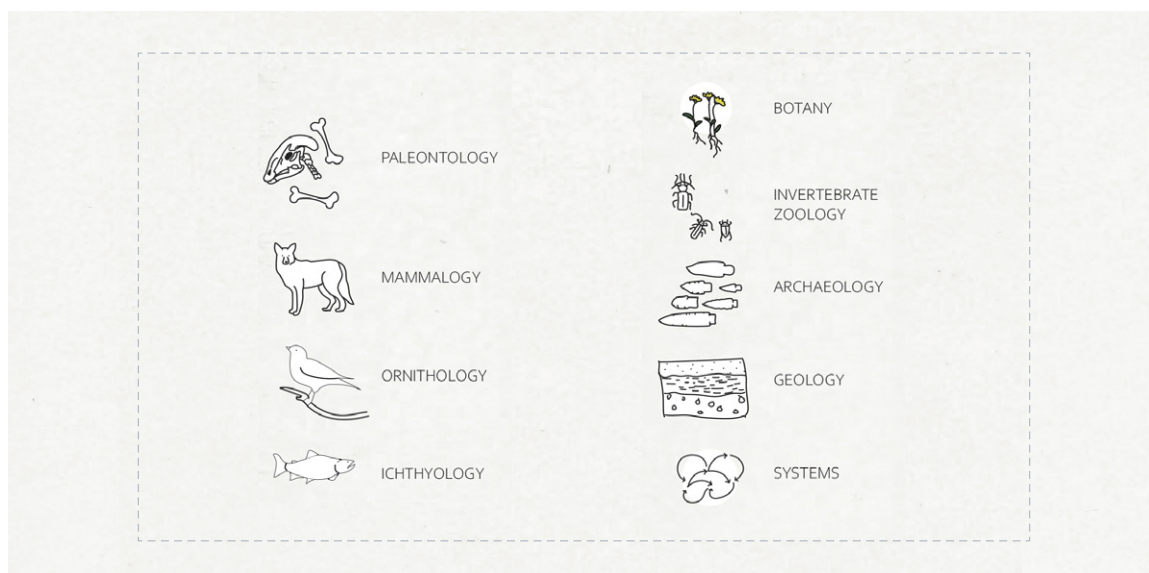## Nature Education In the City

Within Edmonton, the capital of Alberta, there are few spaces developed to enrich ecological literacy, those being the Telus Science Center, the city zoo, the Royal Alberta Museum, the Muttart Conservatory (botanicals), John Janzen Nature Center, and few interpretive trails. Additional isolated sites are the collections within the University of Alberta and the botanical gardens on the outskirts of the city. While there are various nature-based organizations and volunteer groups such as Edmonton Native Plant Group (a volunteer group that meets up to protect and restore native plant species by weeding, gardening, and promoting local fauna) and Edmonton Nature Club (who hosts educational walks, lectures and assists as citizen scientists by contributing plant and animal observations and inventories), these organizations are often independent entities with no designated place other than a website (COE 2008, 42). In a city of nearly one million people, these few natural education spaces reflect the inadequacy of environmental education within the city (COE 2020e, 142).

City footprint (Data from CEO,
Base map from ArcGIS n.d.)

Environmental Education Spaces
(Base map from ArcGIS n.d.)

PALEONTOLOGY

MAMMALOGY

ORNITHOLOGY

ICHTHYOLOGY

BOTANY

INVERTEBRATE ZOOLOGY

ARCHAEOLOGY

GEOLOGY

SYSTEMS

NATURE CENTER

TRAILS

1. Telus Science Center
2. City Zoo
3. Royal Alberta Museum
4. Muttart Conservatory
5. John Janzen Nature Center
6. University of Alberta Museum Collections
7. University of Alberta Botanical Gardens

Above: Nature education in the city collages (base map from ArcGIS, n.d.).

ZOO

MUSEUM

MUTTART

1. Telus Science Center
2. City Zoo
3. Royal Alberta Museum
4. Muttart Conservatory
5.John Janzen Nature Center
6. University of Alberta Museum Collections
7. University of Alberta Botanical Gardens

Above: Nature education in the city collages (base map from ArcGIS, n.d.).

SCIENCE CENTER

UNIVERSITY COLLECTIONS

BOTANICAL GARDENS

1. Telus Science Center
2. City Zoo
3. Royal Alberta Museum
4. Muttart Conservatory
5. John Janzen Nature Center
6. University of Alberta Museum Collections
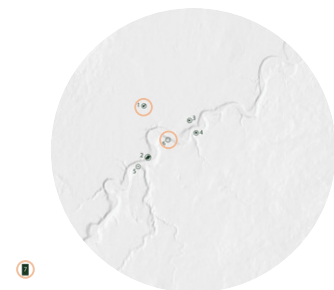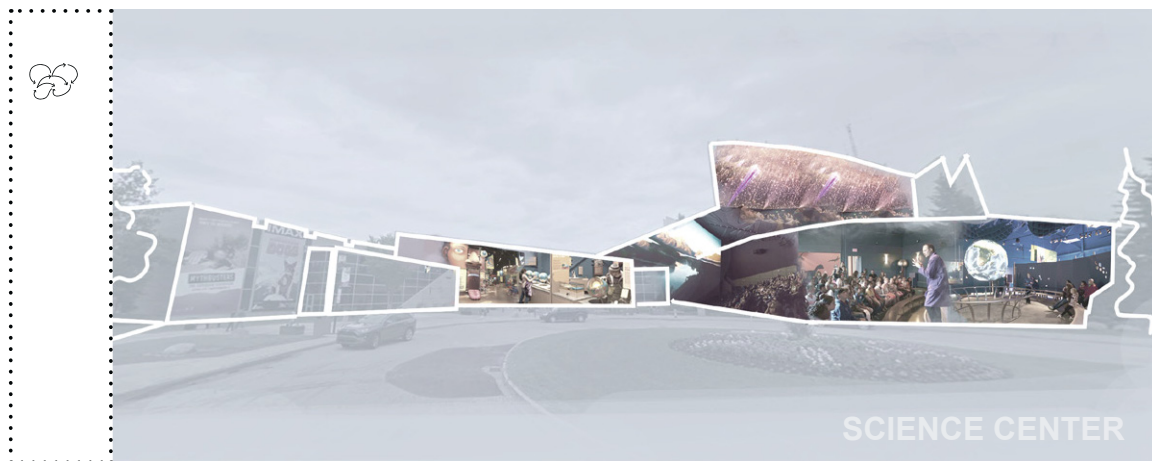7. University of Alberta Botanical Gardens

Above: Nature education in the city collages (base map from ArcGIS, n.d.).

A Site of Transitions

Edmonton is an ideal site for place-based education as the city's foundations originate from the North Saskatchewan River. Its deep valleys are home to a wide range of biodiversity and its exposed stratigraphic layers reveal history beyond the Anthropocene era; these characteristics provide abundant place-based learning opportunities and curiosities to be discovered. It is a context in which city patterns are influenced by topography and ecological systems of place, creating edge conditions between urban and natural areas that has, and continues to, influence development. These edge conditions become moments to establish or enhance connections / porosities between both urban and natural systems.

Edmonton is located within a zone of natural transition and change. Nationally, Edmonton is located within the prairie grassland ecozone. Provincially, it is categorized as within the Parkland region- a transitional zone between Alberta's northern boreal forest and the southern grasslands (COE 2008, 9-10). This situates Edmonton within an edge

Situating Edmonton within the parkland region, a site of transition between grassland and boreal forest. (base map from Google Earth n.d.)

condition, consisting of two ecozones and the condition between. These zones host wide ranges of vegetation, animals, insect species and climatic variations specific to each of the areas, as well as the overlapping conditions between. Edmonton's natural protected areas are mostly those of the boreal forest due to grasslands often being considered empty and ripe for development or used for agriculture due to its fertile soils.

River Valley System

The city's origins, growth, and histories are deeply linked to the river, the landscape, and its processes.

Edmonton's topography developed as a result of glaciation. As glacial ice covering the region melted, a short-lived glacial lake was formed (roughly 12,000 years ago) and rapidly drained establishing a foundation for the North Saskatchewan River and its tributaries to flow and etch the steep valleys that Edmonton has today (Pyszczyk 1996,

Geological histories and dinosaur fossils in Edmonton. Clipped images from Collage of Potential Place-based Educational Topics

4). The waters' erosional power has carved away layers of years and continues to erode away at its 100-million-year-old cretaceous sandstone bedrock base. While the arrival of humans is uncertain, animals were present for millions of years as evidenced by dinosaur fossils and remains of mammoths, sabretooth cats, and other animals that have been found within gravel deposits and eroded valleys in and around Edmonton (Pyszczyk 1996, 5).

Prior to the Fur trade in the late 1700's, the North Saskatchewan river valley system, and table lands were

TOPOGRAPHY   HYDROLOGY

CITY GROWTH   NATURAL AND GREEN SPACES
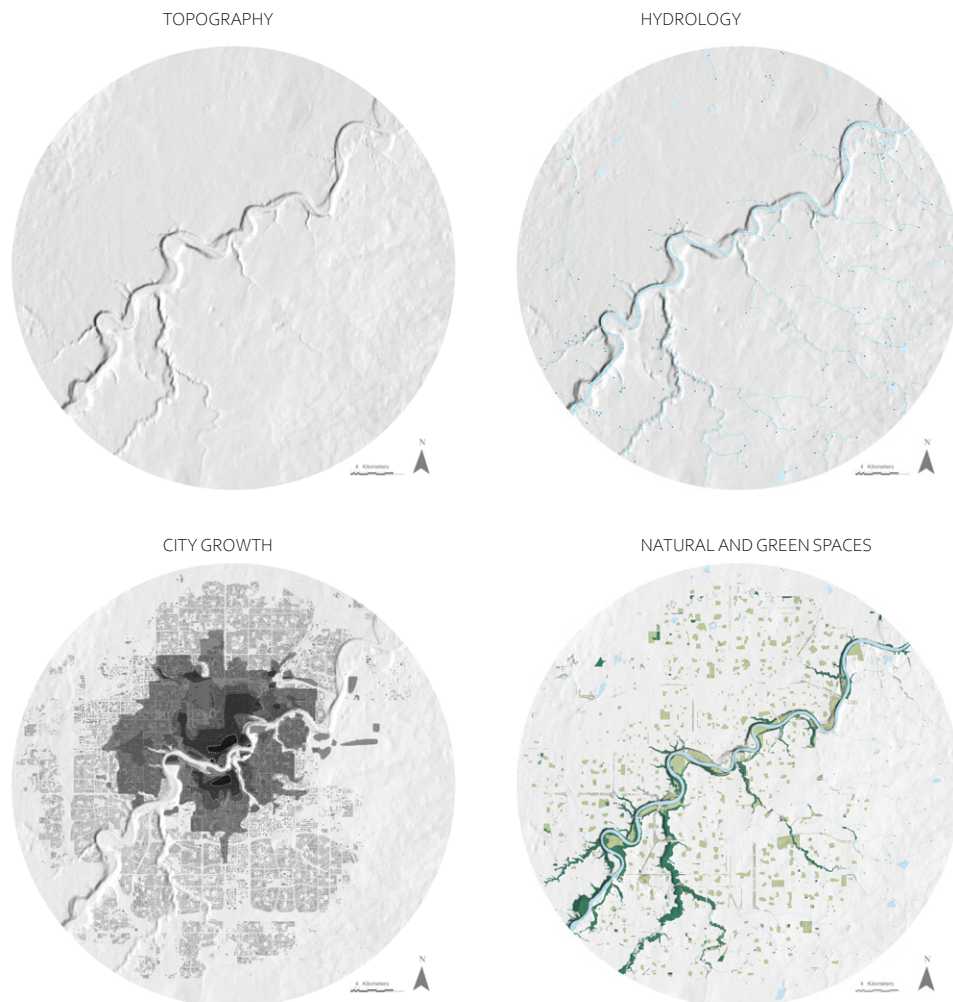
Top Left: Topography (data from ArcGIS n.d); Top Right: Hydrology (data from AEP 2018, ArcGIS n.d.); Bottom Left: City Growth (data from City of Edmonton 2019; Bottom Right: Natural Areas and Parks (data from COE 2019 and COE 1963, 407, and ArcGIS n.d)

home to indigenous people for over 6,000 years. Its tall banks and glacial moraines provided materials, as well as dry ground and view points to survey the land; while the carved out ravines and river provided essential transportation and exposed rocks for tools, as well as food and medicines (Pyszczyk 1996, 7- 9) (COE 2020c, 7).

The North Saskatchewan River enabled travel and trade to expand west in Canada leading to the establishment of a trade post upon the river flats, which came to be known as Fort Edmonton. The river and its valleys provided valuable resources that encouraged city growth and industry such as fur, coal, lumber, gravel, clay and gold (COE 2008, 17). After multiple river floods and the advancement of technology (such as cars, the rail system, and bridges) enabled one to traverse the steep valleys, settlement and industry moved
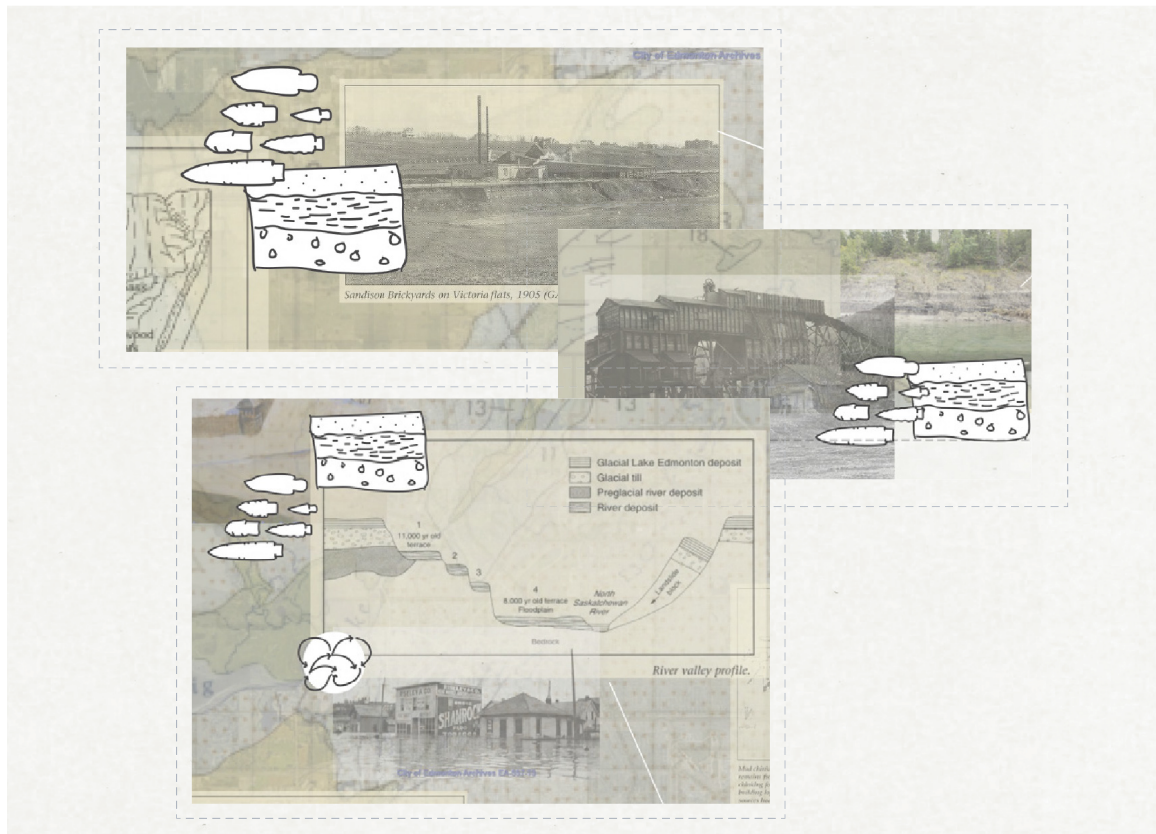
City history and industry linked to the valley system, depicting prior coal mine, brickyard and flooding. Clipped images from Collage of Potential Place-based Educational Topics.

into the table lands above and bordering the river valley and ravine system (COE 2020c, 7). In 1907, the city began, and continues today, to acquire river valley and ravine lands following the advice of landscape architect Frederick C. Todd, who proposed to preserve the river system as a recreational asset for the growing city (COE 2020c, 7).

Today the river valley system is a point of pride and enjoyment for Edmontonians. It is a protected system totalling over 7,400 hectares consisting of the North Saskatchewan River, its multiple tributaries, and ravines that the city continues to grow around (COE 2020c, 3). This system is a character defining feature of the city, whose deep ravines provide
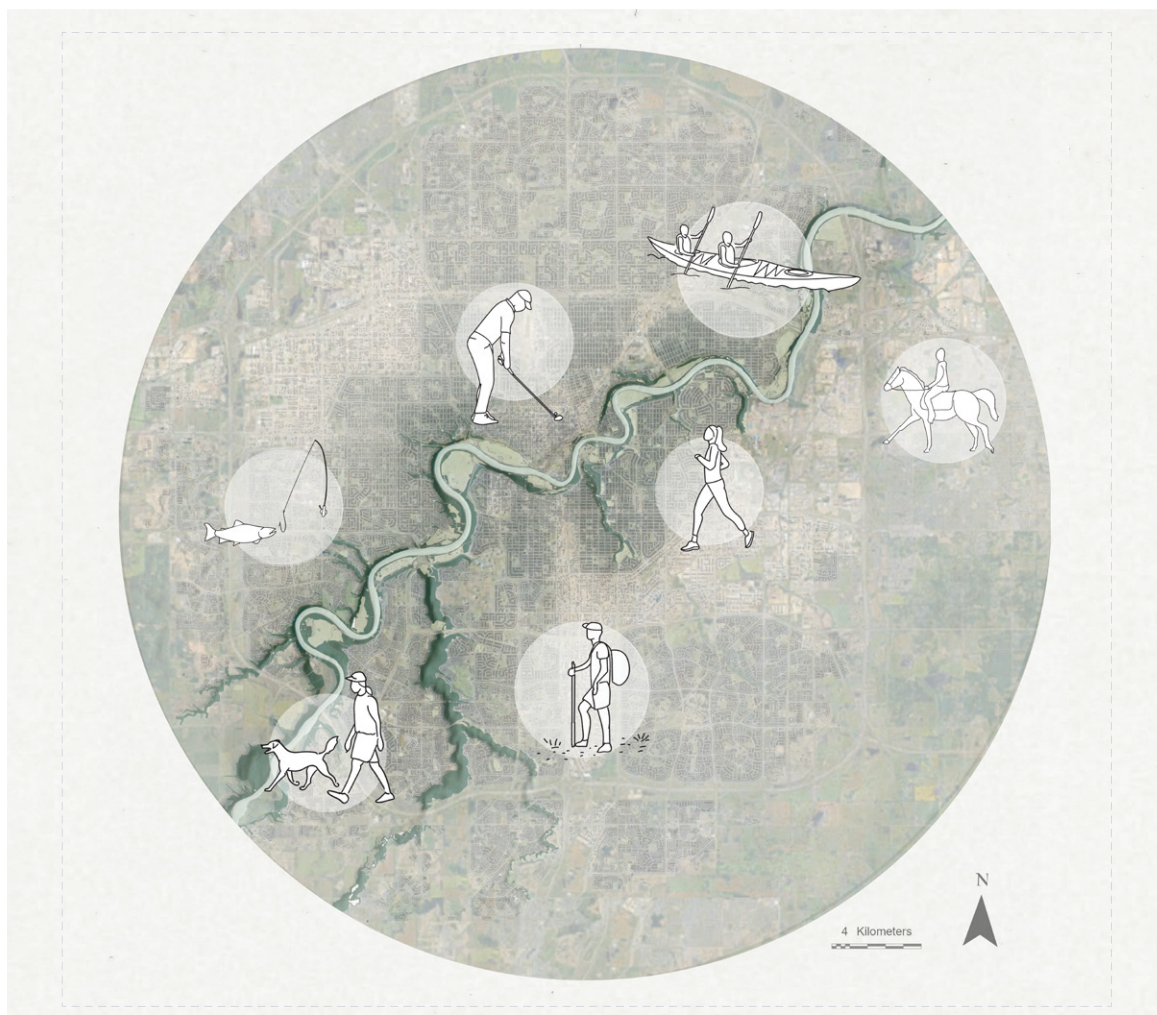
Recreation in the river valley (base map from ArcGIS and COE GIS data, n.d.)

essential ecological corridors and habitats while also providing vast interconnected recreational sites consisting of trails and parks hosting activities such as golf, horseback riding, skiing, snowshoeing, skating, biking, hiking, and boating (COE 2008, 11).

An intervention within the ravine system provides not only a vast resource of information, featuring a diversity of ecologies, geologies, and histories, but it also provides a link of education to current city values of recreation, thus reducing potential barriers to learning and change. Additional relationships can be integrated by pulling in existing entities, such as museum collections, university researchers, volunteer citizen scientists and providing a centralized space to direct individuals to organizations and opportunities for active participation.

Guide book in the creek demonstrating community involvement in environmental education (photo from @spiffythespacedog 2020).
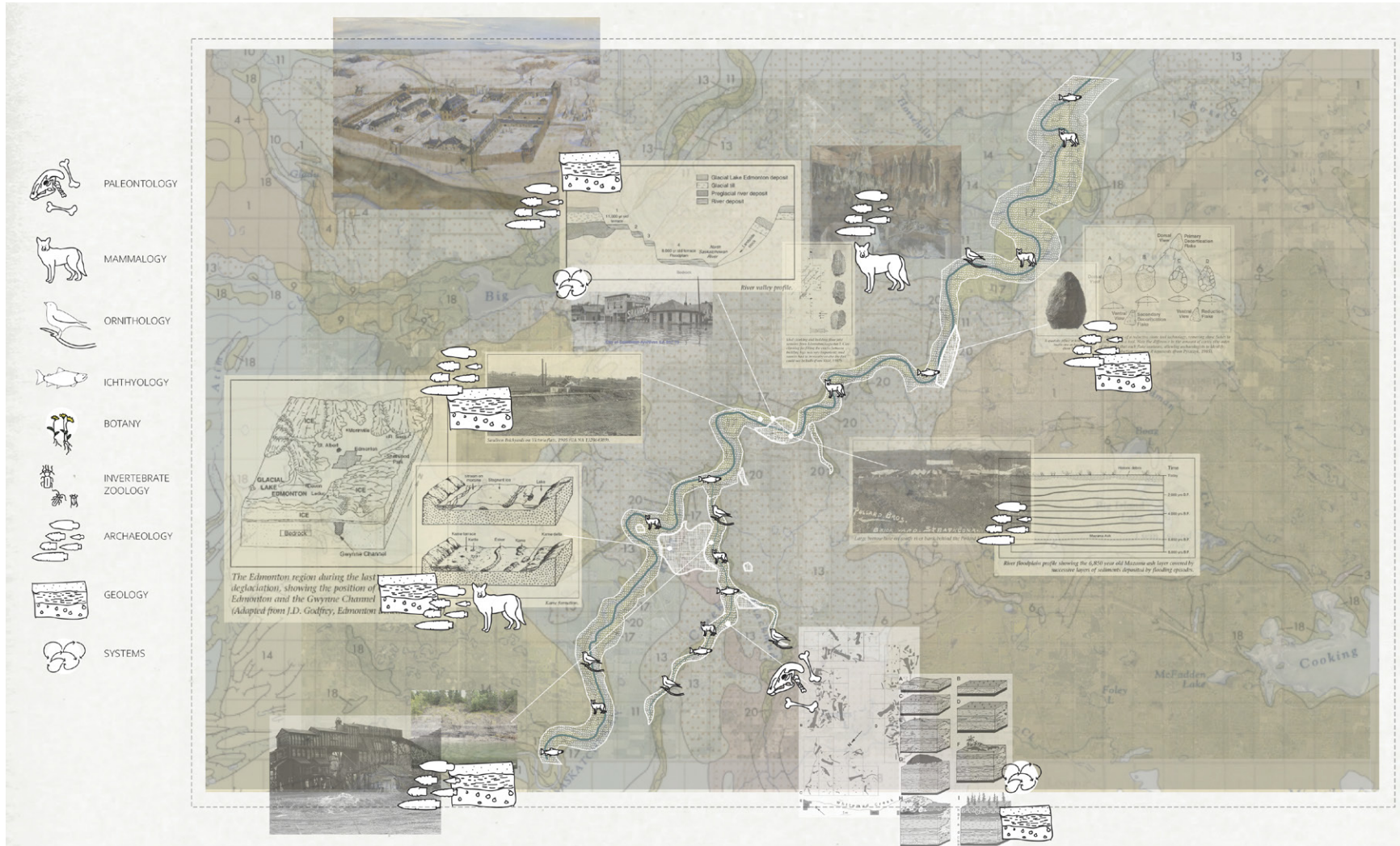
Collage of potential place-based educational topics linking land and city. (Ella Walker Painting of Fort Edmonton. Flood photograph from CEO: Flood of 1915. Fort Edmonton furs from Big Daddy Dave Blog, 2013. Edmonton's brick yards, glaciation, geological layers and archeological artifact images from Pyszczyk 1996. Dinosaur bone bed images from Bell et al. 2014. Edmonton Coal Mines from Koller 2020)

Chapter 7: Design

Test Site: Whitemud Creek

Whitemud Creek is a test ground for this thesis offering an ecologically diverse area situated within an urban context. As it is Edmonton's last creek naturally connected to the river, it provides an optimal point for learning flows of nature and the importance of connected systems. It is a place of fluctuating expansion and contraction of ecological activity and habitat. In spring and summer there is an influx of activity through migration of animals, such as birds and fish, growth of plants, and an increase of people outdoors. While in winter there is a slowing and quieting of activity as the creek freezes and the snow blankets. This site also provides ample opportunity for linking to existing programs within the ravine and to adjoining communities above.
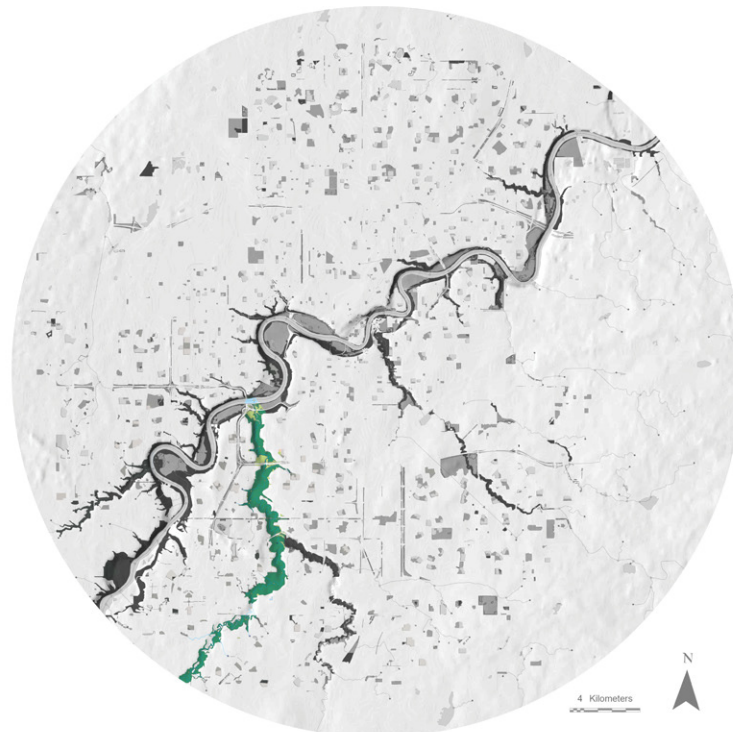
Whitemud Creek location within the city highlighted in green (base map from ArcGIS and COE 2020a)

Whitemud Creek temporal mapping in relation to the seasons depicting an expansion and contraction of activities.
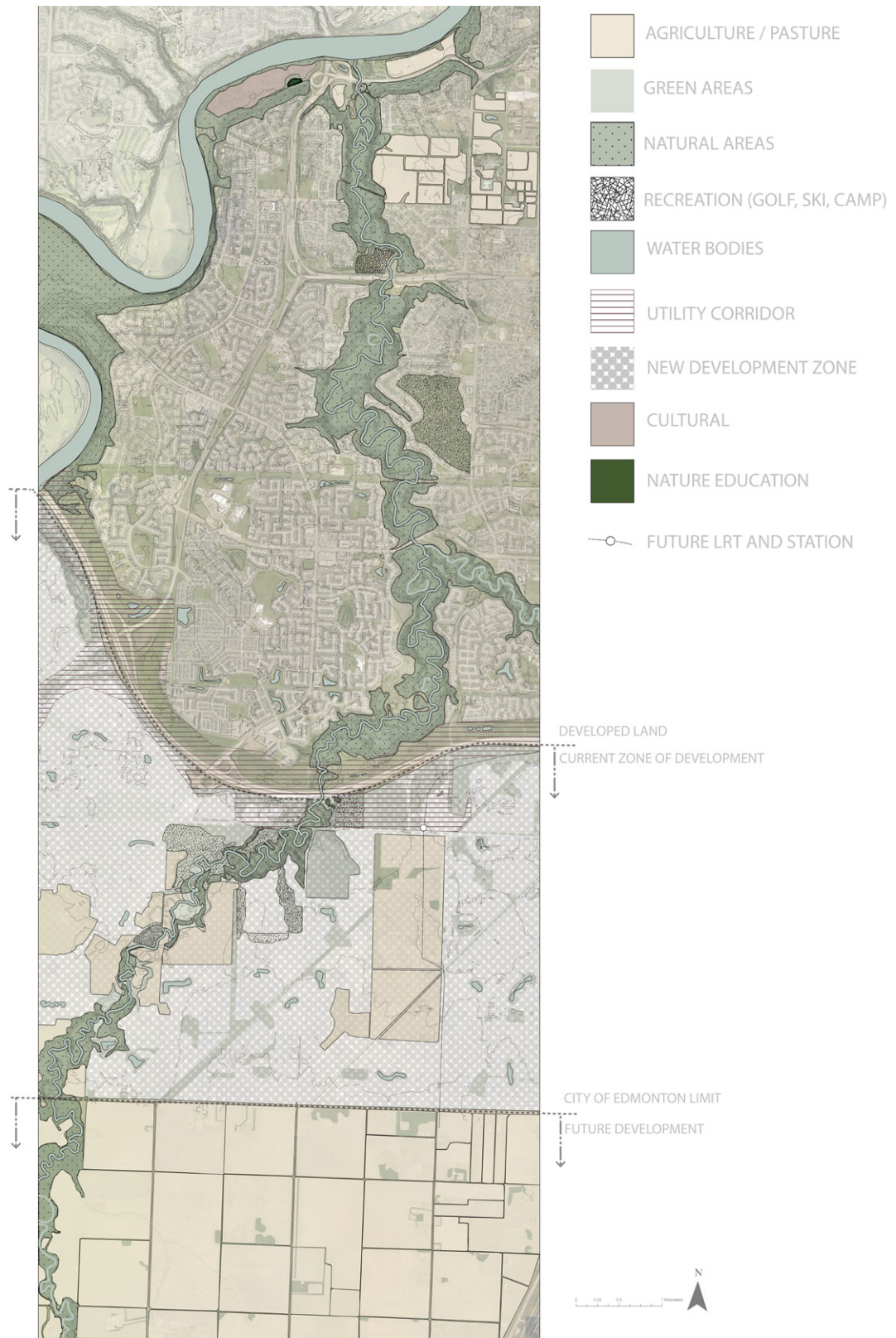
Overview mapping of Whitemud Creek, studying city growth and development patterns along the creek (data from CEO 2020a and base map from ArcGIS).

Site Analysis

In developing an approach to how a design might integrate within the creek, mapping exercises were performed. A layering of topography, programs, trails, entry points, and ecological features of pinch points, landslides, restoration potentials and ecologies reveal patterns of place, including relationships and dynamic edge conditions that currently exist, as well as potential relationships that can be established or reinforced.

The topography of the creek is the underlying structure of the city pattern. In the table lands above there are primarily residential communities, while the ravines below are primarily natural areas with little development. Due to erosional forces of the creek, landslides pose risk to those who have built too close to the edge (which has and continues to result in houses and even roads falling victim throughout the city). This has led to a greening of the edges with small parks bordering housing lots and the ravine. These green edges provide public green spaces with entry points to the creek and a buffer reducing pressure on unstable slopes. Cultural and recreational programs are situated within the creek such as a ski slope, Alfred H. Savage Center (a community space for gatherings such as weddings or meetings and washrooms for park users), Kihciy Askiy (Sacred Earth) a future indigenous cultural site, Fort Edmonton Museum, city horse pasture, and the John Janzen Nature Center (with a child focused educational program). These areas are situated to the North side of the creek while the south is primarily a natural ecological corridor. Trails wind through the creek and are less developed to the south, strategically shifting to the table lands avoiding ecological pinch points. The creek has largely returned from its modified agricultural/
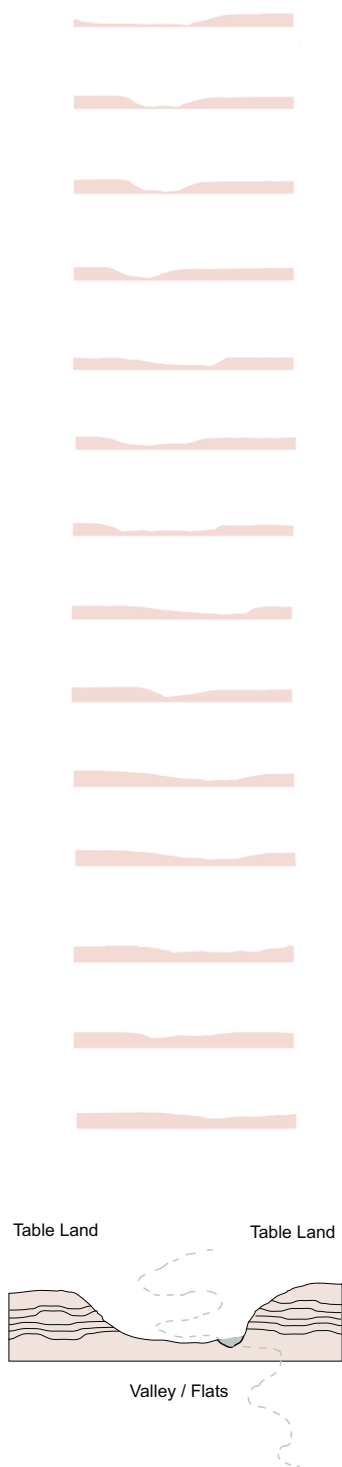
Sections of Whitemud Creek (from north-top to south-bottom) showing table lands and valley (created with Google Earth n.d. data)

Whitemud Creek Site Analysis. Studying patterns of the city and the relationships between topography, ravine, development and ecologies. Communities and development are situated primarily above and bordering ravine. (Satellite base photos from ArcGIS, data from COE 2018)
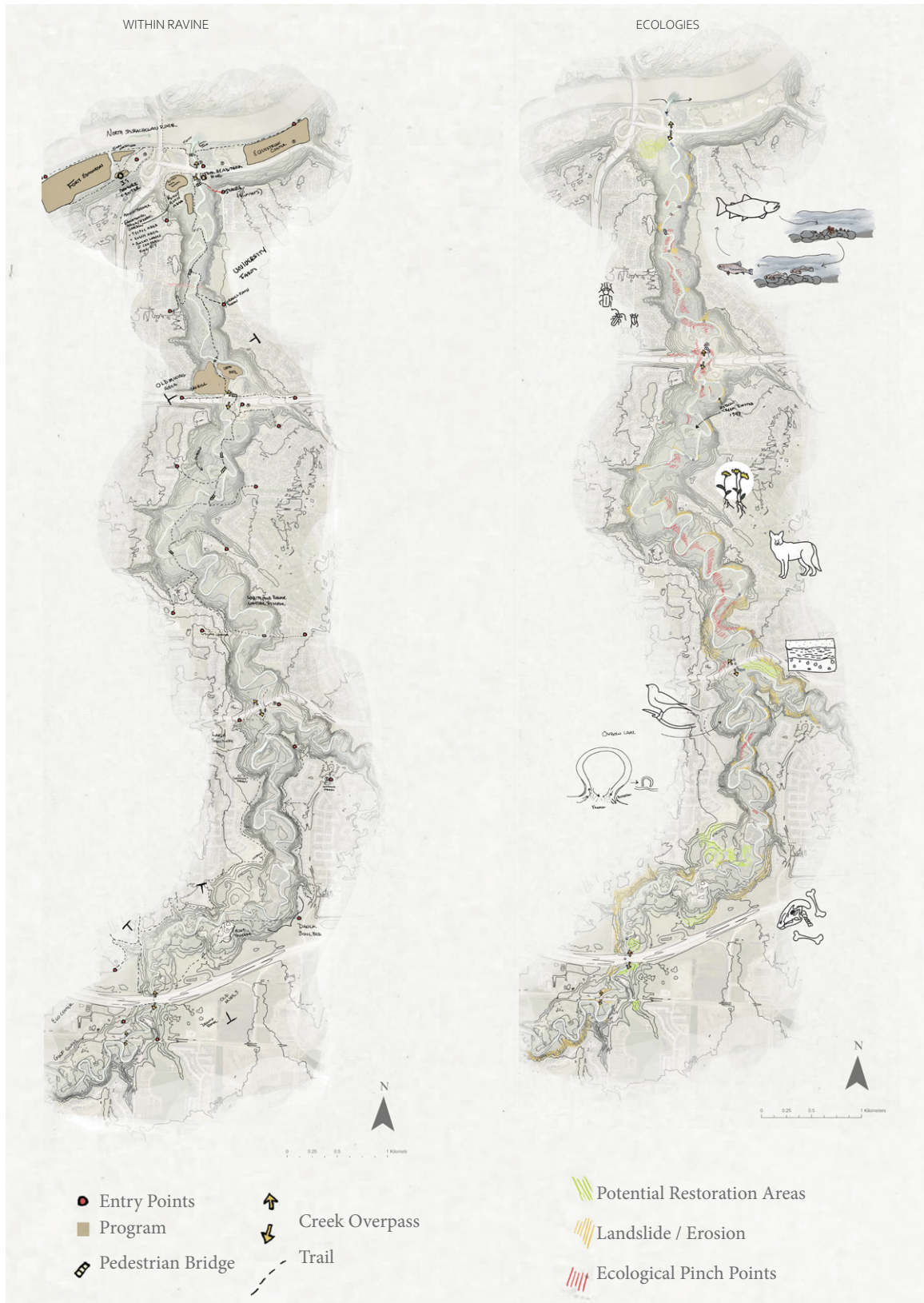
WITHIN RAVINE

ECOLOGIES

N

N

● Entry Points

■ Program

▱ Pedestrian Bridge

⬆ Creek Overpass

-- Trail

⫽ Potential Restoration Areas

⫽ Landslide / Erosion

⫽ Ecological Pinch Points

Whitemud Creek Site Analysis. Studying patterns of the city and the relationships between topography, ravine, development and ecologies. Ravine hosts protected ecologies, trails and few recreational / cultural programs.(Satellite base photos from ArcGIS, data from COE 2018)

industrial state of the mid 20th century, though some areas still require habitat restoration. Examples of areas identified were the southernmost highway, previously modified for coal mining, and the northern end of the creek that is modified land from a prior farm, primarily consisting of non-native plant species and is currently used as pasture land for city horses.

Prototype Network

Informed by Whitemud Creek mapping studies that reveal the patterns of place, where urban is separated from natural and table land from ravine, a prototype network is proposed. This network creates a system of paths, flows, and porosities between community and nature. This network integrates markers, a nature resource center and restoration landscapes. These interventions are intended to act as a starting point or precedent that can be applied at a city-wide scale integrating nature and community. Main centers can be distributed in more centralized areas acting as a knot or binding point that supports and provides more
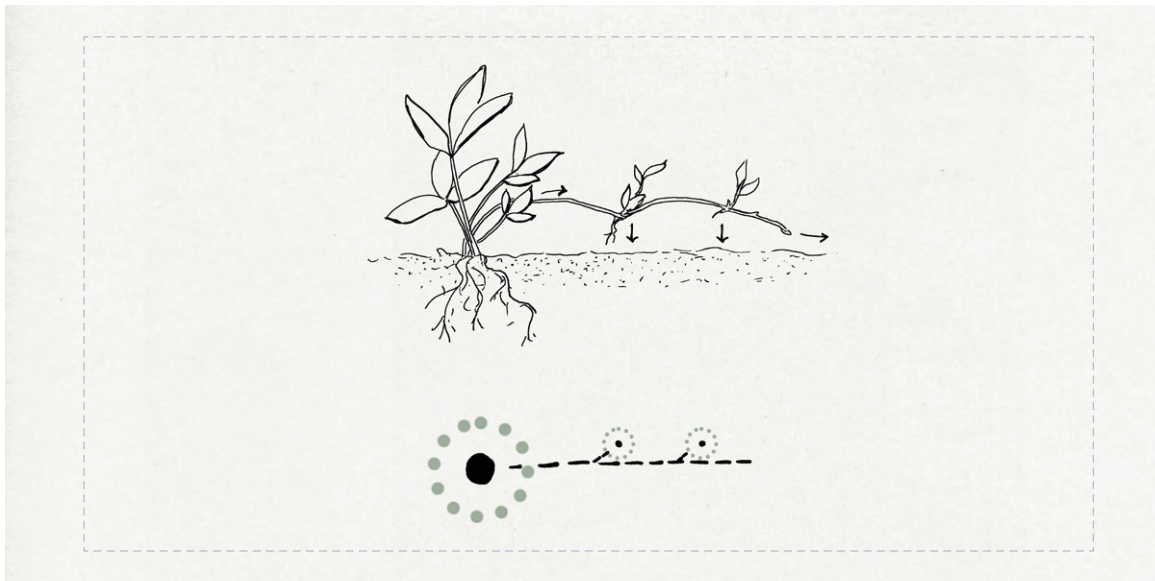
Conceptual diagram of the network represented by plant growth and spread, where a parent plant (main center) extends and supports to new growth (markers and pavilions).

extensive resources for the smaller points. Markers are added at edge conditions between ravine and community, creating destination points for recreational activities, and potentials for participation through their curation. Finally, participatory restoration / re-naturalized landscapes spread and percolate through the city diversifying modified edges of the creek and habitats exterior of the protected creek. These extending naturalized landscapes offer opportunities for more trails and markers to be integrated and for community involvement in the growth and restoration of essential habitats. By involving the community in re-naturalization, it forges personal attachment to the landscape and its processes.

Network Diagrams identifying potential locations.

Markers

Within the network, curiosity markers are integrated at edge conditions between community and ravine (and in future restoration landscapes). They become a place that invites the community to learn, investigate and connect to the creek. These small locally intimate educational moments create a destination point for locals to attend on more frequent outings, and for those exploring the trails. Markers offer opportunity for schools and community members to take part in research and curation of their temporary displays. These markers provide authentic place-based resources for classes, in which curriculums can be linked to both the curation and the visitation of markers (similar to the region wide treasure hunt example in Chapter 4). The architecture of the marker is scaled to their specific site. At small thresholds they are smaller display posts to not disturb the environment around it. In more expansive areas, markers become pavilions capable of hosting small programs such as seating for bird watching and sketching, or planting benches for a community garden.

Schematic image for marker located at edge condition between community and ravine.

POTENTIAL SITE 1 (HIGHWAY BREAK)

POTENTIAL SITE 2 (HIGHWAY BREAK)

UTILITY CORRIDOR (GREEN BREAK)

POTENTIAL SITE 3 (ROAD BREAK)

POTENTIAL SITE 4 (HIGHWAY BREAK)

TRAIL IN VALLEY

TRAIL ABOVE VALLEY

PROGRAM IN VALLEY

DIVISION IN VALLEY

POTENTIAL SITE

POTENTIAL TRAIL IN VALLE
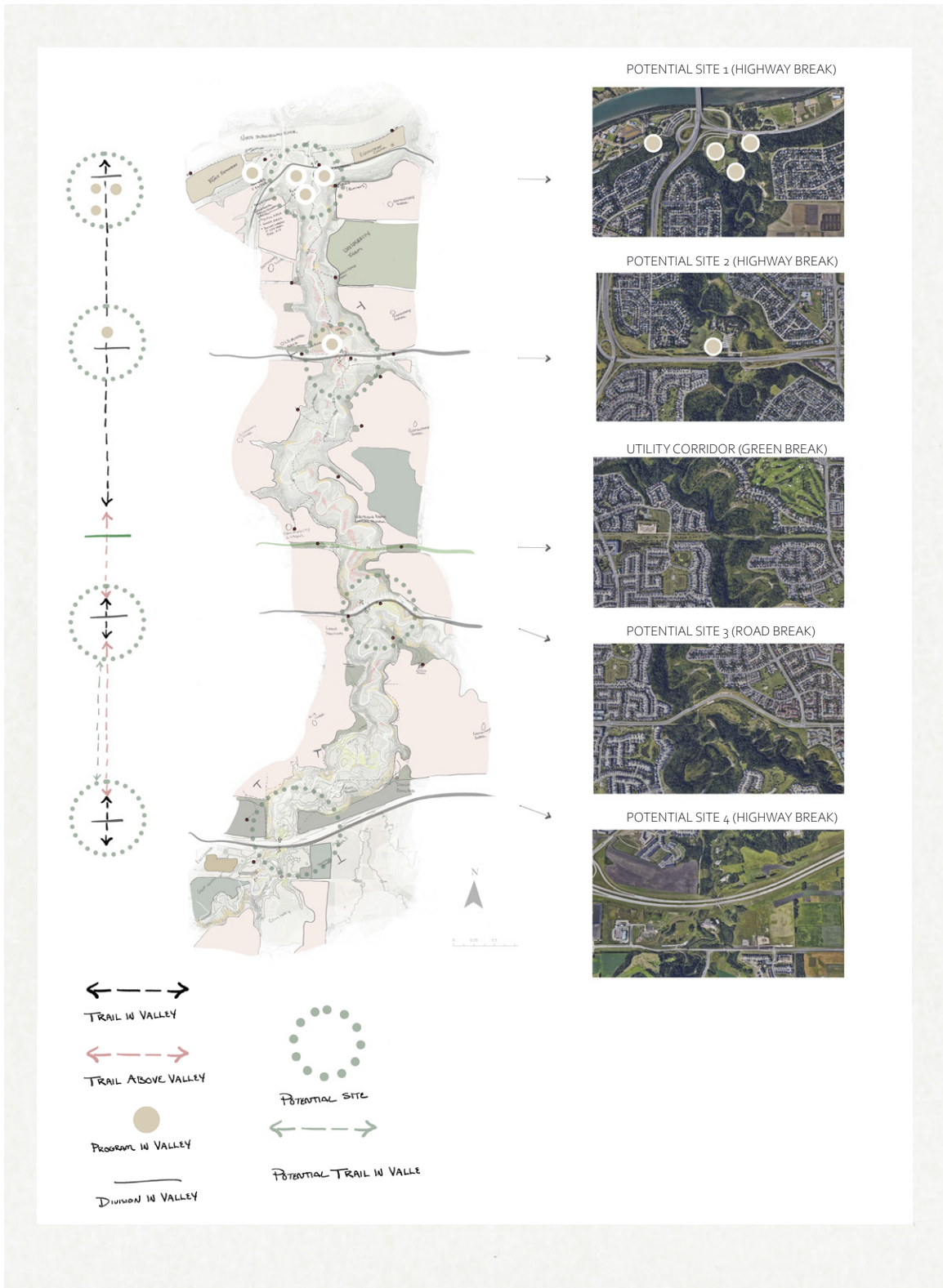
Whitemud Creek analysis utilizing layered mapping and diagraming of break points in the creek. Site 1 is chosen as the Nature Resource Center's location due to the centralized position, trails, potential linkages to other programs on site and communities above. (Satellite base photos from Google Earth 2017, data obtained from COE 2018)

Key plans locating
Resource Center's site
within the city (top) and
within the creek (bottom).

Nature Resource Center

The Nature Resource Center, located within the creek, provides an educational and participatory resource base for the network with direct linkages to the ecologies of the creek. The Center acts as a support for the curation and creation of markers, while providing communities more extensive opportunities to learn about nature, and how to take part in protecting and expanding local ecologies.

Locating

In siting the Resource Center, break points within the creek were highlighted as necessary for access without creating further disturbance or fragmentation of the creek. By distilling the break points down into simplified components of trails, entry points and programs, four potential sites were highlighted. The northern most site was chosen as it provided the most centralized location near the confluence with the river, a greater connection to other trails in the river system, vehicular access, and the highest potential of hybridity to link with existing and future programs. By integrating into the trail system existing values of recreation can be supported while also drawing attention to and highlighting other possibilities/ opportunities such as participation through citizen science.

Establishing Relationships

Acting as an in-between, the Resource Center connects and expands existing features of the site. It integrates and creates connectivity of the city wide trail system to communities above; it supports and expands upon the existing nature center for children by providing outreach for young adults and beyond; it works with the Alfred Savage community event space to provide more diverse community programs while utilizing their parking facilities and event

Experiential site studies situating Nature Resource Center.
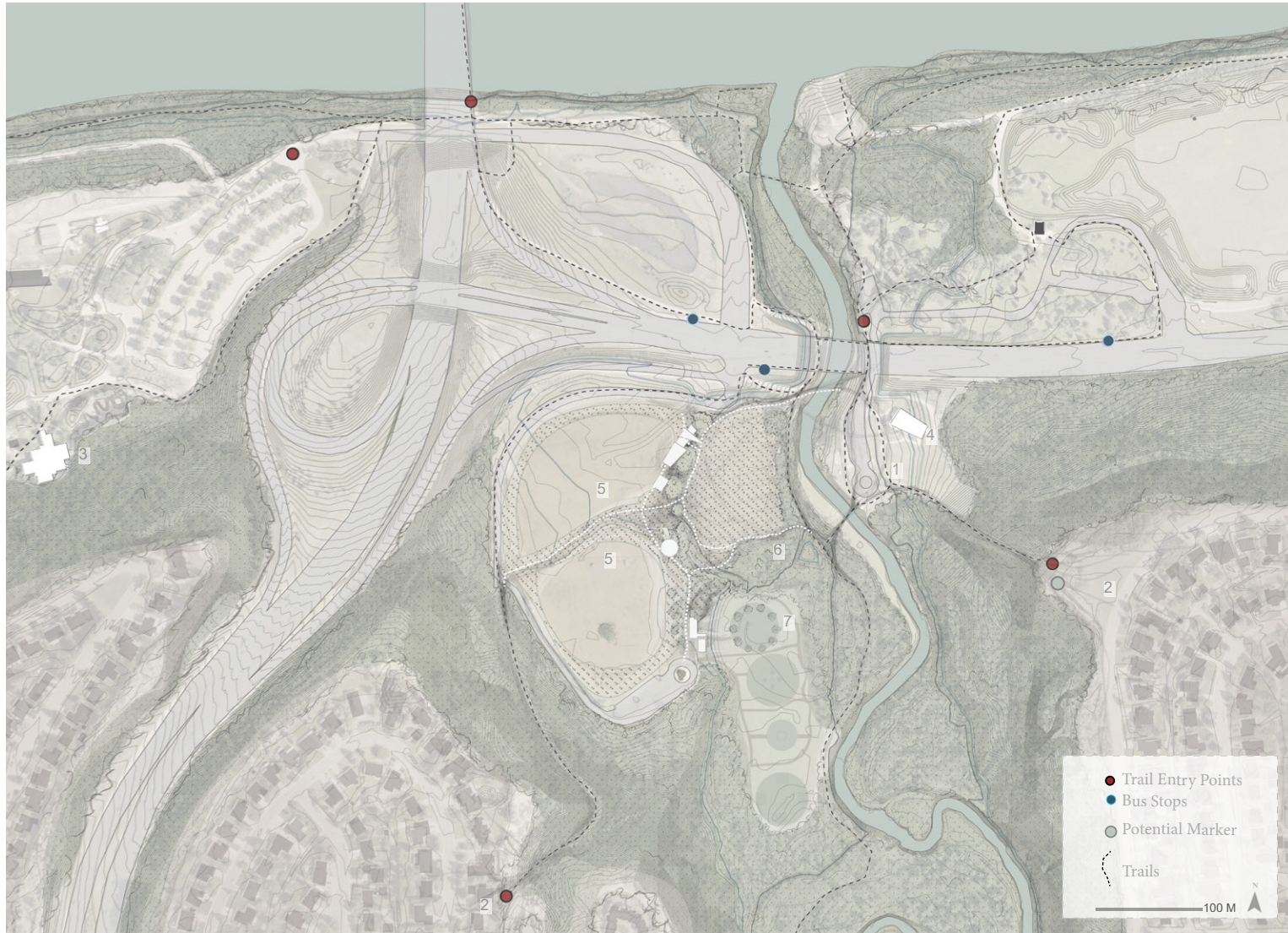
1. Recreational Area + Trail Head

2. Communities

3. John Janzen Nature Center

4. Community Event Space + Parking

5. Horse Pasture

6. Ravine Ecologies

7. Future Sacred Earth Site

● Trail Entry Points
● Bus Stops
○ Potential Marker
╌ ╌ Trails

100 M

Site Plan of the Nature Resource Center

space for larger classes and lectures; and it integrates the future Sacred Earth Indigenous cultural site by reconfiguring the proposed building programs to connect and create learning opportunities while also generating privacy.

The Sacred Earth support buildings are reconfigured to generate in-betweens and paths while providing privacy during cultural events. Its buildings act as threshold between ceremonial areas, pasture and trail. Using forms that shift into landscape, a soft natural edge is created through a built up hill and a continuation of the re-naturalized landscape over it. As a planted hill, it shelters the site from prevailing NW winds and trail users. The hill creates a feature for open programing such as an amphitheater for lessons and performances, or a space for children to roll down and play while parents gather within meeting areas.

1. Change Rooms and Washrooms
2. Wood Storage
3. Tipi Storage
4. Interior Gathering Space
5. Landscaping Storage and Washroom
6. Hill / Amphitheater

Gathering Areas

Top: Key plan of Sacred Earth support buildings. Bottom: Sacred Earth support buildings generating path, in-betweens and framed gathering areas.

Top: Site wind study
Bottom: Site solar study

Trail Head

Pasture Land

Re-naturalization

New Paths

Nature Resource Center:
1. Resource Building
2. Workshop
3. Gallery
4. Sacred Earth Support Buildings
5. Re-naturalized Landscape and Path

PASTURE   FOREST / RENATURALIZATION

50 M
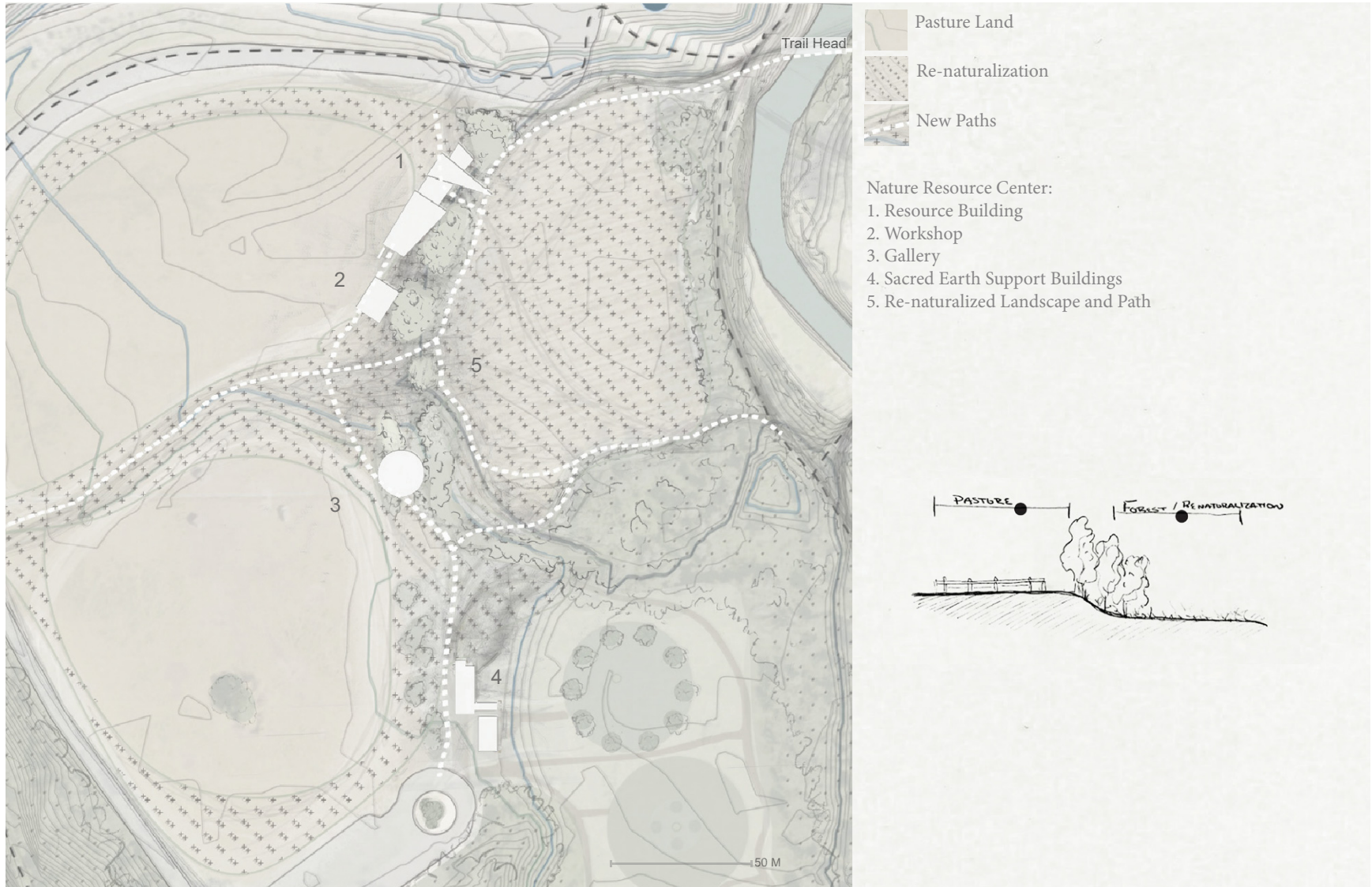
Nature Resource Center Site Plan.

Clips from Experiential Collage, showing material exploration influencing architectural material palette. (Photo of Whitemud Creek's Tufa Spring (@ joeiscranky 2020; Photo Looking down stairs, @ cityofedmonton 2019)

Situating

Situated between horse pasture and re-naturalized landscape, upon an elevated ridge above the flood plain, the center becomes an in-between. It is an extension of the trail and landscape, with forms based on creating flows and paths while responding to and informing of place. Sectionally, like the valley slopes, it is a stratified layering of elements with its corten roof, clerestory windows, thick cabinet walls and aggregate base. The Resource Center is an architectural frame that is responsive to place by highlighting the creek's qualities, and responding to its temporalities. The building's material relationships situate it within the ravine and time, while its flexible walls, screens, and framed spaces engage the landscape and accommodate fluctuating seasons and activities.

 In developing a relationship, the Nature Resource Center's material palette situates it in both place and time by integrating the architecture into its natural context. Utilizing wood siding that greys and ages, and corten steel whose rust patina shifts its materials begin to reflect time and reveal interactions with the elements of place. This palette is derived from features within the creek, as existing built elements of foot bridges and stairs are of wood construction and steel elements are often painted a rusty red. Additionally, a tufa spring found nearby oxidizes into a bright rusty stream that is especially evident during winter. The Center's wood siding and built-up timber columns intentionally recede into the trees, while the red/ brown corten compliments the natural colours of place: the browns of the trail in early spring; greens of summer; a backdrop to the oranges and yellows of the fall; and provides a subtle pop of colour in contrast to the snow in winter.

An aggregate concrete flooring echoes the heterogeneous surface of the valley. It is layered with curiosities of place using impressions from elements, such as textured bark or fossils, and an embedding of small elements, such as fragments from trees or pieces of brick from past valley brickyards. This surface is intended to act as a continuation of the valley ground, transitioning between building and trail, where wandering leaves, gravel and dirt blend with the diversely patterned ground. These layered curiosities become more evident in large aggregate extrusions that invite the user to interact closely with its material texture and embedded elements; to explore with their eyes, touch, or even make sketchbook rubbings from. These material choices are informed by place and enable the building to integrate within the landscape while simultaneously highlighting its features and offering experiential qualities to interact with.
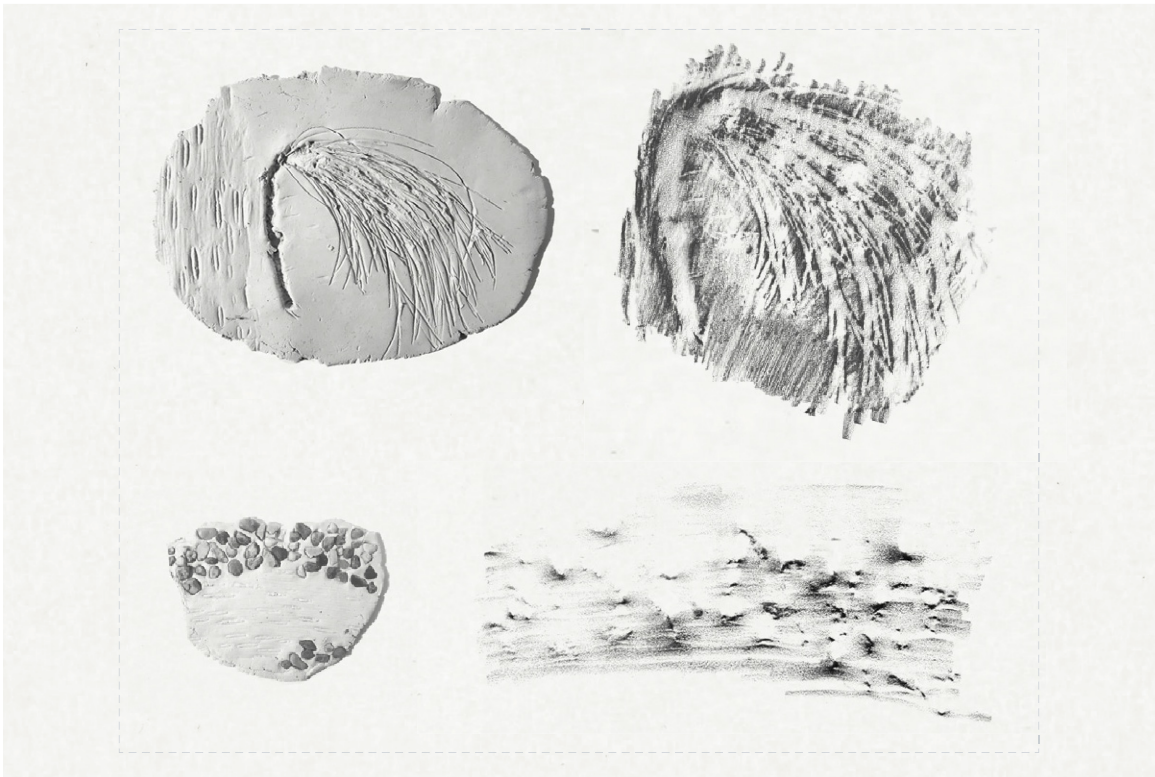
Aggregate studies: creating impressions from trees, embedding of rocks and sketchbook rubbings of textures.

Expansion and contraction of seasons, clip from Whitemud Creek Temporal Map.

The Architectural Frame

Upon approach from the trail head, the resource center peeks out from the trees with an extended roof and column acting as a marker inviting one towards the building. It is a sundial of the seasons, a marker highlighting the time in which we are situated. Daily at noon, the column frames a band of light upon or between concrete aggregate extrusions corresponding to spring and fall equinoxes, and summer and winter solstices. This framed light directs attention to moments within each season, with surrounding plantings and embedded information hinting at ecological events such as those outlined in the Whitemud Creek Temporal Map.

Like the seasonal activity within the creek, the building expands and contracts. In summer, spring and fall it accommodates an increase of activities by enabling program to spill out to in-between spaces. While in winter it is a quiet, contemplative and enclosed space.

Column Summer Solstice Spring/ Fall Equinox Winter Solstice

Perspective of approach from north trail and view of sundial marker. Diagram of sundial marker showing the sun's path throughout the year in relation to aggregate extrusions.

10 M

Winter contraction of Resource Center depicting enclosed spaces.

10 M

Summer expansion of Resource Center depicting interior opening and activating outdoor spaces.

10 M

Overview plan of Resource Center.
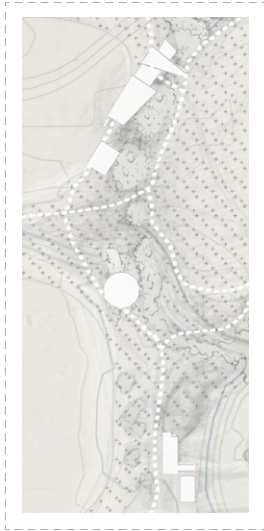
The resource center features a variety of spaces offering differing supports, such as a resource room for close studies, outdoor breakout spaces, guidance area, communal staff room (enabling an exchange of ideas between different disciplines), and a workshop. These parts work together to generate a learning environment that facilitate moments within the experiential learning cycle -spaces to reflect, to research, to experience and to connect with opportunities for participation. The architecture connects parts as a whole and inside to out by utilizing paths, thick cabinet walls, roofs, floors, and site lines that extend beyond individual spaces to create extensions of one space into another and activating interstitial spaces within and between these elements.

1. STAFF ROOM
2. GUIDANCE AREA
3. OUTDOOR WORK SPACE
4. RESOURCE ROOM
5. LIBRARY

5 M

Top: Key plan. Bottom: Plan showing in-betweens created by roofs, floors and thick walls that extend and frame spaces.

Resource Space

An interior resource space displays local specimens, fossils and archaeological finds in partnership with the University of Alberta Museum collections. The resource center draws the university in as curators of temporary installations, promoting their collections while also making them more accessible for study. Hosted by a research guide, this area is a collective learning space where specimens are brought out to you to interact with, draw and journal. It is a space facilitating careful self-directed observation and is supplemented by a quietly offset library area.

3. OUTDOOR WORK SPACE
4. RESOURCE ROOM
5. LIBRARY
6. OUTDOOR GATHERING

5 M
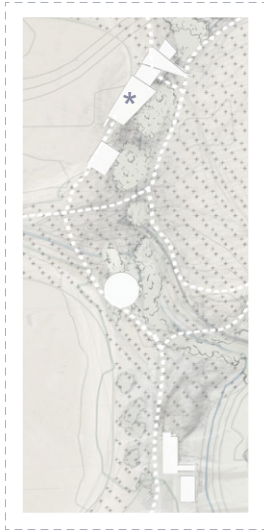
Top: Key plan locating interior resource spaces. Bottom: Plan showing interior resources spaces of the Resource Center.
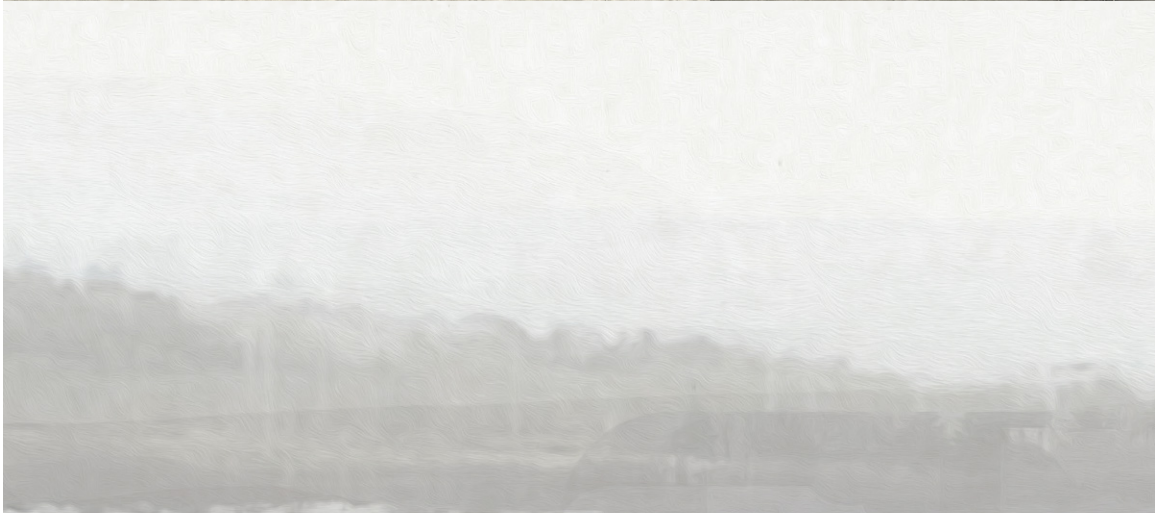
Top: Interior perspective of resource space in winter
Bottom: Section through library, resource space, outdoor workspace and guidance area.
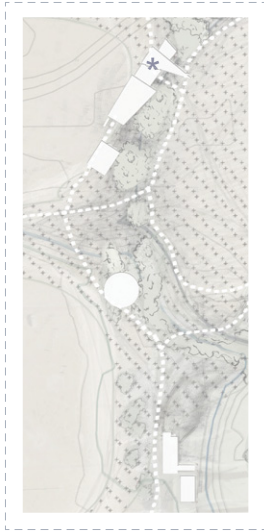
In summer, outdoor spaces offer open programing with large aggregate stones and stairway seating to facilitate diverse interactions for individuals to lay out their finds from the ravine to study, sit, lounge, or provide a breakout space for classes and citizen science volunteers. A guidance area, hosting support staff, such as researchers, workshop artist, cultural guide, and a volunteer outreach advisor becomes a space welcoming interaction as its accordion glass walls discreetly tuck away into thick cabinet walls.

1. STAFF ROOM
2. GUIDANCE AREA
3. OUTDOOR WORK SPACE
4. RESOURCE ROOM

5 M

Top: Key plan locating outdoor work space. Bottom: Plan showing outdoor work spaces between guidance area and resource room. Guidance area's curtain walls are shown folded away into cabinet wall.

Top: Exterior perspective of outdoor workspace in summer.
Bottom: Section through resource space, outdoor workspace, guidance area and staff room.

Outdoor Gathering

In fall, the outdoor gathering area framed and sheltered by the workshop, resource area and trees offers a space to reflect and discuss discoveries. It is a landscape of aggregate concrete stones centered around a fireplace to generate discussion, spontaneous interactions and a sense of community. In winter this space provides a sheltered outdoor area for nature classes that strive to keep learning outside but can take shelter in the adjacent workshop if necessary.

5. LIBRARY
6. OUTDOOR GATHERING
7. WORKSHOP

5 M

Top: Key plan locating outdoor gathering area. Bottom: Plan showing outdoor gathering space and workshop.

Top: Section through workshop, outdoor gathering area, and library in fall.
Bottom: Section through workshop, outdoor gathering area, and library in winter.

The Workshop

The workshop is a space for classes and community groups. It is capable of hosting planting workshops and events for the re-naturalized landscape, or activities such as drawing, painting and other methods of creating. It is a space for experiential activities that gear the mind towards more sustained involvement, observation and study; whose process and products can also generate discussion. The workshop is also a support space for the curation of markers, as the resource center is intended to be a facilitator assisting classes in their studies, creations and curations.

5. LIBRARY
6. OUTDOOR GATHERING
7. WORKSHOP
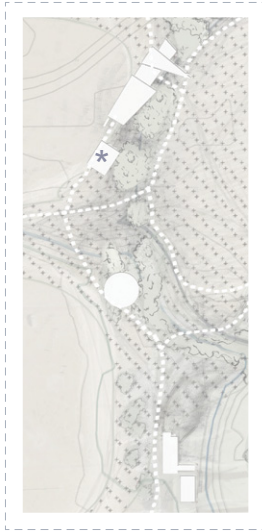
Top: Key plan locating workshop. Bottom: Plan showing outdoor gathering space and workshop.

Inhabited plan showing workshop with flexible accordion curtain walls and shifting screens that enable workshop to transition into a continuous extension of the landscape and path. Image depicts examples of activated outdoor spaces hosting art classes and areas to sit, study, etc.

In spring, the workshop becomes a continuous extension of the land by opening its walls towards uninterrupted views of the newly re-naturalized landscape and path winding between pasture lands. Exterior sliding screen walls provide a filtering effect, enabling elements of place to gently flow in such as wind, the smell of the rain and sounds of the ravine.

The spaces of the resource center become lively and activated by shifting temporalities of place that we are often removed from. It embraces sensual experiences of sound, smell, feeling, sustained observation and direct interaction with elements of place to generate wonder, insight and relationships.

Top: Key plan showing location of perspective. Bottom: Perspective looking towards workshop from the path between pastures.

Chapter 8: Conclusion

This thesis takes an ecological and integrative approach towards architecture, one that encourages and provides flexible spaces and programming for education and environmental learning. It uses architecture as a frame to connect and set relationships between inhabitant and environment. In this way, the building becomes a cabinet facilitating educational moments and encounters, and a marker revealing and tracing changes through time. As a cabinet, architecture acts as a frame at both the scale of artefact and the scale of the user with its structure influencing how individuals interact with its contents and view the world. It is an In-between that establishes fluctuating levels of porosities between inside / outside, building / nature, and user / place. Through flexible and interactional forms that open, enclose, frame, expand, contract, extend, filter, and connect, the architecture becomes an instrument creating sensorial experiences that reveal the poetics of place and inspire connection through wonder. Architecture acts as a ground, structuring the frame for place-based education to take root, where participants learn, grow, and participate. Through ecological thinking, the architecture, as both cabinet and frame, becomes a liminal set of elements that draws in, enhances, and supports entities, programs, institutions, and ecologies to create integrated educational experiences. It becomes a dynamic extension of the landscape and part of a connected system by responding to and establishing paths, flows and relationships between elements and entities. As a proposed network, informed by ecological thinking, this thesis illustrates how architecture and education have the power to weave both culture and nature together into a greater system that invites interaction,

a sense of community, and an encouragement of curiosity and discovery.

Explorations of theory and pedagogical studies, focusing on barriers to change and educational methodologies, were essential in understanding how an effective environmental education response can be approached. Using these studies, design principles were developed and integrated into a methodology towards a physical framework for environmental education. While the architectural intervention of this project is specific to Whitemud Creek, the educational methodologies (place, hybridity, and experiential) and design methodologies (situating, in-between, and phenomenology) become a sensitive framework with the capacity to be translated into other contexts for environmental education. It is a flexible framework that becomes grounded and specific when applied; as each principle is place-based, responding to, and generating relationships with the context in which it is situated.

This thesis develops an architectural frame to spark creative and collective ways of thinking, teaching, and learning about nature. It is frame developed to grow new ways forward through ecological literacy and reciprocal relationships with earth.

> It is about the simple planting of seeds within the wilds of the landscape imagination, hopefully propagating a field more diverse and enabling than ever before. (Corner 2014, 127)

Appendix:
Additional Explorations

As a network is ever branching and continuous, this thesis has potential to grow in numerous directions by drawing in new partners and forming new relationships that tie back to place. To me, this network has an ever-growing list of explorations, but as time is limited, this thesis' architectural interventions focused on developing an architecture for the primary resource spaces and workshop. As such, a gallery space has been proposed (but not refined) for the Whitemud Creek site- as works of art can encourage and promote discussion and question dominant discourses. It is intended to be a small gallery space situated upon the trail, hosting temporary linked installations of art, books, specimens and landscape. The design of a mock exhibition proposal for the gallery helped establish the initial steps of the nature resource center. Parts of this exhibit proposal have been included within this appendix to provide background to the resource center and hint at what the gallery could be.

Clip of site plan showing location of circular gallery.

EXHIBIT EXPERIENCE

1. Enter gallery space and view sketches/notes on the participatory gallery wall. Obtain seed paper (infused with wildflower seeds) from the counter to perform your own sketches and studies on.

2. Walk through and around artist exhibit.

3. Sit on window benches to relax, view exhibit, or to read books from curated library.

4. Read exhibit title and curator's statement.

5. Take part in your own studies by sketching, observing, listening and feeling the specimen exhibit within the thick cabinet-like walls.

6. Use curated library to look deeper into subjects or find stories relating to exhibit subjects.

7. Post your studies on the participatory gallery wall, or take them with you for planting on the site (8) or throughout the city.

9. Participatory gallery wall is deconstructed yearly and the used seed paper is planted within a restoration landscape to expand native ecologies throughout the city.

Gallery's exhibit plan and procession.

PARTS OF THE GALLERY

Participatory gallery wall

Seed paper for studies

Exhibit of specimens
and curated library
within thick cabinet-like
walls.
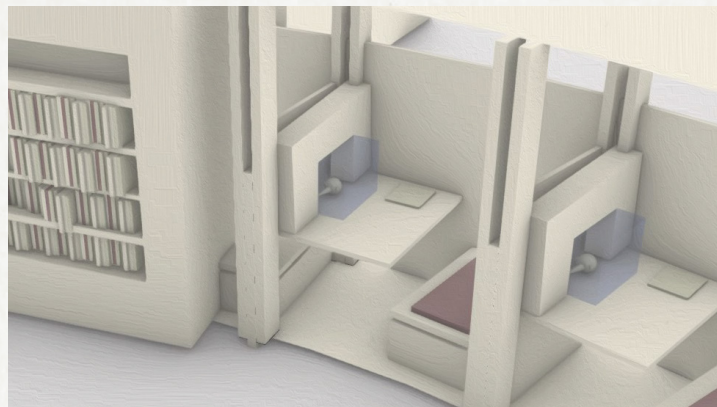
Local artist exhibit
within central space
(example installation
is a sculptural flock of
birds, inspired by local
artist Allison Service's
Found Flock).

Participatory Restoration
Landscape

Seed Paper is planted to
grow local wildflowers.

Perspectives showing the gallery parts and sequence.

Mock Exhibit Overview:

This exhibit proposal outlines a design for a permanent exhibition space that hosts rotating collections of natural specimens in tandem with a rotating local art exhibit and library collection. A participatory gallery wall and landscape are also proposed. The exhibition space is crafted as framework to host temporary exhibits and visitor participation through sustained observation and study. By encouraging visitor curiosity and inspiring their own investigations into subjects, this exhibition promotes self-directed learning. The exhibits are approached through multi-sensory, interactive, and playful ways to peak one's interest and curiosity.

Part 1: Exhibit Within the Cabinet

Visitor Role: Experiential Study and Viewing

This portion of the exhibit offers an opportunity for one to become familiar with exhibit topics through direct interactions and studies. It engages multiple senses by employing specimens (loaned by the University of Alberta), photographs, textured impressions, and sounds. These components are integrated into thick cabinet walls that encourage and facilitate an individual creating their own field notes and sketches. It is an approach inspired by the University of Alberta's Zoology lab which invites fine art classes to draw and study its specimens. The cabinet is structured to slow the viewer's pacing down by encouraging them to sit comfortably and become immersed within it. If users wish to obtain textual information or stories about the subjects they can utilize the curated library built into the cabinet-like walls. The central space, framed by surrounding cabinet walls, features local artist installations that are curated to correspond to temporary exhibit topics.

Top: Thick cabinet walls of gallery featuring textures, specimens and study space. Middle: example of specimen (Canadian goose skeletal mount image from Skull Site n.d. Bottom: example of textured impressions (Picture of Canadian Geese foot prints from Evans 2014).

Preliminary concept of restoration landscape at Whitemud Creek utility corridor.

Part 2: Studies Wall and Landscape

Visitor Role: Participatory

Upon entry to the gallery space, individuals obtain a piece of recycled paper infused with native wildflower seeds to do their studies on. After their studies, notes and sketches can either be disposed of by planting them in the designated planting beds within the site, kept by the individual and planted throughout the city, or submitted to the gallery and added to the participatory gallery wall for all to see. The gallery wall is deconstructed yearly with sketches first scanned then planted into a restoration landscape. This process of the exhibit becomes an embodiment of the Nature Resource Center, fostering ecological learning and participation; it collects into a collaborative piece to be displayed, looked at, learned from, added to, and later becomes a restorative piece in the city landscape. This process not only encourages growth of ecologies but becomes a memorable connection between participant and nature, drawing their attention and appreciation towards these ecologies in which they have taken part in and studied.

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