

A Golden Green Belt
Integrating Nature in Ottawa's Next Suburbs

By

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In

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Abstract

The greenspaces, parks, forests, yards and gardens of modern-day Ottawa's suburbs are conceived from the point of view of their human users but not as welcoming extensions of natural habitats for local fauna. An unbuilt greenspace in Nepean located at the westernmost point of contact between Ottawa's agricultural "Goldbelt" and its famous protected "*Greenbelt*" offers a lens to rethink human settlement from the point of view of animals. The design of a fauna-oriented retirement campus offers a footing for this re-oriented design methodology. Analytical design at various scales aims to discover a point of balance between private spaces and spaces of interaction for both human and animal dwellers of the site. The design of a *Golden Green Belt* offers itself as a prototype for future suburban developments at a time when urban sprawl and population growth continue to alter the lands around Ottawa. The imagined neighbourhood of *Golden Green Belt* offers itself as an essential link and safe wildlife passageway just as it listens to and honours the muted voices of animals amidst our human noises.

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Introduction

This thesis examines a farmfield in the Rideau-Goulbourn ward of Ottawa bounded by Old Richmond Road to the east, Hope Side Road to the North, Eagleson Road to the West, and another farmfield to the South (Fig. 1). The venue of 5044 Hope Side Road, located on the hinge between Ottawa's rural Goldbelt and its protected Greenbelt, provides an opportunity to rethink the suburban way of development. As of today, nine parcels have been subtracted from the farmfield and contain single family dwellings.



Figure 1: Aerial view 5044 Hope Side Road.

Located immediately across Hope Side Road is the conventional suburb of Bridlewood. The suburb of Barrhaven expands five kilometres to the East of the site. The proximity of these two growing suburbs point to likely future developments of the same type – densely built single family housing – in this area (Fig. 2). The Tomlinson - Moodie Quarry & Asphalt Plant is located northeast of the site, across Old Richmond Road. With the suburb of Bridlewood to the northwest and that of Barrhaven to the southeast, the Tomlinson - Moodie Quarry & Asphalt Plant punctuates a diagonal line that links these two Ottawa suburbs. While the quarry – which is surrounded by *Greenbelt* lands – is an obvious site for the establishment of a fauna-centric development in the future, the specific site chosen for this thesis is more vulnerable to neighbouring expansions, and the one that most urgently needs attention (Fig. 3).

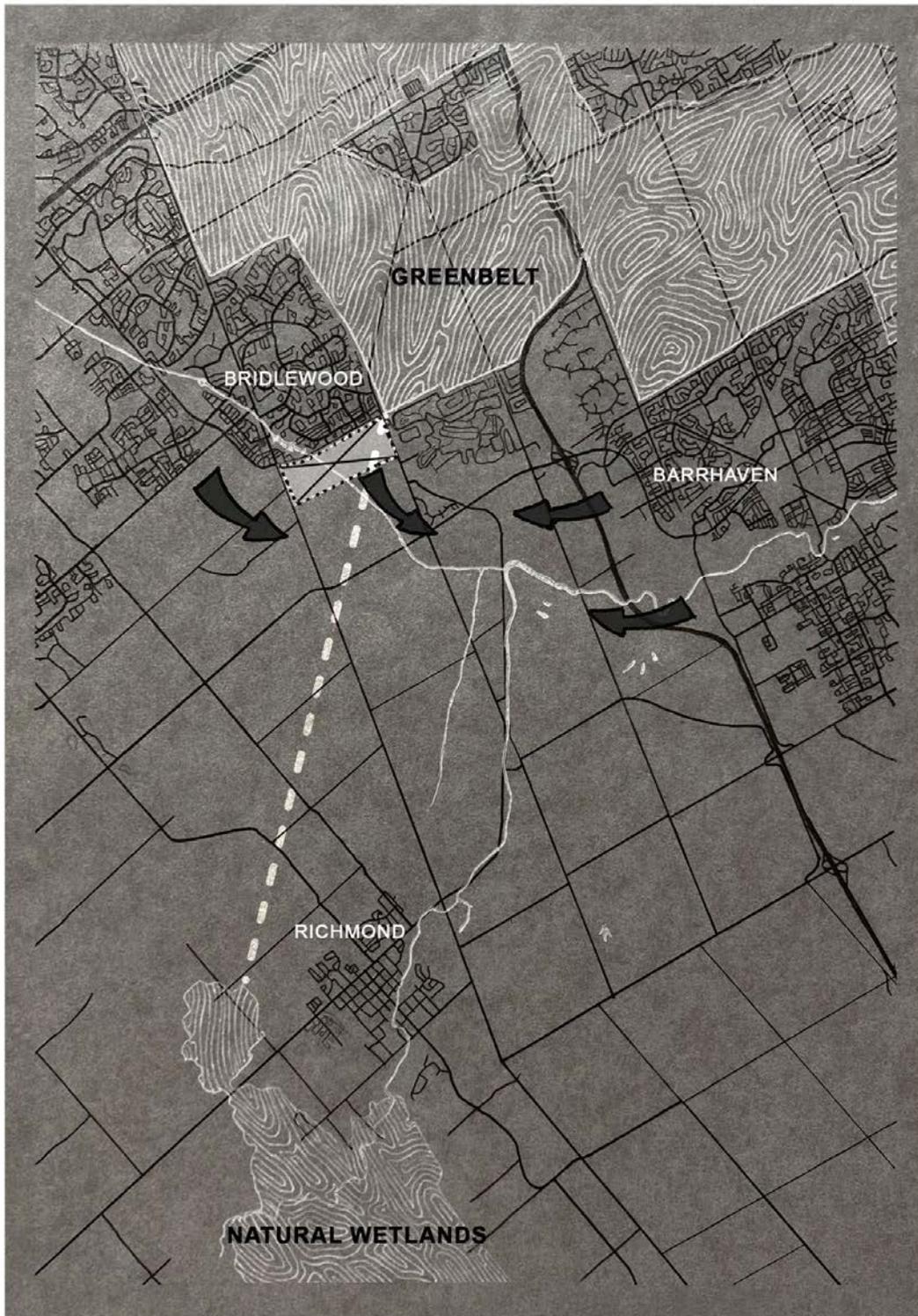


Figure 2: The view 5044 Hope Side Road in relation to nearby neighbourhoods, to the Greenbelt, and to natural wetlands to the south-west of the site.

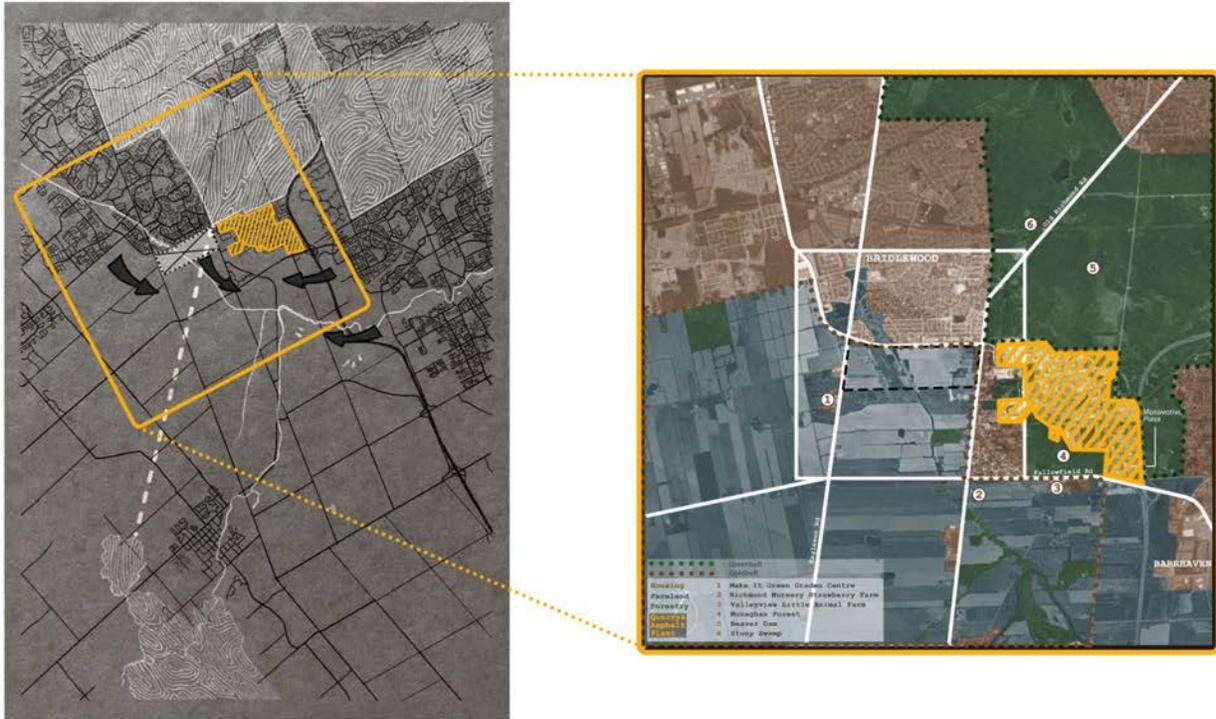


Figure 3: The view of the Quarry in relation to 5044 Hope Side Road.

The counter proposal in this thesis aims at ushering in a new chapter in Ottawa's suburbs in which conventional suburban layouts are modified to prioritise animal life and passage. If we can effectively implement new methods of planning and construction, we can achieve a point of greater balance for future generations. The thesis proposes that "golden green belt neighbourhoods" could be developed to "cap off" suburban sprawl throughout Ottawa, or at the very least, to demonstrate the possibility of developing housing and human settlements in ways that welcome and support animal and human coexistence while providing a safe passageway for fauna. The thesis will explore architectural details and planning strategies. We will be brought to discover the

fruitfulness of associating two divergent neighbourhood forms to achieve the goal of housing humans and protecting animal life and passage at the same time.

A Few Notes About the Organisation of This Thesis

I've chosen to investigate architecture via the lens of animal experience. As a result, throughout this thesis, I will provide two perspectives: the animal's and the human's, leading with the former. The concept of structuring the material in this manner reinforces the thesis's central premise: that animals require a bigger voice in the design of our built environment. Animal life must take precedence at this moment in time.

Chapter 01

Walking Intuitions: Why Fauna?

Foreword

Three years ago, I relocated from Kanata to Stittsville, a little town west of Ottawa, to a single family residence on Cranesbill Road. The move-in date corresponds to the completion of the house, which is located within Mattamy Homes' new Abbottsville Crossing subdivision in Glencairn, still under development to this day. In addition, I had lived in Kanata for six years before that. I was able to watch changes and evolutions firsthand and up close throughout this nine-year period of living in the western suburbs of Ottawa. Daily observations of the environment behind my house and long walks in the Glencairn area gave the first inspiration for my thesis. The following text expands on my reading of the landscape around me and on my choice of the thesis subject and site for developing an alternative suburb of the future.

My Childhood Israel

Coming from a densely populated city in Israel, with mid- to high-rise buildings, polished and minimalist landscape design, and a lack of nature, I have never questioned the architecture of suburbia and city sprawl (Fig. 4). I've always noticed homes being constructed on lifeless, arid sites or through renovations of run down structures. However, I have maintained a strong connection to Israel's animals and the outdoor realm via the numerous stray cats living beneath the buildings in my midst, Israel's non-native parrots nesting in their envelopes' crevices, and the innumerable insects attempting to find their way in. I've observed people's attitudes and reactions towards these creatures and listened to frequent calls to "exterminate" them. Each had their own justifications for wanting to do so; reasons ranged from the more reasonable need to keep insect stings and feline waste on the streets at bay, to the ludicrous desires to silence the parrots' singing to sleep in, or even, to avoid paw prints on pristine vehicle hoods. However, other people left fruits and nuts outside their windows, used recycled boxes to build sun and rain cat shelters, as well as planted a wide range of climbing plants in order to attract pollinators to their balconies. I belonged to the second group of individuals.



Figure 4: Screenshots of google-maps to showcase visual differences between the cities of Rishon LeTsiyon and Ottawa.

My Relocation to Canada

When I first arrived in Canada, I had the sense that nature thrived inside city walls. Having always regarded squirrels, raccoons, coyotes, and others as relatively rare and beautiful creatures, I've never understood why people were so opposed to them. Thus again, everyone I have encountered fell into one of two categories with regards to their perceptions of wildlife. As time passed, I began to see that the verdant suburbs – with a tree in every front yard and flattened parks with neatly trimmed grass in the back – had less to do with living in balance with nature and more to do with manipulating the environment to appear as though one did. Rather than promoting a balanced lifestyle that benefited non-humans, suburban landscaping was done simply to give a notional impression of living among greenery, away from a supposedly dirty and unhealthy city centre.

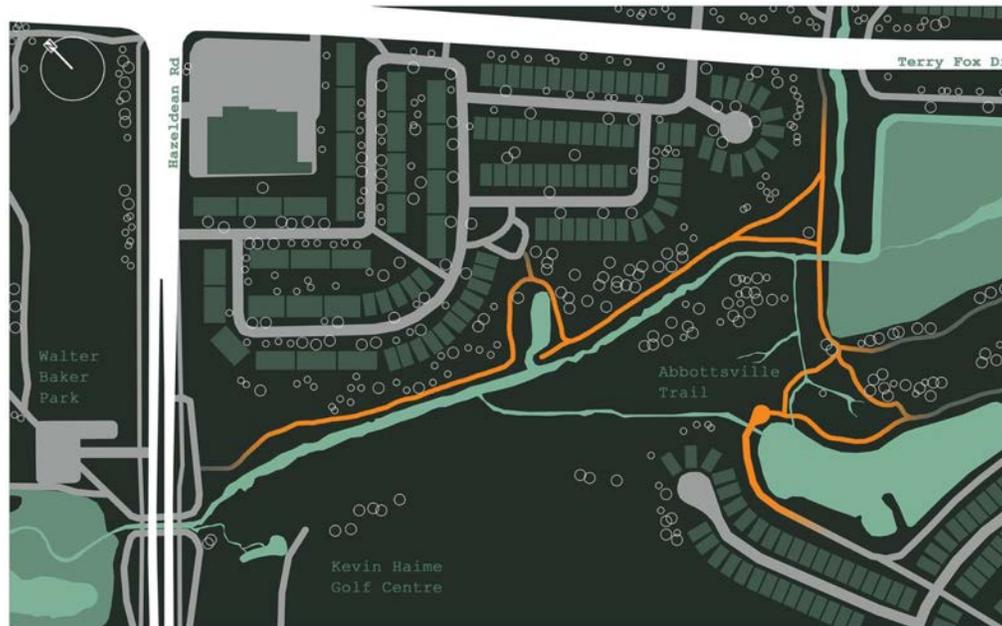


Figure 5: Abbottsville trail located behind the house in which I live.

My observations as a participant-observer of suburban yards, parks and gardens, both public and private, over the last three years have cemented this perspective. With my windows overlooking a park, until recently, I have witnessed an increasing amount of changes through human participation over time. These intrusions included the placements of fencing, cutting of shrubs and their replacement with maintained lawn and addition of asphalted paths.

Not having a car, I depended largely on walking to get to stores and bus stations. During the Covid pandemic, living far away on the opposite side of Ottawa from most of my friends, I've had plenty of time on my hands. As a consequence, I've spent hours

wandering the streets and greenspaces of Stittsville daily, unknowingly researching animal routines, patterns, and shelter locations (Fig. 5). My developing interest and involvement in this field began to show through in my academic work as I began recording local fauna's migration paths across the park land touching the Abbottsville Trail (refer to appendix A: preparatory projects completed in previous courses). Though beginning as lighthearted and cheerful documentations, they led me to a place of realisation of the unavoidable deterioration of the neighbourhood's greenspaces.

Bird song was ongoing, but my inventory of species in this location was only impressionistic. The continual whirring of frogs and insects, followed by the swift fluttering of bat wings in the skies, animated the evening air. When a canine silhouette was noticed from a distance, one question typically followed: "Should I avoid this coyote or should I approach in case it's a lost dog?" During muddy, rainy seasons or snowy winters, one could have followed the tracks of turkeys, rabbits, skunks, and who knows what else. Occasionally, when the water of Carp River became still, a loud splash might be heard, and if you were fortunate, you would catch a glimpse of a fish flip, a playful weasel, or a diving beaver. Early summer was a tense period for nature lovers like myself who had to rely on memory and alertness to avoid stepping on turtle nests. Turtles seem remarkably unafraid of the safety of their nests, and bury them carefully along well-travelled routes, relying on no animal being heavy enough to harm the eggs beneath the earth. Finally, the ever-changing flora promised to delight and surprise, with

different flowers appearing each week, including out-of-place sunflowers that appeared far too numerous for this location. It was for these reasons that the forty-five minute walks to the store were exciting. I preferred these walks to the ten minute drive available to me right now.

However, as more housing was constructed, more greenspace was lost.¹ The native shrubs were removed and replaced with symmetrical, repetitive plants. Weeds have been supplanted with wood chips or lawn. The bird songs continue to be heard, but in considerably smaller numbers, overpowered by the sounds of vehicles. As for the bats, they seem to have left. The roads are now dotted with flattened frogs, their silhouettes extending into tire marks. A dog observed without a leash is probably simply a dog. The snow is now littered with human imprints and occasional rabbit paws. Except for a few fish and beavers, the Carp River water has remained motionless, except for splashes caused by bait and rocks thrown by children. I only saw one turtle nest in the whole summer of 2021, and it was destroyed with sticks that poked through the delicate soft eggs. Aside from that, the last two sunflowers were quickly clipped, preventing them from spreading new seed. I no longer have to glance down as I walk; there will be no animal waste, no off-guard frogs, and no stray branches. Levelled ground, soft grass and paving will now always be preserved.

¹ Novatech. *5618 Hazeldean Road Planning Rationale & Integrated Environmental Review Statement*. By Eric A. Bays. Novatech File: 108195. Ottawa, Ontario: Statement, November 9, 2016, http://webcast.ottawa.ca/plan/All_Image%20Referencing_Subdivision_Image%20Reference_Do7-16-16-0020%20-%20Planning%20Rationale.PDF (accessed February, 2021).

Unlike with humans, we cannot create architecture based on conversations with animals and plants. We cannot construct a questionnaire and inquire how they feel about a proposed neighbourhood extension, road intervention, or a tree removal. However, as humans who intervene in their lives, altering and influencing them, we must have the ability to listen and respond. We may examine their behaviour, path creation, and logic as they make decisions. I believe we should reconsider favouring people in our designs, and instead, prioritise both. Animals are the clients who remain silent, unable to protest or oppose if their health or livelihood are adversely affected or placed at risk; as architects, we must be their voice!

Understanding the Meaning of “Greenspace” in Ottawa

The City of Ottawa's Greenspace Master Plan

With the rapid expansion of cities around the world including Canada in recent years, urban sprawl has become a more prominent problem to be addressed. The preference for suburbs dates back to the beginnings of the industrial era.

French philosopher and historian Francois-Marie Arouet, better known as Voltaire, penned the following in *Embellissements de Paris* in the mid-18th century:

*We blush with shame to see the public markets, set up in narrow streets, displaying their filth, spreading infection, and causing continual disorders... Immense neighbourhoods need public places. The centre of the city is dark, cramped, hideous, something from the time of the most shameful barbarism.*²

² Sarmant, Thierry (2012). *Histoire de Paris: Politique, urbanisme, civilisation*. Éditions Jean-Paul Gisserot. p.133. ISBN 978-2-755-803303.

As of the second half of the 20th century, North American downtowns have been linked with unfavourable crowding, poor air quality, dirt, noise and light pollution, causing the general public to think of suburbia as an escape from the ills of the city. Though current Canadian city centres are incomparable to Voltaire's description of France's lengthy unlit corridors, many regard downtowns as undesirable and cluttered in comparison to the verdant suburbs. This can be said of Canada's capital city. Though this chapter discusses greenspace planning in Ottawa as a whole, it focuses on suburbia.

The city's *Greenspace Master Plan* celebrates the city's green heritage as such:

*Ottawa is distinguished as a capital city by the abundance of parks, rivers, and woodlands that contribute to the high quality of life enjoyed by its residents.*³

The City of Ottawa's 2006 *Greenspace Master Plan* is a seventy-one page document complete with maps and a glossary of terms, that examines design techniques for "Urban Greenspace." The City of Ottawa's official website includes a link to this planning document.⁴ – The term "Urban Greenspace Network" therein refers to a system of

³ City of Ottawa. *Greenspace Master Plan: Strategies for Ottawa's Urban Greenspaces*. Department of Planning and Growth Management. Publication: 4-01. Ottawa, Ontario: Ottawa.ca, Publication, 2016, https://documents.ottawa.ca/sites/documents/files/greenspace_master_plan_en.pdf (accessed January, 2022).

⁴ Planning, Real Estate and Economic Development Dept. *Greenspace Master Plan*. City of Ottawa, December 1, 2016. <https://ottawa.ca/en/planning-development-and-construction/official-plan-and-master-plans/greenspace-master-plan>.

nature reserves, open spaces, and leisure lands that could connect every Ottawa dwelling to a wider network of greenspaces. Waterways, woodlands, pocket parks, stormwater management ponds, and landscaped grounds located inside the boundaries of major institutions, as well as "green" front yards, are all included in the same network. The City of Ottawa document defines greenspace by determining and categorising the level of human intervention, accessibility and biodiversity within the space. As such, Ottawa's greenspaces are divided into three main categories. The *Greenspace Master Plan* presents them under the grouped heading "Natural Lands, Open Space and Leisure Lands, Other Open Space." The following section presents these, looking at each one separately.

"Natural Lands"

In the category "Ottawa's Natural Lands" one finds wetlands, forests and waterway corridors which have self-sufficient ecosystems and need minimal to no human intervention to thrive. It is rare to find spaces into which humans have not intervened within the cityscape. This kind of space is not reproducible once development has occurred. For this reason, the only places they can be found are in non-developed areas. These in turn are either isolated pockets of greenery within the City limits, or, they fall within the Greenbelt boundary.

“Open Space and Leisure Lands”

Generally defined as human-designed and controlled landscaping, Ottawa’s “Open Space and Leisure Lands” include public parks, gardens, play areas and outdoor sports fields, and land containing pathways and trails. These greenspaces require frequent human interventions such as the cutting of tall grasses to comply with the demands of public recreational use. Characterised by manicured vegetation and paved pathways these areas are limited in their flora and fauna diversity. The city claims that it still creates a “natural” setting within which many species can adapt and flourish. Ottawa’s “Open Space and Leisure Lands” often come with community services such as parks and sports fields.⁵

“Other Open Space”⁶

The other variety, or the “leftovers,” are types of lands which contribute to the greenspace making. Available for public use, these lands usually surround buildings, parkways and other infrastructures, and are usually used to restore or extend natural

⁵ Un, Kit. “Fact Sheet: Bioretention Areas.” MAPC. METROPOLITAN AREA PLANNING COUNCIL, September 15, 2016. <https://www.mapc.org/resource-library/fact-sheet-bioretention-areas/>.

⁶ City of Ottawa. *Greenspace Master Plan: Strategies for Ottawa’s Urban Greenspaces*. Department of Planning and Growth Management. Publication: 4-01. Ottawa, Ontario: Ottawa.ca, Publication, 2016, https://documents.ottawa.ca/sites/documents/files/greenspace_master_plan_en.pdf (accessed January, 2022). Pp. 5.

environments, to add recreational purposes, and to visually enhance the City. The official document is vague in its definitions of soft surface landscaping and water management systems. As such, infrastructural greenspaces such as bioretention cells and landscaped ditches seem to be included in the City's greenspaces inventory. Usually spotted in building offsets and parking lot edges, bioretention cells are shallow depressions filled with sand, mulch, and vegetation, functioning as stormwater filtration systems.⁷ The document's vagueness of terms suggests that the City does not exclude these bioretention cells when calculating the amount of greenspace present in Ottawa. The following excerpt from the City of Ottawa's *Greenspace Master Plan* document describes what it considers to be a well designed park, and provides a bulleted list of qualities.

Well-designed park and leisure land exhibits the following qualities:

- *Character - a place with its own identity*
- *Continuity and enclosure - a place where public and private spaces are clearly distinguished*
- *Quality of the public realm – a place with attractive, well-constructed, well-maintained and successful outdoor spaces*
- *Ease of movement - a place that is easy to get around and through*
- *Legibility - a place that is easy to interpret and understand*
- *Adaptability – a place that can handle change easily*
- *Diversity – a place with variety and choice*⁸

⁷ City of Ottawa. *Greenspace Master Plan: Strategies for Ottawa's Urban Greenspaces*. Department of Planning and Growth Management. Publication: 4-01. Ottawa, Ontario: Ottawa.ca, Publication, 2016, https://documents.ottawa.ca/sites/documents/files/greenspace_master_plan_en.pdf (accessed January, 2022).

⁸ *ibid.* pp. 38.

While all of the above qualities and goals are well-intentioned they are strictly oriented toward the human user, and do not acknowledge wildlife.

Characteristics of a Green Street

Green Streets include many enhancements designed to support walking and cycling in an attractive, open space environment such as wider boulevards, sidewalks, multi-use pathways, street trees and other landscaping, and roadway features. Each Green Street would have its own character and design based on its context, the types of users, the right-of-way dimensions, and its transportation role.

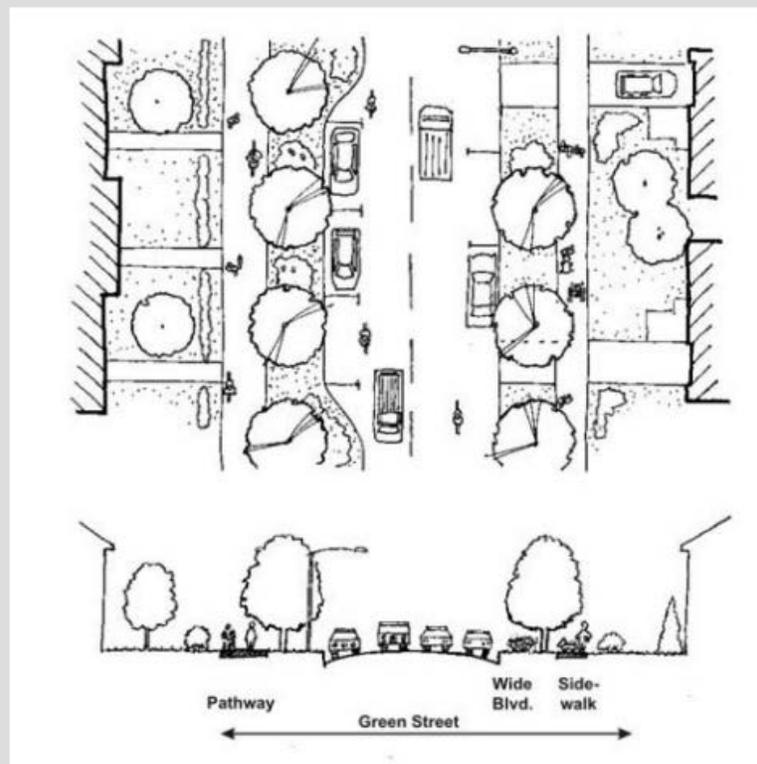


Figure 6: An example of a human-centric approach for designing green spaces. From The City of Ottawa's 2006 *Greenspace Master Plan*.⁹

⁹ *ibid.* pp. 37.

In the sections of the document that address accessibility, it becomes clear how the City approaches design strategies. Though the text refers to animal use and although it mentions green corridors as an example of wildlife circulation, it goes into much more detail for topics pertaining to human use of the spaces (Fig. 6). Access is measured by human walking distances to targets. The city's regulations and targets for greenspace locations – which are to be within 400 metres of residential areas – are conceived from the human point of view.¹⁰ In some cases these green pockets created for urban human use could trick migrating wildlife who might read them as forest entrances.

The problematic inadvertent creation of wildlife traps occurred at Maplewood Park and Deevy Pines Park, an example I personally witnessed while living in the Kanata region. In both cases, larger wildlife such as coyotes or deer families found their way into these densely planted pockets through nearby forests or green corridors, allowing them to infiltrate suburban subdivisions and obstruct traffic, and, in some cases, to create conflict with passing dog walkers. Intentions and reality do not always work together. The famous urban studies activist Jane Jacobs reflected on the flaws of city and suburb design resulting from designing at a distance from reality. The following quote captures Jacobs' belief in the importance of observing built environments as they are.

¹⁰ *ibid.* pp. 35-36.

Cities are an immense laboratory of trial and error, failure and success, in city building and city design. This is the laboratory in which city planning should have been learning and forming and testing its theories. Instead the practitioners and teachers of this discipline (if such it can be called) have ignored the study of success and failure in real life, have been incurious about the reasons for unexpected success, and are guided instead by principles derived from the behaviour and appearance of towns, suburbs, tuberculosis sanatoria, fairs, and imaginary dream cities – from anything but cities themselves.
 -Jane Jacobs¹¹

Ottawas' *Greenspace Master Plan*, too, seems to have ignored the successes and failures of real life. The document defines proper greenspace planning in a self-reflexive manner from its own standards and opinions. Substantive justifications and references to successful greenspace planning in other parts of the world are absent from the document. The *Greenspace Master Plan* repeatedly refers to Ottawa as a beautiful nature-driven city but does not point out its weak spots. Lacking the self criticism that it so much needs, the document sweeps issues pertaining to flora and fauna under the rug, or only minimally addresses them. The following quote is a good example of the dismissive brevity of the text when dealing with animals. "Although plant and animal diversity is limited, plant and animal species that can adapt to urban conditions flourish and create a "natural" setting for urban residents."¹²

¹¹ Jacobs, Jane. Essay. In *The Death and Life of Great American Cities: Orig. Publ. 1961*, 6. New York: Vintage Books, 1992.

¹² City of Ottawa. *Greenspace Master Plan: Strategies for Ottawa's Urban Greenspaces*. Department of Planning and Growth Management. Publication: 4-01. Ottawa, Ontario: Ottawa.ca, Publication, 2016, https://documents.ottawa.ca/sites/documents/files/greenspace_master_plan_en.pdf (accessed January, 2022). Pp. 5.

For persons living in Ottawa, it is not at all uncommon to hear fellow citizens compare their City to others, like Toronto, emphasising how much “greener” Ottawa is in contrast. However, when the topics of roadkill or biodiversity loss arise, the voices quiet. Ottawans seem to live within their own bubble of success, ignoring the City’s growing ecological issues.

To summarise, while the *Greenspace Master Plan* is intended to honour Ottawa's green legacy, its heavy focus on human interests rather than on the health of wildlife and robustness of migration paths exposes the document's bias vis à vis “nature” and living in proximity to “nature.” Ottawa’s greenspaces are not as vibrant and alive as they could and should be.

Chapter 03

Retired Living

Retirement Community: A Suitable Program for a Wildlife

Experiment

When it comes to Canadian suburbs, animal-human interactions occur on a regular basis, and both parties stand to benefit from them. These interactions can be brief or prolonged in time. The party that benefits is alternately the animal, who may be the recipient of human-provided food, or, the human, who may receive psychological benefits from looking out their window to a scene animated by animals during colder seasons, or even a pandemic (such as was the case recently). However, in many circumstances, like when one party trespasses on the other's realm (for example, a skunk's smell for the human, or human's noises or artificial lighting for nocturnal animals), these might become unwelcome.

Selecting the appropriate program for this site became as critical as selecting the site itself. The choice of this program needed to be sufficiently regulated to allow for the safe

passage of both parties, and to encourage interactions while keeping them optional. More often than not, the primary focus of wildlife-related programs (animal parks and zoos) is to observe or interact with the animals within a bounded environment. Undoubtedly some of these human-made environments serve a purpose, be it education, conservation, or rehabilitation, or even, protection. However, aside from cases where animals are enclosed for their own good, the notion of subjecting animals to unbroken control and supervision, is problematic. This project seeks to find the perfect spot of harmony, where both coexist out of their own free will, with the wilderness having as much claim to the site as its human residents. This thesis initially considered programs such as zoos, farms, museums, safari parks and the like, but quickly eliminated them due to their need for a border. Such profit-driven programs rely heavily on regular earnings, themselves reliant on consistent human visiting, and its corollary, continual animal stay. In contrast, the open-concept design that this thesis aims for must be self-sufficient and completely independent from animal activity for income. Becoming more mathematical, the human-animal relationship that this thesis is interested in can be described as an equation where the human visitor is the constant, and the animal visit, the variable. In the afore-mentioned programs of zoos, both are constants. On the other hand, with national parks and forest trails the equation has two variables instead, since it can be influenced by seasonal changes and other phenomena. The following attempts to give written form to the various equations and their terms.

Constant (animal flow) + Constant (human flow) = earnings + entertainment program type A (zoo, museum, farm)

Variable (animal flow) + Variable (human flow) = entertainment program type B (park, forest trail)

Variable (animal flow) + Constant (human flow) = Long stay program type C (suburban neighbourhood, retirement community)

Or simplified

$$C(\text{animal}) + C(\text{human}) = \$ + Pa$$

$$V(\text{animal}) + V(\text{human}) = Pb$$

$$V(\text{animal}) + C(\text{human}) = Pc$$

The thesis also considered programs such as veterinary school, university campus, hospital, camp, drug rehabilitation centre, etc.. These programs that do not rely on the flow of animals to support their activity all fall within the last equation, where the human flow is the constant, and animals, the variable. However, another variable enters the equation: the duration of time humans spend in that place. As an example, a university student may frequent an institution for years yet spend a limited amount of time on the campus itself. Participants' short yet frequent visits mean that interactions with local fauna will be short-termed and subject to chance. They will not be able to adjust the spaces to invite the wildlife to return and stay, since they will not be constantly present on site. The architectural problem of the design of a university campus does not offer a lens to study human-animal meeting spaces. Furthermore, in places of quickly changing dwellers and visitors, a stable observer who will monitor the human-animal interactions at all times of the day and all seasons of the year is non-existent. The concept of living within an animal-rich environment and coexisting with animals goes unnoticed there. In rehabilitation centres, where individuals may remain on site for

months, or even years, this concept works much better. In such places, one's understanding of the potential for animals and humans to cohabitate is likely to be deeper. In other words, the architectural problem of designing animal-human spaces is much more interesting in places where dwellers spend long periods of time in realms where animals live freely. These architectural programs belong to the "constant+variable" category. This thesis aims to discover design strategies that can be applied to the current fabric of the suburbs. The goal here is to get as close as possible to designing a neighbourhood in which humans and animals live in full balance.

If \rightarrow $x = (\text{repetition amount}) + (\text{duration length})$

Constant (animal flow) + Constant (human flow) + (time<x) = earnings + entertainment program type A (zoo, museum, farm)

Variable (animal flow) + Variable (human flow) + (time<x) = entertainment program type B (park, forest trail)

Variable (animal flow) + Constant (human flow) + (time>x) = Long stay program C (suburban neighbourhood, retirement community)

Or simplified

$C(\text{animal}) + C(\text{human}) + (t < x) = \$ + Pa$

$V(\text{animal}) + V(\text{human}) + (t < x) = Pb$

$V(\text{animal}) + C(\text{human}) + (t > x) = Pc$

Variable (animal flow) + Constant (human flow) + (time>x) = Long stay program (suburban neighbourhood, retirement community)

The above analytical phrasing informed this thesis in its final choice as to program:

Passing Wildlife + Inhabiting Residents + repetitive interaction through long duration = Retirement Community

Following the rules of this equation, this thesis chose a retirement community as the program to explore on the chosen site. The variable here is the flow of wildlife, and the constant is the population of residents of the retirement community. Finally, the element of time, which due to the long stays and the more open schedule of both parties, will now be at its maximum capability to welcome interactions. Further reflection on the choice of a retirement community is found in the conclusion of this thesis, but for now, this stable group of dwellers provides a useful starting point for thinking this experiment through.

Advantages of Coexisting with Flora and Fauna from the Vantage Point of a Retirement Community

The Stigma Around Elderly Care Facilities

When the time comes to choose an appropriate retirement living option, many seniors experience a degree of anxiety about moving out of their homes. Retirement communities are often stigmatised due to the negative connotations surrounding once popular nursing homes.¹³ Nursing homes are senior care facilities which offer

¹³ Shuster, Michael. "Why Seniors Fear Moving to a Retirement Home, Retirement Residence." Ontario Real Estate Specialist Michael Shuster, November 3, 2021. https://shusterrealestate.com/fear_moving/.

day-and-night medical attention for seniors who need special accommodations for their health. With on-hand medical equipment as well as safety and accessibility codes, these facilities often possess a sterile and clinical atmosphere rather than a home-like feeling. In many cases, residents must share spaces and are deprived of privacy. Residents often complain of boredom within these facilities due to the lack of variety in both environmental changes (often, their rooms and spaces do not have direct connections to the outdoors) and activities provided on site. In addition, with the rise of Covid-19, an increasing number of these facilities isolate their residents within enclosed spaces, allowing for the easy spread of disease, compromising seniors' health. Medicalized living, isolation, and loneliness, contribute to depression amongst seniors living in nursing and negatively affect their quality of life and general well-being. While nursing homes have improved, and while alternative senior living options have grown more accessible, many problems remain.¹⁴

The Canadian Institute for Health Information (CIHI) released a study in 2010 on depression observed in older persons living in senior residences. Sampling roughly fifty-thousand members of the population living in various senior facilities, CIHI

¹⁴ Cornu, Ben. "13 Reasons to Keep Your Senior out of a Nursing Home." Looking for Senior Home Care? Caring Senior Service, February 22, 2022. <https://www.caringseniorservice.com/blog/13-reasons-to-keep-your-senior-out-of-a-nursing-home-1>. See also Huetter, Robyn. "Seniors' Top 10 Fears of Ageing: Senior Living 101." Senior Apartments: Independent & Assisted Living in West Seattle. Daystar Retirement Village, May 4, 2020. <https://info.daystarseattle.com/senior-living-blog/understanding-your-aging-parents-seniors-top-10-fears#inability-manage-activities>.

identified over 40% of seniors to be experiencing some type of diagnosable depression.¹⁵ Similarly, in the United States, approximately 20% of seniors are diagnosed with major depression and an additional 30% have significant symptoms. In sum, depression affects half of the senior population living in retirement homes. This is a huge problem. The need to reconsider seniors' living spaces and neighbourhoods is pressing, and constitutes a rich question for architecture and neighbourhood planning.¹⁶

The Importance of Nature for Mental and Physical Health

Living in close proximity to nature is not only encouraged for older age groups. Indeed, there is now an abundance of articles and studies that speak to the benefits of spending time outdoors and interacting with flora and fauna for people of all ages. In 2019, University of Chicago psychologist Marc Berman and his student Kathryn Schertz explored the topic of cognitive benefits as a result of interactions with nature.¹⁷ Some of the reports concluded that visual greenery and sounds of nature promote cognitive

¹⁵ "CIHI Study Finds Depression in 44 Percent of Seniors in Residential Care Facilities." CMHA Ontario. Canadian Mental Health Association, June 24, 2010. <https://ontario.cmha.ca/news/cihi-study-finds-depression-in-44-percent-of-seniors-in-residential-care-facilities/>.

¹⁶ Rosen, Jules M.D. "A Doctor's View: Depression in Long-Term Care Residents." Health Progress. Catholic Health Association Of the United States (CHA), December 2014. <https://www.chausa.org/publications/health-progress/article/november-december-2014/a-doctor%27s-view-depression-in-long-term-care-residents>.

¹⁷ Schertz, Kathryn E., and Marc G. Berman. "Understanding Nature and Its Cognitive Benefits." *Current Directions in Psychological Science* 28, no. 5 (2019): 496–502. <https://doi.org/10.1177/0963721419854100>.

development in children as well as behaviours of self-control. In addition, housing in greener neighbourhoods showed better attentional functioning in contrast to those with less surrounding vegetation.¹⁸ In the same vein, a diverse group of students and researchers from the University of Washington investigated nature as a source of pleasure in retirement communities. Its benefits include improved mental health, social engagement, and reduced stress.¹⁹ In a 2019 Danish study that examined over 900,000 residents born between 1985 and 2003 and their level of exposure to greenspaces in the first ten years of their life, researchers showed that those who spent less time in greenspaces were at a 55% higher risk of developing a psychiatric disorder later in life. These included depression, mood disorders, schizophrenia, eating disorders and substance use disorders. The results of this study evidence the importance of prolonged exposure to greenspace and support the idea that integrating the natural environment into urban and neighbourhood planning is important to the improvement of the mental health of the general population.²⁰ The mutual relationship between humans and nature is another important dimension to understand. With two colleagues, Carleton University professor of Psychology Dr. John Zelenski, led a study that exposed subjects to natural

¹⁸ Weir, Kirsten. "Nurtured by Nature." *Monitor on Psychology*. American Psychological Association, April 1, 2020. <https://www.apa.org/monitor/2020/04/nurtured-nature>.

¹⁹ Bratman, Gregory N., Christopher B. Anderson, Marc G. Berman, Bobby Cochran, Sjerp de Vries, Jon Flanders, Carl Folke, et al. "Nature and Mental Health: An Ecosystem Service Perspective." *Science Advances* 5, no. 7 (2019). <https://doi.org/10.1126/sciadv.aax0903>.

²⁰ Engemann, Kristine, Carsten Bøcker Pedersen, Lars Arge, Constantinos Tsirogiannis, Preben Bo Mortensen, and Jens-Christian Svenning. "Residential Green Space in Childhood Is Associated with Lower Risk of Psychiatric Disorders from Adolescence into Adulthood." *Proceedings of the National Academy of Sciences* 116, no. 11 (2019): 5188–93. <https://doi.org/10.1073/pnas.1807504116>.

and architectural landmarks. Their results demonstrated that all types of exposure to “nature,” both virtual and in real life, made people more charitable and also gave them a better grasp of sustainability.²¹ One of the explanations for this recurring pattern was the emotion associated with awe, wonder and inspiration, when contemplating things that are sublime, such as the beauty of nature.²² Zelenski concludes: “One of the things that may come from awe is the feeling that the individual is part of a much bigger whole.”²³ Enhancing such a connection to a bigger whole is the goal of the design component of this thesis.

Bringing awe into urban and suburban planning? Yes, this should interest planners and architects in the present time and this thesis will consider how to do so. In addition to promoting good mental health through the experience of being related to a “larger whole,” providing a green urban setting to citizens promotes physical activity and helps to reduce the effects of loneliness and social isolation. This sense of connection to a

²¹ The experiment's participants were shown educational movies juxtaposing natural and manmade environments. Nature movies concentrated on undeveloped areas with plentiful fauna and flora, whilst architectural landmark videos highlighted man-made locations. Following the two relatively 'pure' representations of nature and non-nature, it was defined as manipulating the participants' mood and subjective relationship with nature.

²² “Awe.” *Merriam-Webster.com Dictionary*, Merriam-Webster, <https://www.merriam-webster.com/dictionary/awe>. Accessed 29 Mar. 2022.

²³ Zelenski, John M., Raelyne L. Dopko, and Colin A. Capaldi. “Cooperation Is in Our Nature: Nature Exposure May Promote Cooperative and Environmentally Sustainable Behaviour.” *Journal of Environmental Psychology* 42 (2015): 24–31. <https://doi.org/10.1016/j.jenvp.2015.01.005>.

larger whole and to others results in higher levels of overall well being.²⁴ Exercise is well known to contribute to the physical health of people of all ages. However, as people age, it becomes more difficult for them to push themselves to stay active. The placing of parks near retirement facilities promotes walking, decreases pain, and aids in issues with sleeping, amongst benefitting residents' health in other ways.²⁵ Outside of the visual component, physical interaction with nature plays a positive role as well. For instance, gardening can help one grow one's own vegetables and therefore maintain a better diet. Furthermore, the introduction of wildlife into one's day-to-day life can encourage movement and exploration.²⁶

Including nature in one's life can also take the form of spending time with domestic animals. Through the act of dog-walking, owners engage in significantly more physical activity, and also participate more with a community, which reduces the risk of cardiovascular disease.²⁷ Many cat owners who keep their cats indoors often venture out

²⁴ Cartwright, Benjamin, Mathew White, and Theodore Clitherow. "Nearby Nature 'Buffers' the Effect of Low Social Connectedness on Adult Subjective Wellbeing over the Last 7 Days." *International Journal of Environmental Research and Public Health* 15, no. 6 (2018): 1238. <https://doi.org/10.3390/ijerph15061238>.

²⁵ "The Importance of Nature in Older Populations." Health, Making the case, Short reads. Nature Sacred, August 2, 2016. <https://naturesacred.org/nature-seniors/>.

²⁶ Wolf, K.L., & E. Housley. 2016. *The Benefits of Nearby Nature in Cities for Older Adults*. Annapolis, MD: The TKF Foundation.

²⁷ Engemann, Kristine, Carsten Bøcker Pedersen, Lars Arge, Constantinos Tsirogiannis, Preben Bo Mortensen, and Jens-Christian Svenning. "Residential Green Space in Childhood Is Associated with Lower Risk of Psychiatric Disorders from Adolescence into Adulthood." *Proceedings of the National Academy of Sciences* 116, no. 11 (2019): 5188–93. <https://doi.org/10.1073/pnas.1807504116>.

to fetch their pet grass.²⁸ Such behaviours revolve around caring for pets, and give the elderly additional activities and purpose. However, health reasons such as allergies, the expense of owning a pet, and restrictions placed upon them by their landlords, prevent some elderly people from owning a domestic animal. Others find it challenging to care for a pet, or are afraid to become attached to or form an emotional bond with an animal in case it one day dies or is lost.²⁹ Possible solutions for these issues – such as the introduction of wildlife – will be discussed later in this thesis, as part of the presentation of an architectural proposition for a retirement community for 5044 Hope Side Road.

Green-washing Retirement Housing in Ontario

Numerous retirement communities take pride in their ability to provide amenities, such as a variety of services and recreational activities. Similarly to rental housing, the target audiences of these retirement communities vary depending on where the building is located within the city. Retirement housing built closer to the hearts of downtowns can provide convenient access to shopping, cafés and interactions with the community.³⁰ On

²⁸ Buzhardt, Lynn. “Where the Green Grass Grows: Grass Treats for Cats.” Know Your Pet. VCA Animal Hospitals. Accessed March 29, 2022. <https://vcahospitals.com/know-your-pet/where-the-green-grass-grows-grass-treats-for-cats>.

²⁹ Todd, Zazie. “The Challenges and Benefits of Pet Ownership for Seniors.” Edited by Gary Drevitch. Psychology Today. Sussex Publishers, June 19, 2019. <https://www.psychologytoday.com/ca/blog/fellow-creatures/201906/the-challenges-and-benefits-pet-ownership-seniors#:~:text=Research%20has%20shown%20having%20a,older%20adults%20a%20daily%20routine>.

³⁰ “Overview.” Sorrento Retirement, January 6, 2022. <https://sorrentoretirement.com/overview/>.

the contrary, suburban retirement communities cater to a senior demographic that values quiet neighbourhoods and proximity to "nature." However this suburban version of "nature" is frequently distorted. Facilities' websites often give false impressions about their housing's health score through misleading images of flora. These websites create the illusion of housing surrounded by a "natural environment." More often than not, however, these facilities exaggerate closeness with nature via carefully shot photographs of the on-site landscaping. Photographs of street offsets or of narrow ancillary greenspaces with manicured lawns and unkempt trees usually do the trick. In better scenarios, there are parks or forested areas in close proximity to the site. These are marketed as ideal settings for outdoor activities that inhabitants looking to reconnect with nature may enjoy. The following advertisements for three suburban Ontario retirement communities chosen at random illustrate the idea of false greenery.

Evergreen Retirement Community

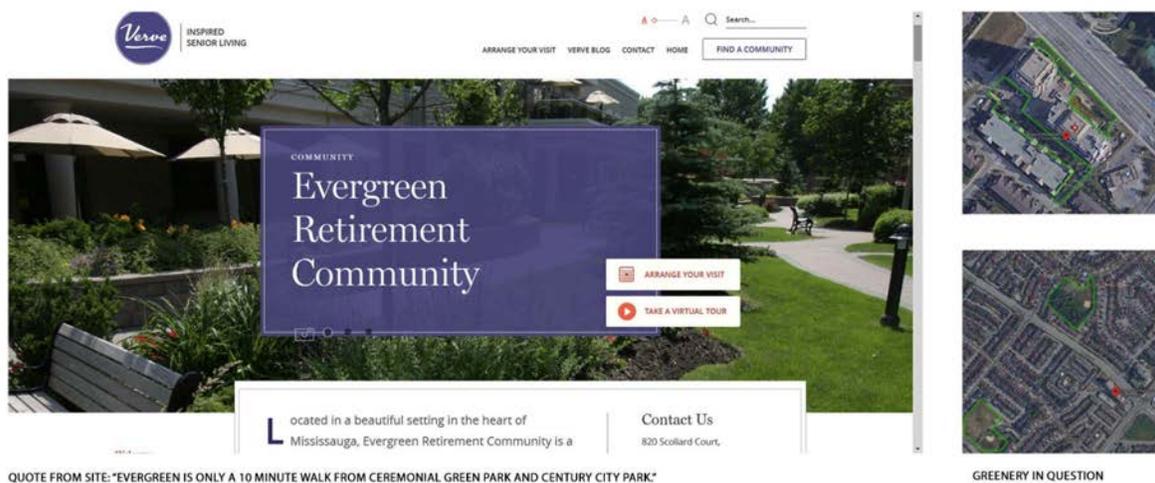


Figure 7: Evergreen Retirement Community.

Located at 820 Scollard Ct, Mississauga, Ontario, Evergreen's false narrative starts with its name. The photo that fills the screen as the facility's website loads is one of greenery. The latter, which serves as the main image to represent the community, strategically centres on a green lawn. As seen on the top map, the community is in fact filled with buildings and roadways. What little narrow human-made landscaped space there is, is covered with turf and only very few trees. Zooming out reveals the two parks mentioned on the site and makes the residences' proximity to nature legible. However, both parks, much like the community's grounds, are isolated and generally covered with turf (Fig. 7).³¹

³¹ "Evergreen Retirement Residence, Mississauga: Verve Senior Living." Evergreen Retirement Community. Accessed March 29, 2022. <https://www.verveseniorliving.com/evergreen/>.

Chartwell Stonehaven Retirement Community

Personal tours or virtual tours available. [Click Here](#)

Where would you like to live?
City or Postal Code Residence

Chartwell Stonehaven Retirement Community

Located in a forested setting in Kanata, Chartwell Stonehaven Retirement Community offers a range of living and support options to ensure your needs can be met with convenience, flexibility and peace of mind. Our friendly staff, beautiful outdoor space and variety of accommodation options make us an ideal place to call home. Living options at Chartwell Stonehaven include independent living apartments, as well as independent supportive living suites.

Chartwell Stonehaven Retirement Residence

Our independent supportive living suites offer the convenience of a delicious dining program, housekeeping and laundry, leisure opportunities and wellness services. For additional peace of mind, we have the availability of on-site

Chartwell Stonehaven Senior Apartments

Conveniently located adjacent to Chartwell Stonehaven Retirement Residence, our seniors' apartments offer an independent lifestyle coupled with convenient services such as staff on-site 24/7, housekeeping and access to all activities

Questions about living here?
613-663-2968

Book a Tour

Preferred Date
yyyy-mm-d Any Time

First Name (Required) Last Name

Email (Required) (999)999-9999

Questions

Sign up for our newsletter to receive retirement living and lifestyle advice
 Yes No

QUOTE FROM SITE: "...AN IDYLIC PLACE FOR QUIET CONTEMPLATION AND CONNECTING WITH NATURE"
"COMBINING PERSONALIZED SERVICE, BEAUTIFUL NATURAL SURROUNDINGS AND AN ENGAGING LIFESTYLE IN SOUTH KANATA."

GREENERY IN QUESTION

Figure 8: Chartwell Stonehaven Retirement Community.

This combined retirement residence and senior apartment building is located at 70 Stonehaven Drive, Kanata, Ontario. The images chosen for this community's website are taken at angles which deliberately showcase its flora, and disconnect it from its more urban aspects. Unlike Evergreen's retirement community, the Chartwell buildings are at least near a forested area. However, a large amount of the nearby land is flattened to accommodate sport fields. Though it is difficult to tell from the photographs, the leftover forest is actually quite small. I have in fact personally visited Chartwell Stonehaven, and the walk within the Deevy Pines Park does not fully submerge you into the promised "nature" advertised on the website. Rather, one is confronted with noises from

Stonehaven Drive, as well as children’s screams from the sport’s fields, and the nearby suburban housing is always in view (Fig. 8).³²

Bridlewood Trails Retirement Community



Figure 9: Bridlewood Trails Retirement Community.

Located just north-west of the site, at 480 Britta Street, this community's windows face the Monahan Drain. However, the green swath attached to the building is a simple green lawn. The heavily planted garden seen in the image at the top of the website thus falsely represents the facility. In addition, the Meadowbreeze Park across the drain is heavily maintained, therefore the closest natural space to the community is the forest, located

³² "Find the Right Retirement Residence for You." Chartwell Stonehaven Retirement Community. Accessed March 29, 2022. <https://chartwell.com/en/continuum-of-care/chartwell-stonehaven-retirement-community>.

over a thirty minute walk from the Bridlewood Trails; this is a lengthy excursion for an average senior, especially through the busy Hope Side Road (Fig. 9).³³

Looking at these advertisements and how they market retirement communities' living conditions, it is easy to see why someone who truly wants to live in harmony with nature could be dissatisfied.

Ontario Retirement Living Options

As seniors reach their golden years, retirement homes and communities increasingly become popular options for long-term living. When looking for retirement living options within the province of Ontario, the official website of the Province of Ontario defines four broad categories of retirement living options: long-term care homes, retirement homes, rental housing, and other housing types.³⁴

³³ "Retirement Community in Ottawa: Bridlewood Trails Retirement." Bridlewood Trails. Riverstone Retirement Communities. Accessed March 29, 2022.
https://bridlewood.riverstoneretirement.ca/?utm_source=google&utm_medium=cpc&utm_campaign=&utm_term=&adpos=&gclid=CjwKCAjwloCSBhAeEiwA3hVo_aF-vw5tVoDLNkzy5YtZBwDBh_siJc_-a-gHuNCTVJ6XMbaDo6HNRoChScQAvD_BwE.

³⁴ See www.ontario.ca. For a definition of long term care home, the website links to the federal site; see Canada, Financial Consumer Agency, "Government of Canada." [Canada.ca.](http://Canada.ca/) / Gouvernement du Canada.
<https://www.canada.ca/en/financial-consumer-agency/services/retirement-planning/cost-seniors-housing.html>. Accessed May 12, 2021. Ontario.ca also links to Federal/Provincial/Territorial Ministers Responsible for Seniors ForumGatineau, Québec. *Thinking About Aging in Place*. Gatineau, Québec: Human Resources and Skills Development Canada, 2012.

Long-term Care Homes

It is important to note that you do not need to be retired in order to be eligible to live in a long-term care home. From Ontario's definition, long-term care homes provide essential services for adults above the age of eighteen who require assisted living, on site supervision, safety and well-being monitoring, help with daily activities, and twenty-four-hour nursing and personal care. Because seniors' health deteriorates with age, these homes constitute one of the most popular options for senior living. Due to residents' wide ranging needs, long-term care homes provide individualised care plans. The plans are often determined by the condition of an individuals' health, the medication they need, dietary restrictions, the supervision they require, and their exercise routine as prescribed by a physiotherapist.

Though facilities may resemble each other in the overall description of their services, they differ in the range of activities, dining options (communal versus personal), social activities and specialised additional services they offer. The variety and number of provided on-site staff members is perhaps the main differentiating factor between types of retirement living options. The most unique of the workers associated with long-term care homes are “personal support workers” (PSW) which help the residents with their daily needs, and “substitute decision makers” which act to legally make decisions on

behalf of residents that are no longer capable of doing so themselves. Site staff may also be specific to the care provided in each of the facilities. Additionally, homes provide services and facilities such as a variety of medical services, recreational programs, individualised religious and spiritual services, shared dining, living and TV rooms, furnished rooms, housekeeping, personal hygiene supplies, and medical and clinical supplies.³⁵

Retirement Homes

Unlike the previously mentioned long-term care homes which are primarily funded by the provincial government and charities, retirement homes are privately-owned accommodations for seniors who are able to manage on their own and who can pay for themselves. Twenty-four-hour nursing care is not provided as it is expected that the residents will live more independent lifestyles. However, some locations may offer on site doctors, nurses, pharmacists and other health services. Retirement homes allow older individuals to live in a more social environment and keep the workload of managing a private home to a minimum. Most homes offer private rooms and apartments, wheelchair accessibility, social and recreational programs, common areas such as dining rooms or lounges, libraries, stores, gardens, and other, extra charge services such as

³⁵ Province of Ontario. "Explore Your Care Options." ontario.ca. © Queen's Printer for Ontario, January 14, 2022. <https://www.ontario.ca/page/explore-your-care-options>. See also "Living in a Long-Term Care Home." ontario.ca. © Queen's Printer for Ontario, March 29, 2022. <https://www.ontario.ca/page/living-long-term-care-home>.

housekeeping, meal plans and laundry. Rent depends on both the building's location and the quality of living within it. Some more expensive places may offer extra services such as shops, places for religious practice, pools, gyms, and more. Retirement homes are also more flexible in the ways they accommodate their residents. Unlike long-term care homes which allow residents to leave the premises for only limited time periods, and that offer managed meal plans, retirement homes permit residents to leave for extended periods of time. Additionally, residents may opt in or out of dining services, as long as they continue to pay their rent and other fees. Given the flexibility and the range of living arrangements offered at each type of facility, the Province of Ontario recommends that prospective residents visit several locations before making a final selection.³⁶

Rental Housing

Rental housing is distinct from the other alternatives, due to its availability to all ages. In this living scenario, seniors are merely tenants, with the same rights as any renter in Ontario: they pay the property landlord rent in return for a living space.³⁷ In Ontario, social housing falls under the category of rental housing, benefiting the low-income

³⁶ Province of Ontario. "Find a Retirement Home." ontario.ca. © Queen's Printer for Ontario, November 3, 2021. <https://www.ontario.ca/page/find-retirement-home>.

³⁷ Province of Ontario. "Seniors: Find a Place to Live." ontario.ca. © Queen's Printer for Ontario, January 5, 2022. <https://www.ontario.ca/page/seniors-find-place-to-live#section-2>.

population.³⁸ Many elderly people choose this option for a variety of reasons. Older adults are increasingly likely to live alone, especially after one spouse passes away. Renting often means a smaller, and more easily maintainable, space, and promotes cheaper independent living. Renting also allows individuals to live outside of retirement homes which are often associated with final stages of life. Furthermore, apartment living provides a wider range of accommodations and locations than those available at other retirement living accommodations. Living as an average renter promotes senior interactions with residents outside of their age circle, allowing for greater socialisation opportunities as well as nearby help when needed. Renting also allows tenants to move easily if need be. In addition, Ontario funds organisations that help senior tenants with independent living within their own homes; these provide in-home services and personal support assigned to designated residential buildings.³⁹

³⁸ Province of Ontario. "Housing." [ontario.ca](https://www.ontario.ca/document/guide-programs-and-services-seniors/housing#section-2). © Queen's Printer for Ontario, February 24, 2022. <https://www.ontario.ca/document/guide-programs-and-services-seniors/housing#section-2>.

³⁹ Brandon, Emily. "Why More Retirees Are Becoming Renters." *Money.usnews.com*. © U.S. News & World Report L.P., February 26, 2018. <https://money.usnews.com/money/retirement/baby-boomers/articles/why-more-retirees-are-becoming-renters>.

Other Housing Types

Aside from the three most common housing options in Ontario, seniors can choose from various living alternatives within the province. These include:

Adult Lifestyle Communities

Though most are not age restricted, they are often geared towards adults who live away from their children. In cases where age is a restriction, these are also known as “55+ communities.” In most cases the neighbourhoods share a common theme which guarantees the tenants share interests such as that of maintaining an active lifestyle.⁴⁰

Most residents continue to work or volunteer while living in more suitable conditions for their age.

⁴⁰ “Why You Should Think about Moving to an Adult Lifestyle Community.” Web log. *Blythwoodhomes.ca* (blog). Niagara Home Builders Association, September 30, 2020. <https://blythwoodhomes.ca/what-is-an-adult-lifestyle-community-and-who-lives-there/#:~:text=Adult%20lifestyle%20communities%20in%20Ontario,residents%20are%20in%20their%2040s>.

Life Lease Projects

In order to join these communities, applicants must meet specific criteria and often be above a certain age. Residents are both tenants and owners. They purchase exclusive rights to the leased suit and common areas provided within the communities and may purchase additional services provided on site.

Co-operative Housing

Co-op senior living offers communal living; dwellers own a share of a house and have an equal say in how their community operates. Co-ops promote social interactions without the chores associated with single-home ownership. Services may be voted to be purchased and be shared by the community.^{41 42}

Supportive Housing

Made for seniors who want to have their own space while living in close proximity to others. Larger dwellings, which usually house up to ten residents and provide private

⁴¹ Advanced Solutions International, Inc. "About Seniors Housing." AdvantAge Ontario - Advancing Senior Care. Accessed March 29, 2022. https://www.advantageontario.ca/AAO/Content/Resources/Consumers/About_Seniors_Housing.

⁴² Breeding, Brad. "Senior Living Cooperatives Explained." Web log. *My Life Site* (blog), March 25, 2015. <https://mylifesite.net/blog/post/senior-living-cooperatives-explained-2/>.

bedrooms and washrooms as well as communal spaces. In most cases, the housing and the support are linked, with the staff members providing a variety of support for the residents.⁴³⁴⁴

In this thesis, I would like to explore the possibility of combining several of these types of communities and placing them on a larger campus not unlike a university or college campus.

⁴³ “Types of Housing.” Canadian Mental Health Association. CMHA Ontario. Accessed March 29, 2022. <https://ontario.cmha.ca/documents/types-of-housing/#:~:text=Supportive%20Housing,-Referred%20to%20as&text=They%20are%20generally%20operated%20by,of%20support%20within%20the%20residences>.

⁴⁴ Province of Ontario. “Seniors: Find a Place to Live.” ontario.ca. © Queen’s Printer for Ontario, January 5, 2022. <https://www.ontario.ca/page/seniors-find-place-to-live#section-2>.

Chapter 04

Within the Ottawa Context

The Two Belts

To be able to start the site's design we must first understand its surroundings, diving into the morphology of the city.

Greenbelt

As defined by the National Capital Commission (NCC):

The Greenbelt comprises 20,000 hectares of greenspace, including farms, forests and wetlands. It was created in the 1950s to protect the rural land bordering the Capital from urban sprawl. It has since become the largest publicly owned Greenbelt in the world. Most of the Greenbelt (14,950 hectares) is owned by the NCC. The Greenbelt protects natural areas like forests, wetlands, streams and sand dunes that sustain biodiversity. The natural areas in the Greenbelt support human and ecological health in Canada's Capital Region.⁴⁵

⁴⁵ "Greenbelt." NCC. National Capital Commission, November 12, 2021. <https://ncc-ccn.gc.ca/places/greenbelt>. I thank Professor Benjamin Gianni and my advisor for their help reading these broader schemas and summarising them.

The *Greenbelt*, first created to limit urban sprawl and benefit the city's ecosystem, has now been leapfrogged, constrained by the city's growth. The belt is now open at four points along its exterior boundary, two on the east and two on the west (Fig. 10). These are the only potential expansions, or so called "doors" that will enable animal transit into and out of the belt. However, given Ottawa's continually rising population, the city will certainly expand, obstructing these "doors." This growth anticipates that the belt would eventually be totally isolated from any other conserved "natural" regions, which would be substantially detrimental to the city's current ecosystem.

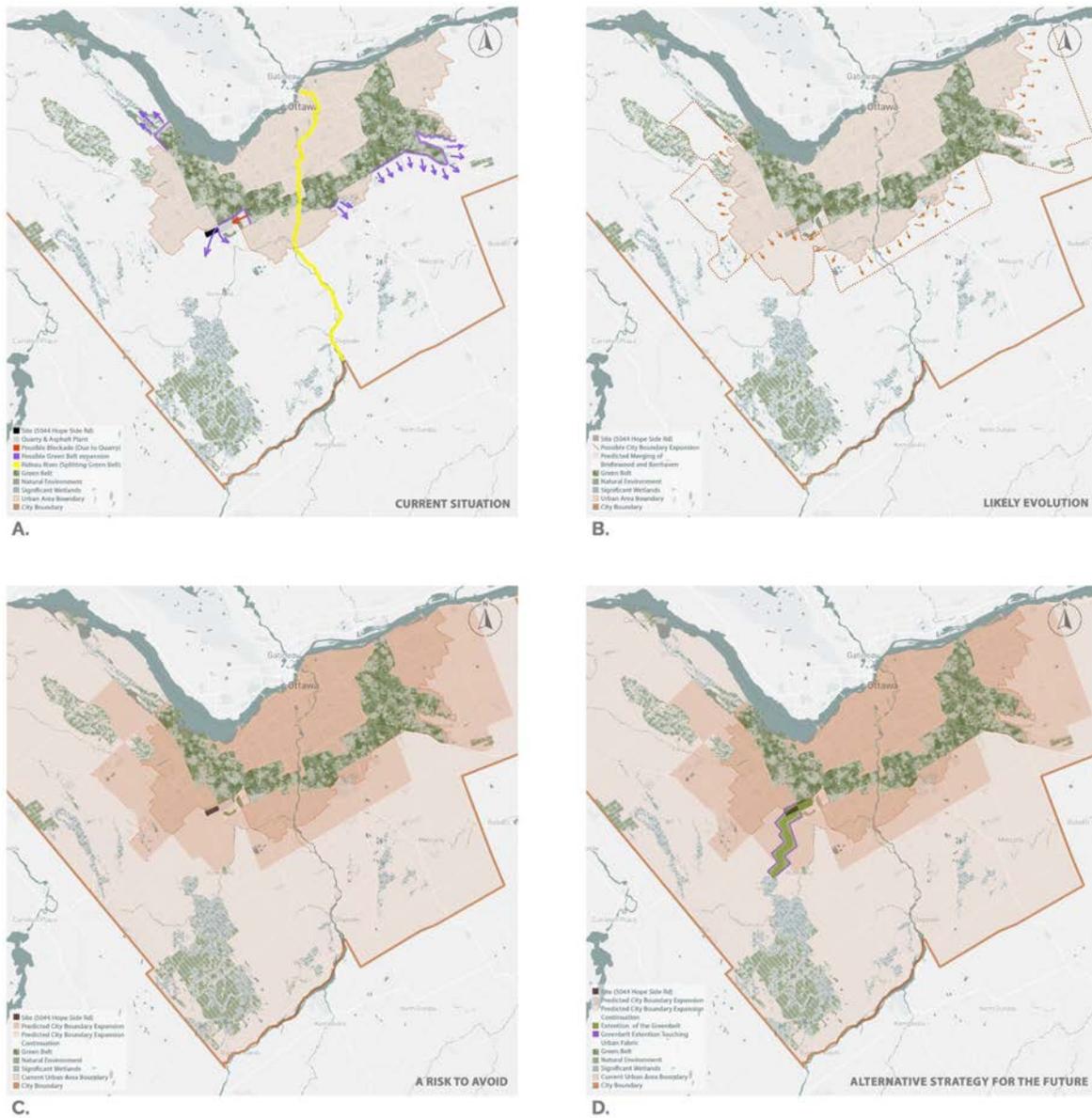


Figure 10:

- The current Greenbelt, its boundaries, and its potential expansion.
- City boundaries likely evolution and eventual caging of the Greenbelt.
- A risk of urban land spreading to all rural regions.
- Alternative future strategy based on the extension of the Greenbelt.

Apart from the Greenbelt, Ottawa is home to a variety of natural environments and significant wetland regions to the southwest of the City (Fig. 11). The largest of these encompasses the Marlborough Forest and is located just south of Ottawa, beneath Richmond Village. If left unattended and overlooked, this area may suffer a similar fate as that of the Greenbelt: the wetlands could become surrounded by development and isolated (and therefore unable to perform their environmental roles). This thesis proposes an alternative strategy for the future in which the lands spanning from the south-west Greenbelt opening towards Marlborough Forest, and associated natural lands, act as a Greenbelt extension. This modification to the city's future growth will provide for a safe route into and out of the belt, and allow wildlife to thrive.

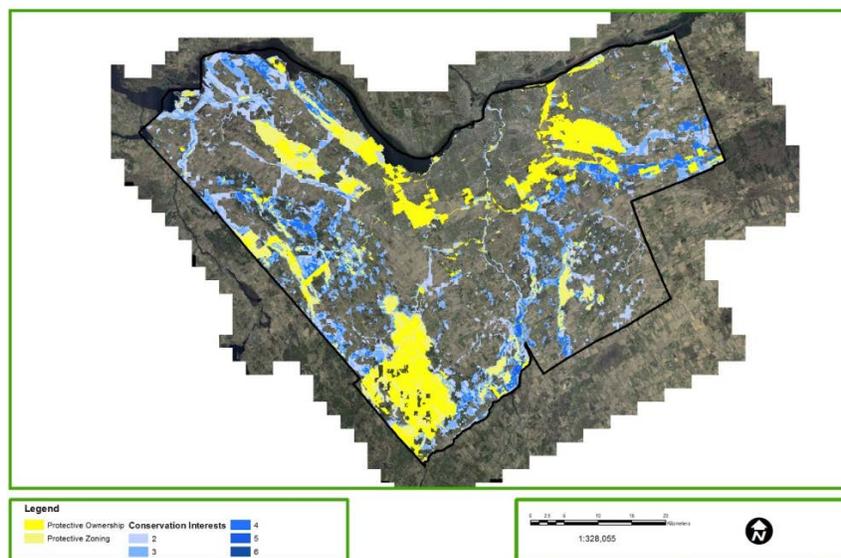


Figure 11: Ottawa conservation and stewardship vision showing existing protected land.⁴⁶

⁴⁶ City of Ottawa. "Moving Forward." Essay. In *New Official Plan Natural Ottawa*, 13. Ottawa, Ontario: City of Ottawa, 2019. <https://ottawa.ca/en/planning-development-and-construction/official-plan-and-master-plans/official-plan/volume-1-official-plan>.

Goldbelt⁴⁷

The city of Ottawa is already taking steps to address the issues of urban sprawl that have been raised in recent years. A new concept of “Goldbelt” is currently being formulated. The idea of the Goldbelt resembles that of the Greenbelt in instauring a zone of non-buildable land to promote density rather than sprawl. Goldbelt land is primarily farmland. The idea of a Goldbelt was first presented in January of 2021 when Ottawa’s city council proposed an addition of a 53,000 hectare urban boundary.⁴⁸ The plan aims to preserve existing suburban communities and their unique identities from being overtaken by future urban expansions and new developments. Another purpose of the Goldbelt plan is to contain and limit urban sprawl until the year of 2100. The policy further prohibits future leapfrogging over the land for the continuation of development.⁴⁹ This proposal is currently undergoing harsh criticism from those affected directly by the changes, including rural land owners (who were waiting for the urban boundary to be expanded in the hope of selling their fields for large sums), Algonquin First Nation groups (who claim there were never consulted on the project), and local environmental advocacy groups (who foresee that Ottawa will need to jump over the

⁴⁷ The term Goldbelt is sometimes spelled in two words in the current literature on this new topic.

⁴⁸ Raymond, T. “City Proposes New ‘Gold Belt’ to Limit Urban Sprawl,” 2021 CTV News. <https://ottawa.ctvnews.ca/city-proposes-new-gold-belt-to-limit-urban-sprawl-1.5269851>

⁴⁹ Planning Committee and the Agriculture and Rural Affairs Committee. Jan 25, 2021. Special Joint Committee meeting (minutes). <https://app05.ottawa.ca/sirepub/mtgviewer.aspxmeetid=8179&doctype=agenda&itemid=41019>

Goldbelt and therefore will build roads through it). In addition, concerns have been raised about the outward expansion and uneven development this policy might promote.⁵⁰

Between its Greenbelt and its Goldbelt, Ottawa has turned to unbuilt land as a way of shaping itself. The city's *Greenspace Master Plan* works to create a more "green" environment for its residents. In this sense, Ottawa has ties to the Garden City tradition. Ebenezer Howard's late nineteenth century idea of the Garden City suggested that humans needed to live in proximity to gardens. His diagrammatic layouts of circular towns of limited size, organised in interconnected networks, contained urban sprawl and overcrowding while balancing quality of life with convenient access to nature.⁵¹ Interestingly, Ottawa's urban form is a half circle terminated by the Ottawa River. If one mirrors the city plan about the River, a circle is created (Fig. 12B). While at a much larger scale, Ottawa is a sort of enormous, reversed, Howardian Garden City. Ottawa is organised in concentric bands, from the downtown to the suburbs, to the Greenbelt, to the agricultural Goldbelt. Howard's small garden cities centre on gardens, and are surrounded by agricultural lands. Apart from scale and order, these concepts are visually apparent when contrasting a Garden City's planning with a mirrored Ottawa's planning. The Garden City's belt logic, though, creates highly fragmented green spaces with

⁵⁰ Best, Chanel. "Ottawa's Planned Gold Belt Expansion: Who Does It Exclude?" *Kroeger Policy*, May 21, 2021. <https://www.kroegerpolicyreview.com/post/ottawa-s-planned-gold-belt-expansion-who-does-it-exclude>.

⁵¹ Britannica, T. Editors of Encyclopaedia. "garden city." *Encyclopaedia Britannica*, January 9, 2012. <https://www.britannica.com/topic/garden-city-urban-planning>.

related isolation of forests, parks, and natural lands. These of course all contribute to biodiversity loss.⁵² The Garden City model must be applied with care, to ensure continuity of green spaces. Its belts are problematic forms that must be reconsidered.

The City of Surrey produced a fascinating biodiversity conservation strategy focusing on the redesign of fragmented greenspaces common in today's city design.⁵³ Working on the City of Surrey, Diamond Head Consulting created a diagram rethinking a way of greenspace design through connectivity and the use of corridors, creating a Green Infrastructure Network, otherwise called *GIN* (Fig. 13).⁵⁴ Interestingly, Vieira Mejía, Catalina, Liubov Shirotova, and Igor Fernando Marques de Almeida's research paper "Green Infrastructure and German Landscape Planning: A Comparison of Approaches" in the Slovenian journal *Urbani izziv* includes this diagram in their piece.⁵⁵ The article presents a very interesting counter-project that reconsiders Garden City logics. Its corridor system links green infrastructure together, avoiding the fragmentation and green-space solitudes of garden cities.

⁵² Fahrig, Lenore. "Effects of Habitat Fragmentation on Biodiversity." *Annual Review of Ecology, Evolution, and Systematics* 34, no. 1 (2003). <https://doi.org/10.1146/annurev.ecolsys.34.011802.132419>.

⁵³ Diamond Head Consulting. Rep. *Biodiversity Conservation Strategy*. City of Surrey, January 2014. https://www.surrey.ca/sites/default/files/media/documents/Surrey_BCS_Report.pdf.

⁵⁴ "Surrey Biodiversity Strategy." Diamond Head. Diamond Head Consulting LTD. Accessed May 6, 2022. <https://www.diamondheadconsulting.com/surrey-biodiversity-strategy>.

⁵⁵ Vieira Mejía, Catalina, Liubov Shirotova, and Igor Fernando Marques de Almeida. "Green Infrastructure and German Landscape Planning: A Comparison of Approaches." *Urbani izziv* 26, no. supplement (2015). <https://doi.org/10.5379/urbani-izziv-en-2015-26-supplement-002>.

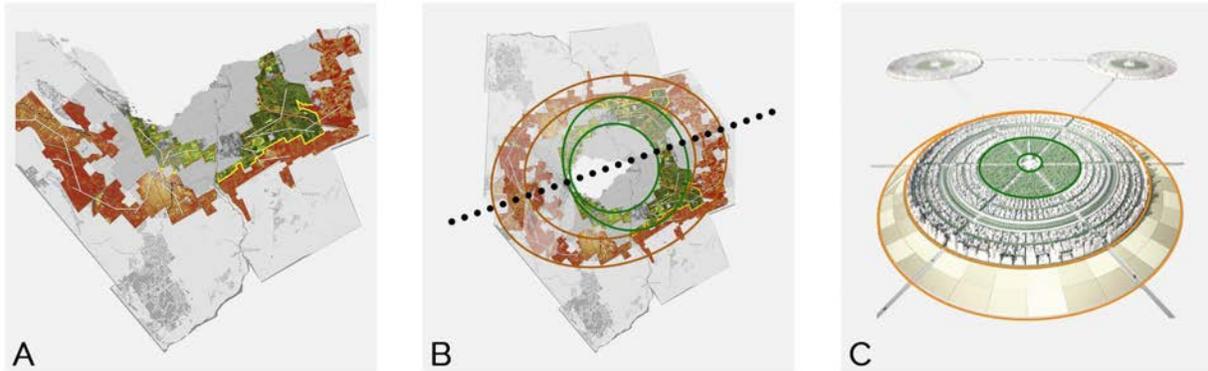


Figure 12: A. Ottawa with Greenbelt and Goldbelt overlapped. B. Ottawa mirrored about the Ottawa River. C. Visualisation of E. Howard's Garden City.



Figure 13: Green Infrastructure Network (*GIN*) strategy.⁵⁶

⁵⁶Nayana 54321. "Garden City Movement." SlideShare a Scribd company, March 31, 2017. <https://www.slideshare.net/NayanaD123/garden-city-movement>.



Figure 14: Screenshots taken of Ottawa through google-maps to showcase the fragmented greenery in the city.

The map on Figure 15 shows a satellite view of the large agglomeration of Ottawa in which Green and Gold belts are highlighted. The Rideau River traverses the City in the middle. The map shows that the belts touch east of the Rideau River, while they are separated by neighbourhoods west of the Rideau River. Animal passage (including migration to the wetlands discussed above - Figure 10) will therefore be difficult in the western portions of Ottawa including the site that this thesis investigates. The environmentalists' criticisms of the Goldbelt proposal are easy to understand.

To the west of the Rideau River, the two belts touch at only two locations, one being 5044 Hope Side Road (the site for this thesis proposition), and the other, a “motovotive plaza” (a grouping of car dealerships) situated along the 416 - Veterans Memorial Highway (Fig. 15). The site at 5044 Hope Side Road is therefore the only valid passageway between the two belts in western Ottawa.

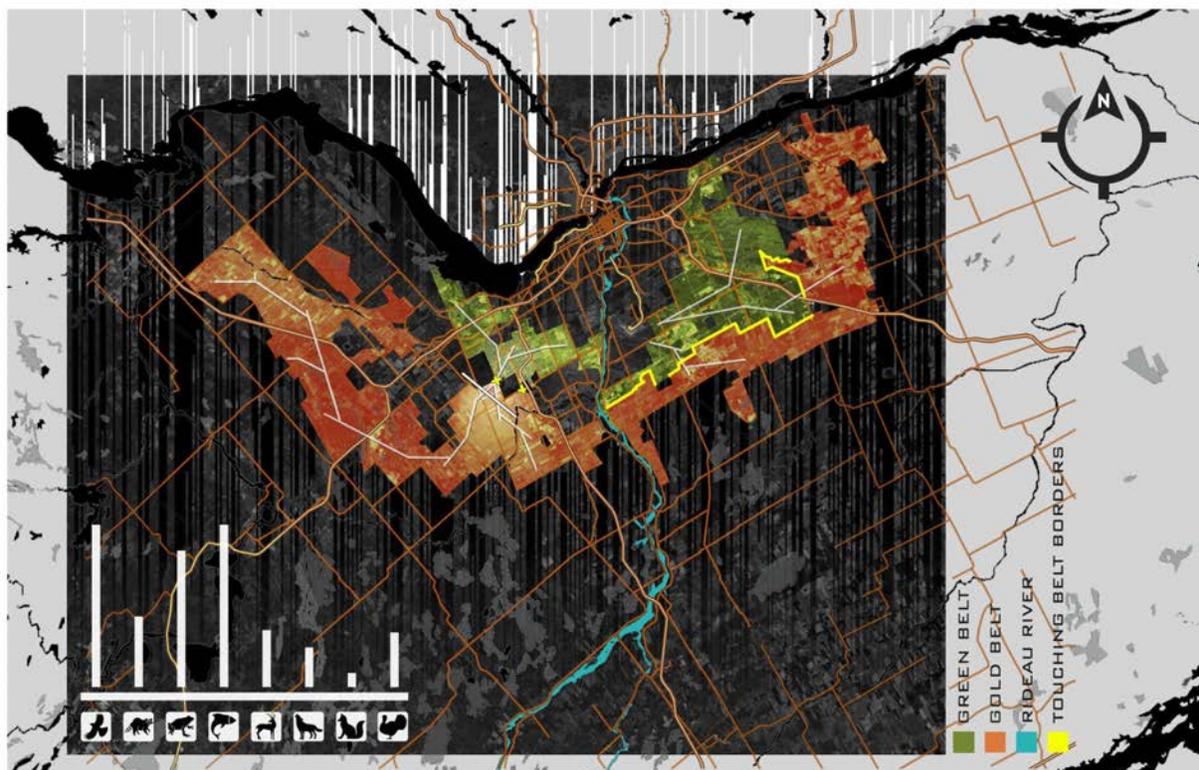


Figure 15: Estimated wildlife routes across the land in relation to the larger context of Ottawa's Greenbelt and Goldbelt. To the east of the Rideau River, Gold and Green belts touch, while to the west, they are separated by neighbourhoods.

As of this day, the site's future development may go in one of two proposed directions: a neighbourhood expansion on the Bridlewoods side, which will connect Kanata, Stitsville and Nepean, and block this corner of the Greenbelt, or the preservation of the farmlands through the Goldbelt, which is still indefinite. The corresponding outcome likely guarantees the isolation of a major portion of the western Greenbelts' wildlife for the long term. For the purpose of preservation, it is imperative that the Hope Side Road site be readjusted to be able to survive as a wildlife passageway. With the Goldbelt time frame of 2100 (after which development may be allowed to take place on, or to hop over it) it is also important that what happens at 5044 Hope Side Road be able to withstand future changes, and not be merely a temporary solution.

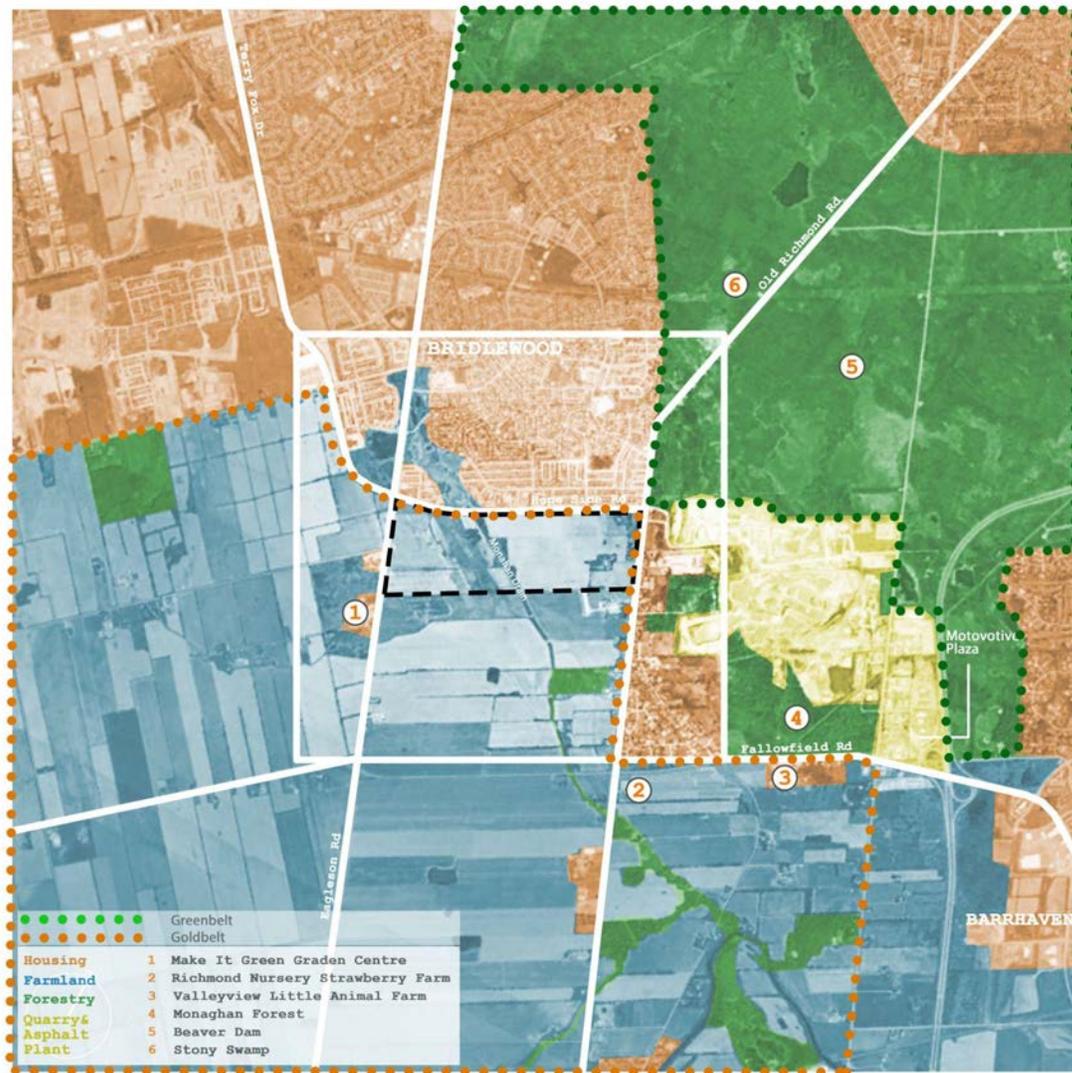


Figure 16: Land use divisions and nearing landmarks.

While the north-west boundary touches a suburban neighbourhood and the eastern side is adjacent to a quarry, the remainder of the property is surrounded by vast farmlands, with the exception of the northern corner which is connected to the wooded region within the Greenbelt territory (Fig. 16).

A Closer Study of the Site

Now that the significance of this area within the wider context of Ottawa has been established, the site must be examined in further detail. The future development of the site must reflect its relationship to the streets and immediate surroundings, functioning as a buffer between these zones.

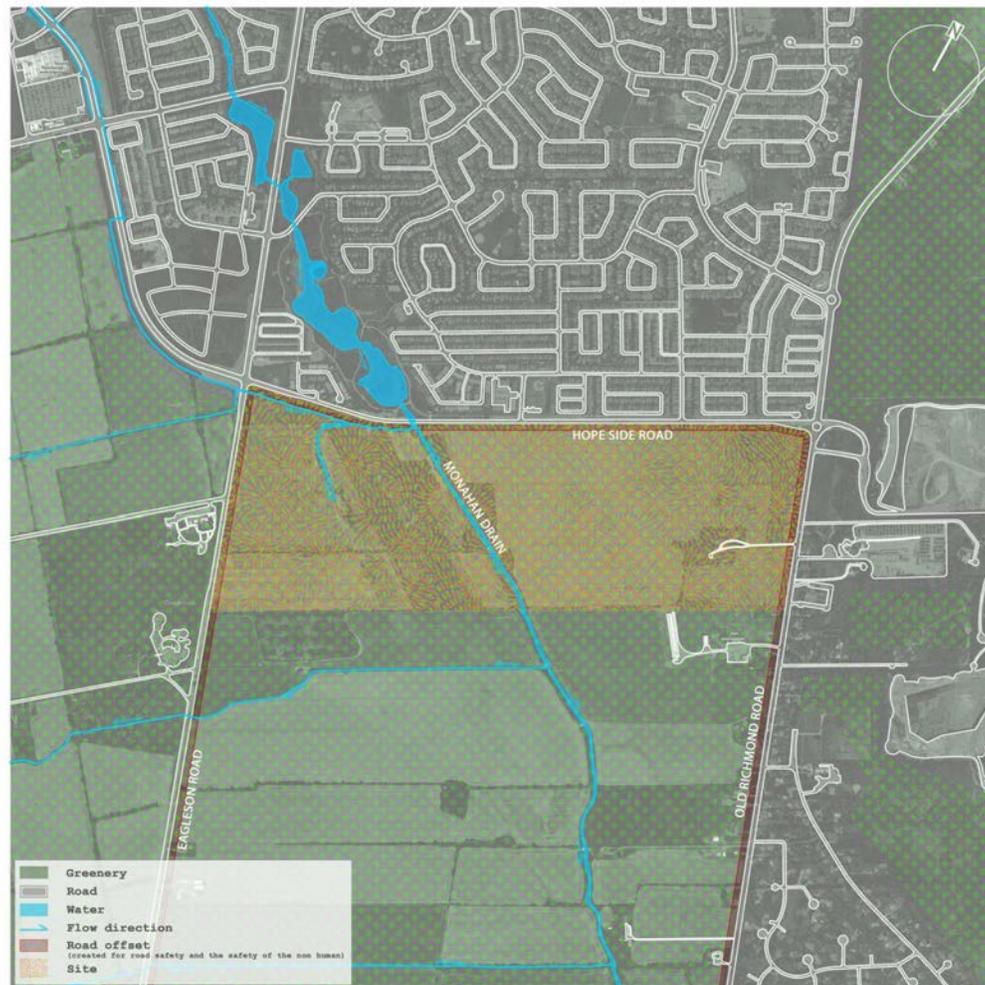


Figure 17: Land use and landscaping features.

A further examination of the surrounding landmarks reveals that the region is heavily nature oriented, meaning the site's proposed development will only amplify the area's environmental awareness (Fig. 17). These landmarks fall into four categories;

1. In-work zone with potential for future green expansion: Tomlinson - Moodie Quarry & Asphalt Plant, discussed earlier in this thesis,
2. Flora and fauna oriented facilities: Valleyview Little Animal Farm, Richmond Nursery Strawberry Farm, Make It Green Garden Centre.
3. Forested lands: Monaghan Forest, Stony Swamp, Lime Kiln Trail, Beaver Dam, and connections to further trails.
4. Maintained parks: Maplewood and Meadowbreeze parks.

The site's terrain is on a slope, but it may be considered flat relative to its span, whereas the only angle of inclination is along the Monahan Drain (Fig. 18).

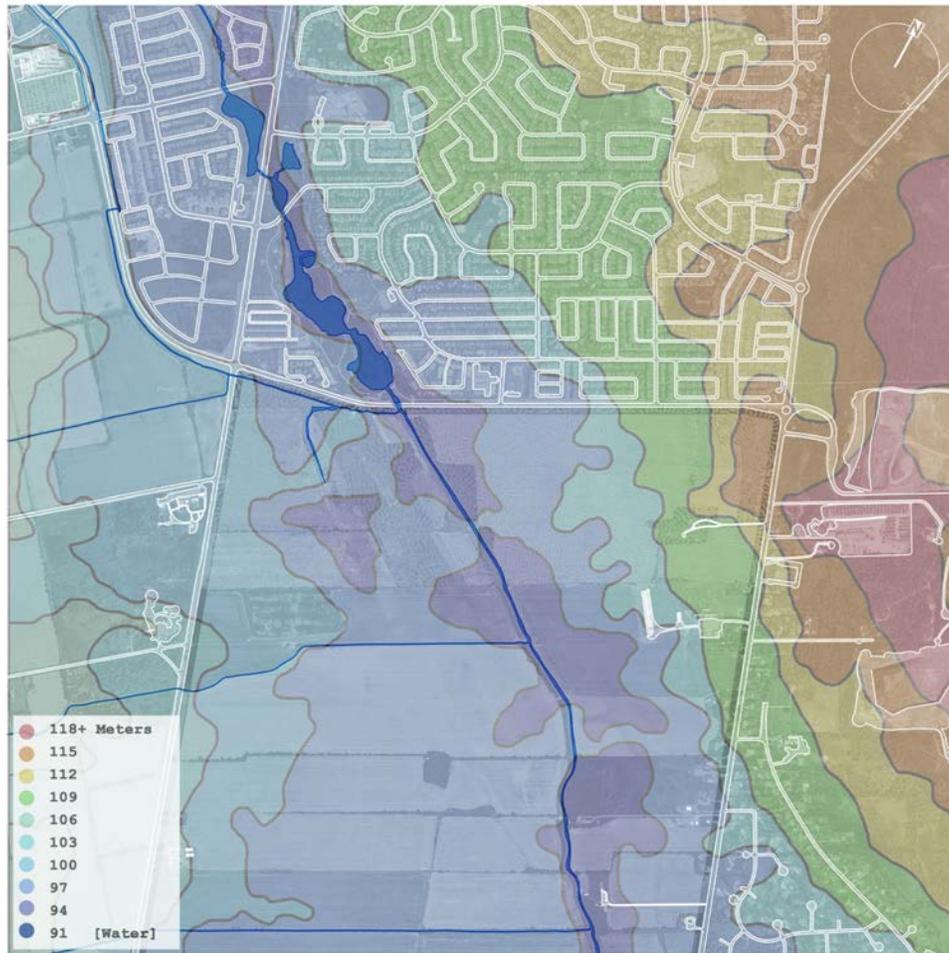


Figure 18: Topographical map.

Through the years of 2016 to 2021 a series of wildlife sightings were observed. These and the associated migratory paths are represented in the next two maps (Fig. 19, 20).



Figure 19: Sightings of wildlife through the years of 2016 to 2021 as well as early on proposed green bridges and road expansions.

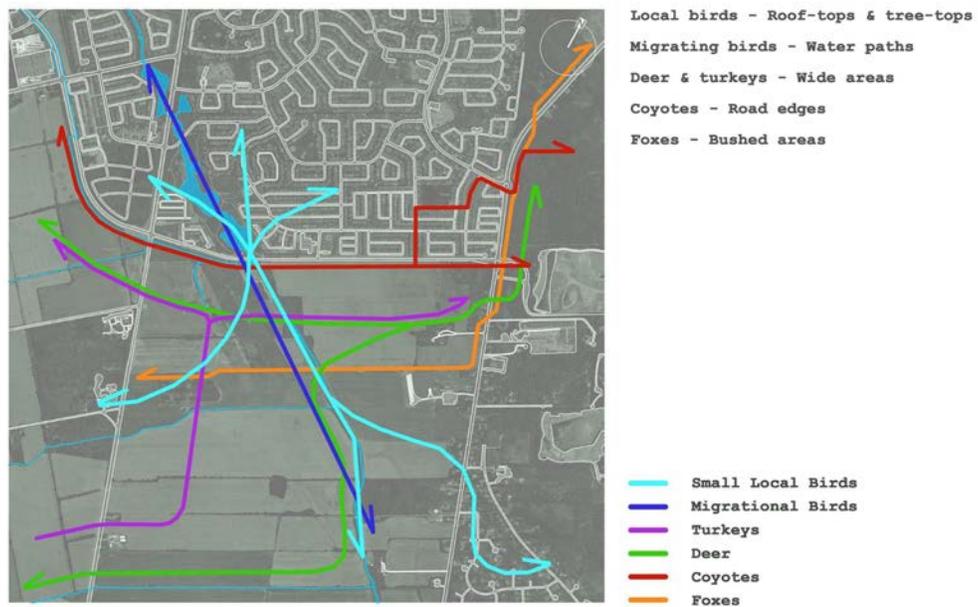


Figure 20: Approximate roots of spotted wildlife through the years of 2016 to 2021.

Design Proposition at 5044 Hope Side Road: The First Moves

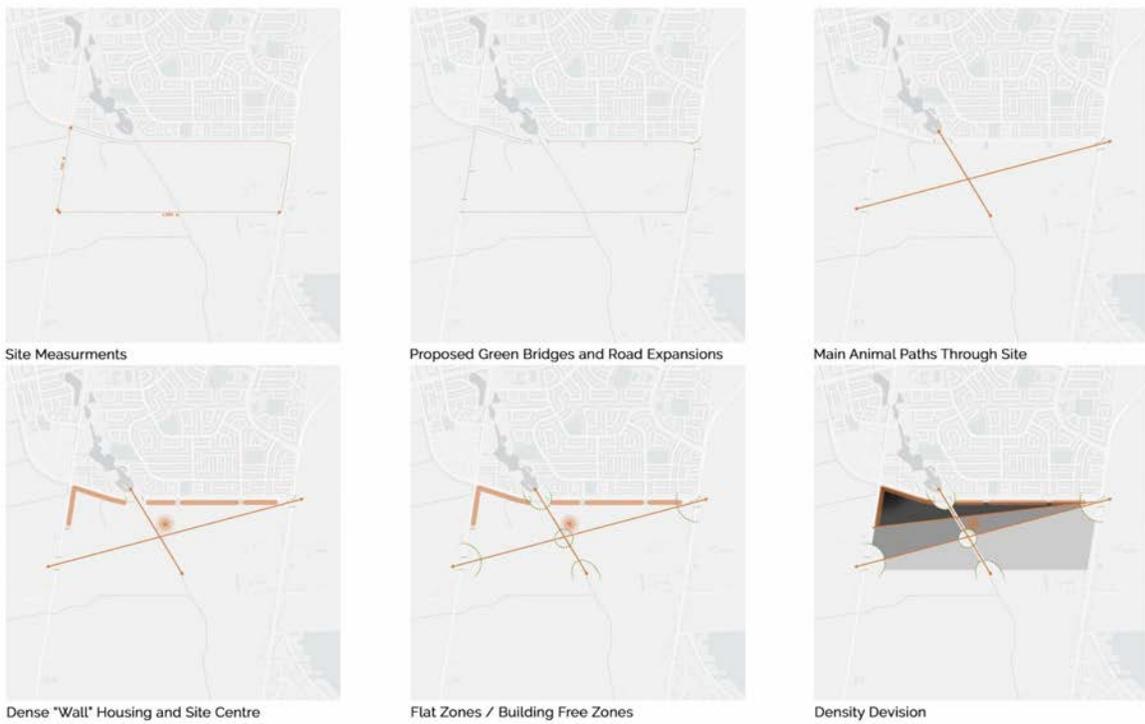


Figure 21: A series of progress guidelines.

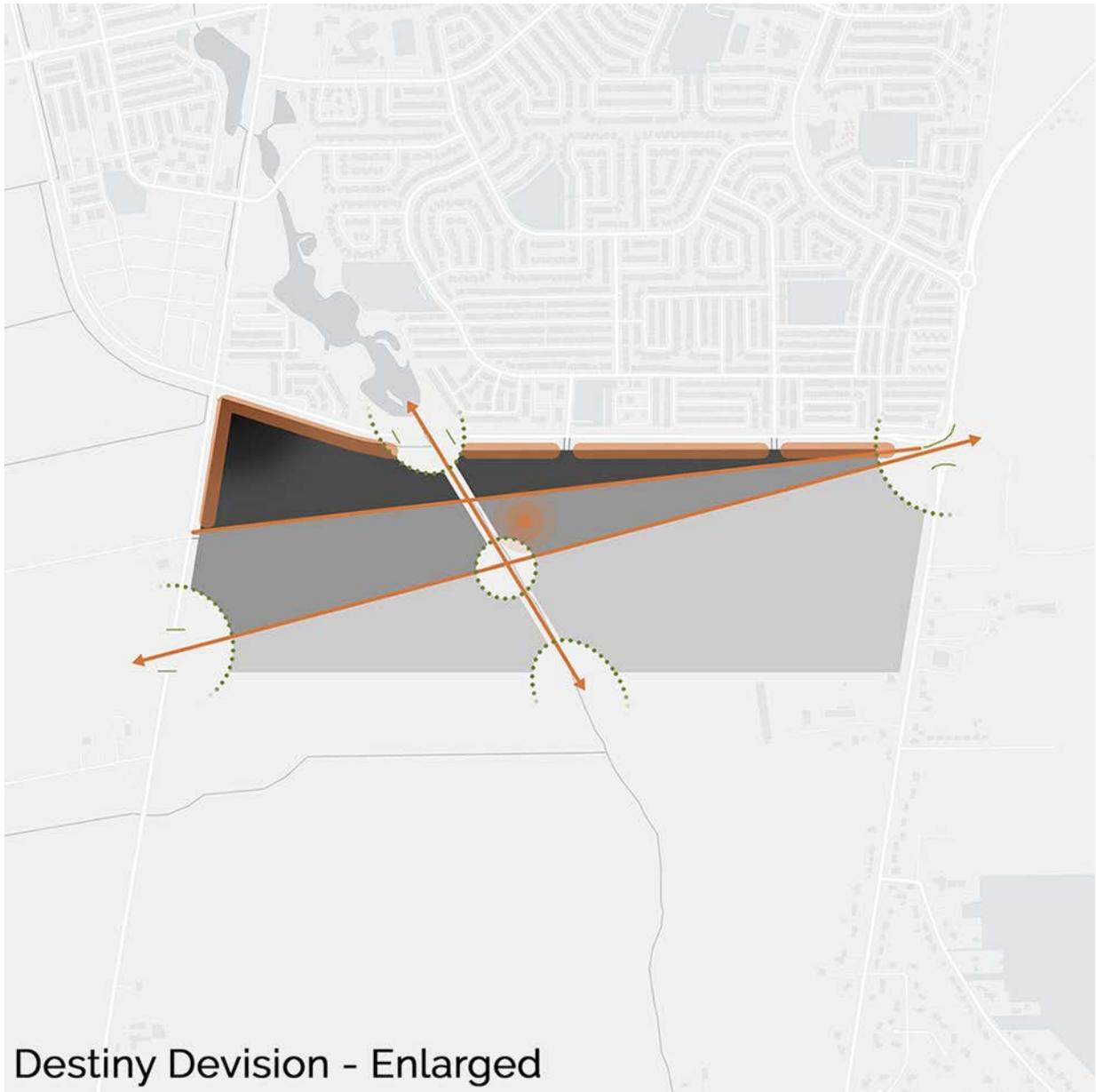


Figure 22: The last map of the series of progress guidelines enlarged.

Roads and Passageways

Following these studies, a set of guidelines was generated for the future master plan of 5044 Hope Side Road (Fig. 21). To begin, three roads were chosen to be extended onto the property. This would improve the flow of traffic and reduce access points to the site, while allowing the bulk of the land to remain free of heavy traffic. Due to this location serving as a "passageway" for animals, two directions have been highlighted. The first runs north-south from the Greenbelt to the Goldbelt, continuing into natural lands and wetlands south of Richmond village described above. The second travels east-west along the Monahan Drain. This latter is a secondary path used by smaller wildlife and aquatic fauna.

A Wall of Houses

To prevent wildlife from unintentionally infiltrating Bridlewood, the thesis proposition places a wall of housing along Hope Side and Eagleson Roads. Not only would this wall prevent animals from accessing unwelcoming zones, but it would also act as a light and noise barrier, blocking the sounds and light of vehicles and outdoor recreational areas.

A Community's Centre

Additionally, a site centre with key amenities was to be constructed, in such a location as to make it the shortest distance possible from any point on the field.

An Offset and Unbuilt Areas

The design leaves an unbuilt zone or offset along all the roads that bound the site. This is done to prevent roadkill, which is often caused by drivers who are unaware of crossing animals. Apart from the linear offsets along the roads, the site organises five designated building-free zones, one at each "door," denoted by the animal entrance and departure points, as well as at the intersection of both dominant animal paths through the site, that is to say: along the Monahan Drain and on the diagonal path that connects to the Greenbelt.

A Density Hierarchy

Finally, the retirement campus was to adhere to a density hierarchy that would modulate high density (like that of nearby Bridlewood) in certain parts, with low density in other parts, to leave areas open for animal passage.

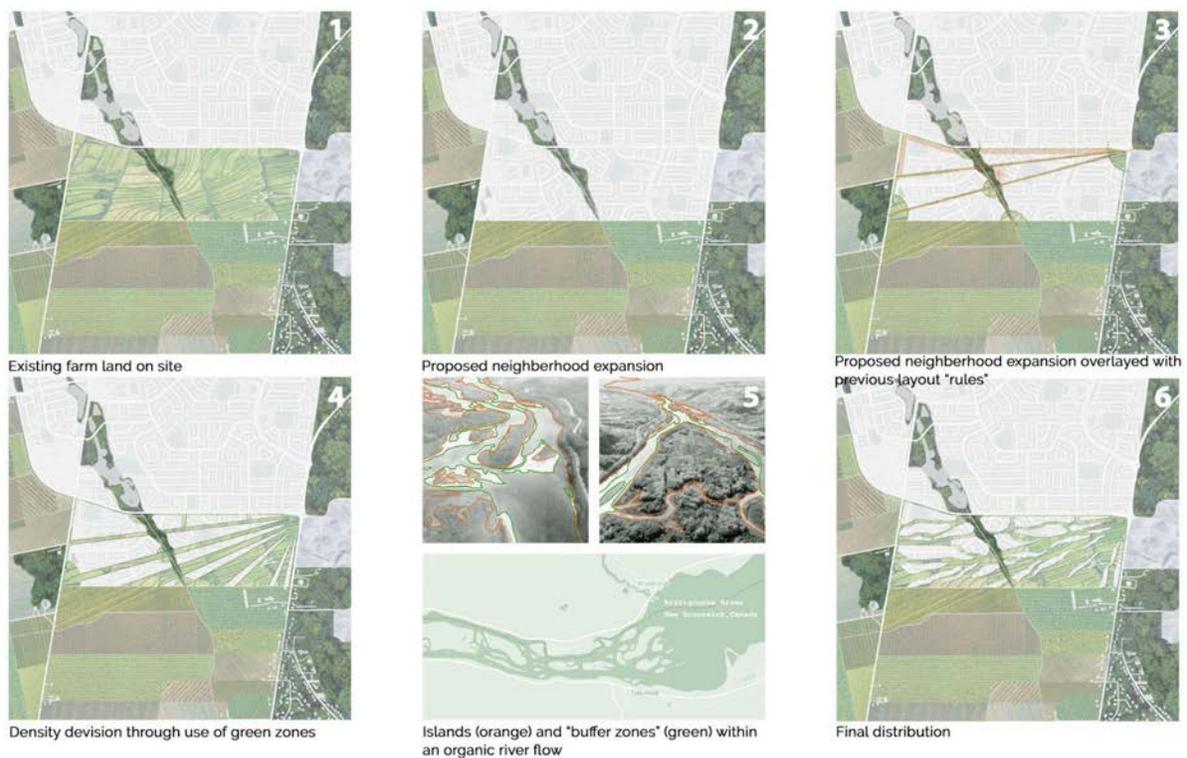


Figure 23: A series of progress maps based on the previous guidelines.

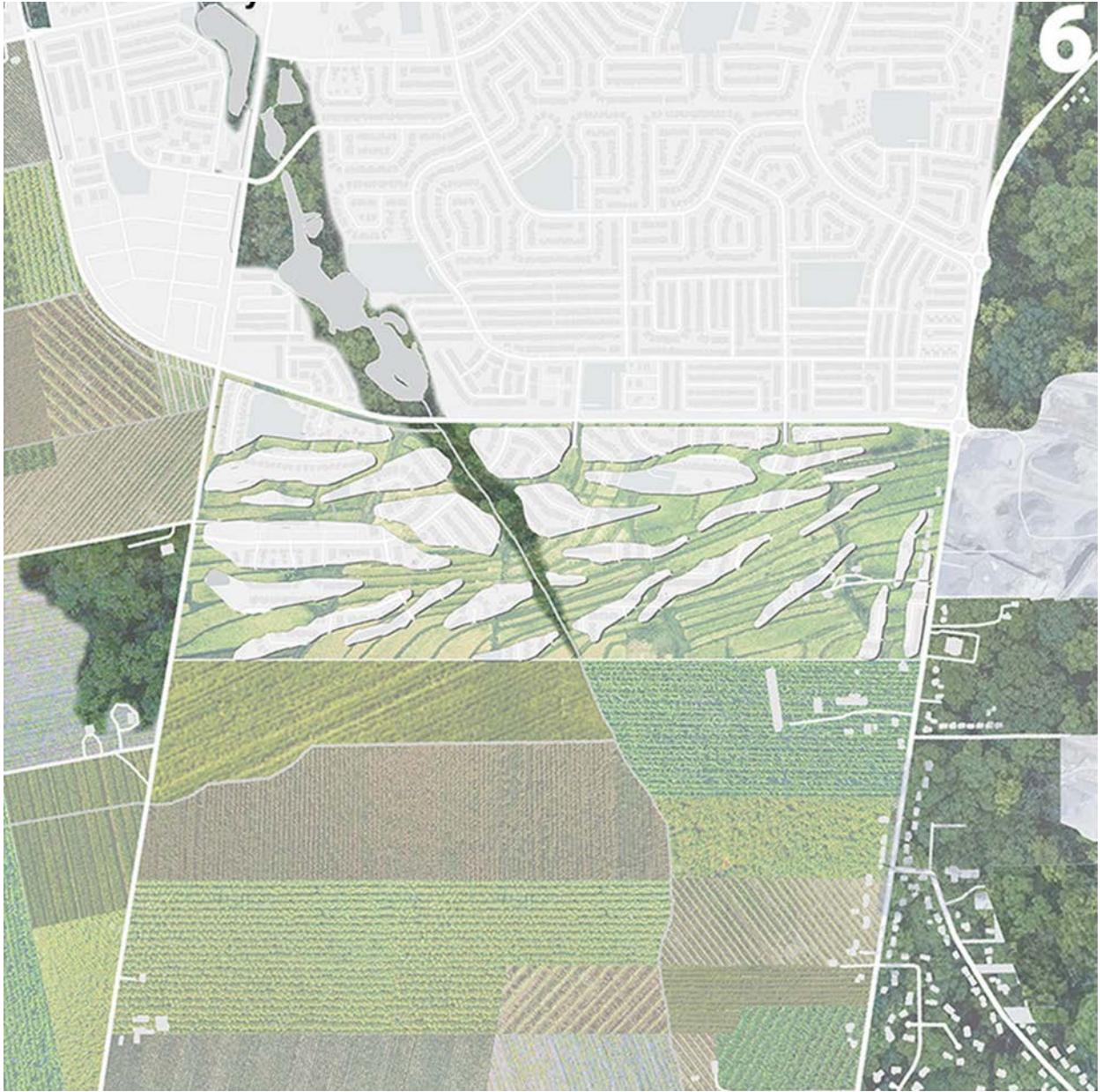


Figure 24: The last map of the series of progress maps enlarged.

A Series of Maps Described

The succession of maps presented above were created to demonstrate the present state of the expansion in map 1, a hypothetical evolution of the expansion in map 2, and finally the application of the previously established rules to split the site into zones and maintain the offsets in map 3 (Fig. 23).

As for the neighbourhood grid that guides this design, the organic structures of rivers were taken as a source of inspiration. Rivers, especially ones with islands, help to provide an image for the building clusters and site massing. Further, as complex regions which neither belong to the densely vegetated flora nor to the naturally flowing waters, beaches around islands are useful metaphors. In this thesis proposition's master plan, the housing clusters are conceived as islands that metaphorically comprise thriving hubs of animal life. The front yards are the corresponding beaches, the only zones in which marine and land animals may interact freely. In this proposition, the unbuilt areas are to the built areas like rivers to islands. The spaces between them, beaches of sorts, offer places for animals and humans to mix and cohabitate. This concept was applied as a sketch onto the already adjusted organisational system seen on the last map of the series (map 6).

Following the final distribution of built and unbuilt zones on the site (map 6), locations were chosen to be developed. Early in the thesis, process models and vignettes of these locations offered a way of searching for and representing imagined animal paths (Fig. 25, 26).



Figure 25: Vignettes looking at possible scenarios that could be seen on the future, developed site.

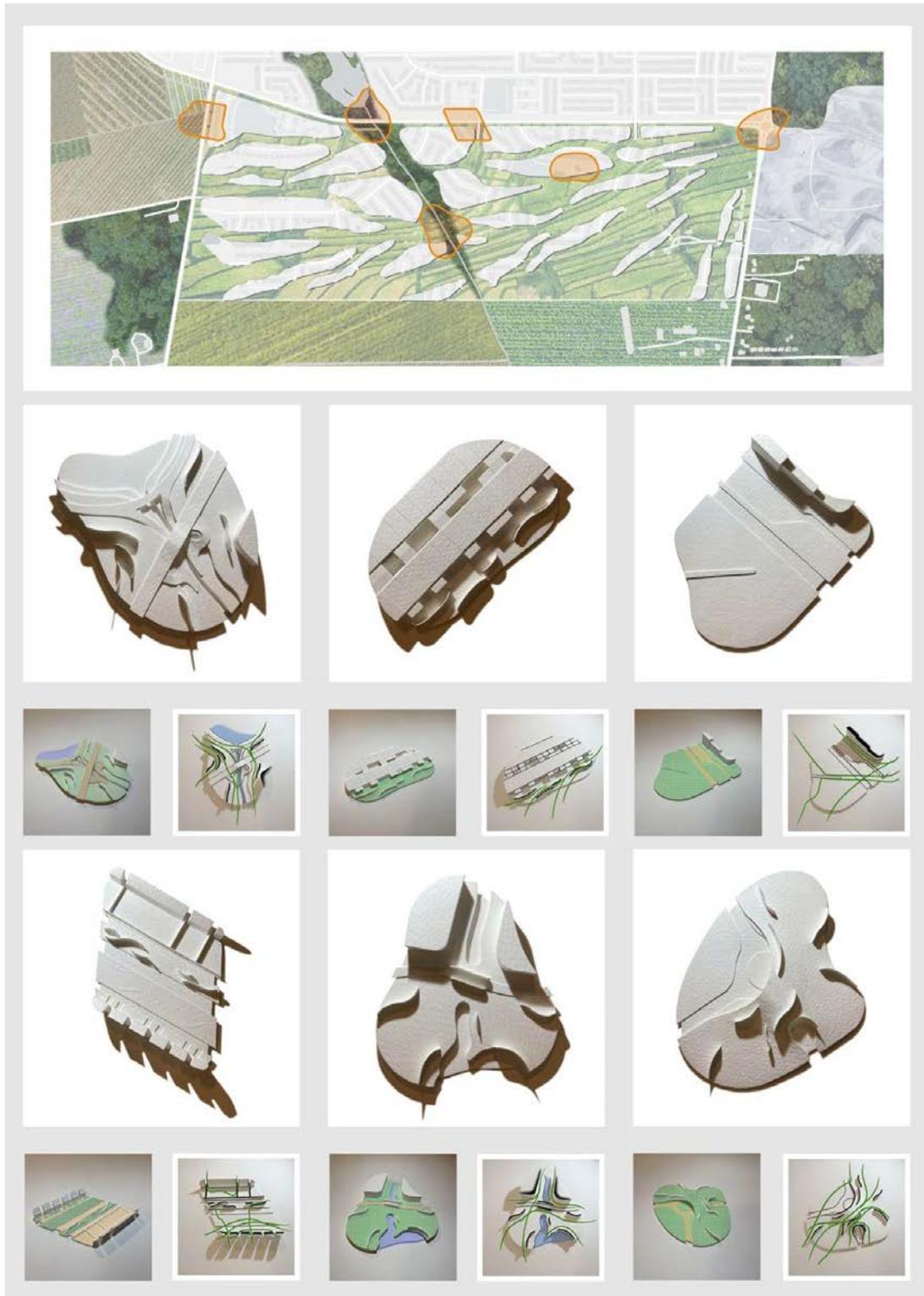


Figure 26: Paper models demonstrating human pathwalk areas (dotted orange), vegetated land (dotted green), and estimated animal routes (green lines). These paper models allude to architectural strategies for folding animal and human realms together.

Chapter 05

Approaching Fauna as Individual Users

Until this stage in this thesis, the site selection and subsequent design organisation considerations have led me to examine the site from the viewpoint of a broader city scale. Similarly to when planning an urban area, a designer must first look at the intended user experience at the scale of transportation and land zoning. Only then can the designer move on to the pedestrian scale of street and sidewalk layouts. After mapping the "X" formed by the directional fauna routes, defining varying zones of density, and reserving unbuilt offsets, the next stage was to examine wildlife behavioural patterns in preparation for designing for them.

Case Studies

The following presents examples of constructions dedicated to facilitating the movement of wildlife from point A to point B, such as wildlife crossings, from around the world. The degree of precision and specificity of their designs is remarkable and underscores

the fact that animals are not a generic group. Designing for animals is a focused task that requires a deep understanding of how each individual species lives.

The Christmas Island Crab Bridge



Figure 27: Christmas Island crabs using the bridge built for them to cross a road.⁵⁷

⁵⁷ Faulkner, Kirsty. *Thousands of Christmas Island Crabs Use a Specially Designed Bridge to Make Their Way from the Forest to Breed in the Ocean*. Photograph. *Dailymail*. Christmas Island: Mail Online, November 14, 2017. Mercury Press. <https://www.dailymail.co.uk/news/article-5080875/Millions-crabs-make-migration-trip-Christmas-Island.html>.

Wildlife bridges have gained popularity as a means of connecting disjointed stretches of land. Overpasses, tunnels, and culverts are the most common types of wildlife bridges. Typically, these corridors are developed with native flora to mimic the natural terrain. However, this ecological crossing for crabs investigates a different method of design. Given its purpose, the crossing cannot simply imitate the surrounding environment. The bridge is constructed of a net-like material that facilitates gripping, yet its boundaries and on-ground bald barriers are low enough to not obstruct the movement of other species (Fig. 27).⁵⁸

⁵⁸ Malm, Sara. "Millions of Crabs Make Migration Trip on Christmas Island." Daily Mail Online. Associated Newspapers, November 14, 2017. <https://www.dailymail.co.uk/news/article-5080875/Millions-crabs-make-migration-trip-Christmas-Island.html>.

Flying Squirrel Pole Crossings



Figure 28: Poles located at the sides of the road to allow for the safe passage of flying squirrels.⁵⁹

This design, like the crab bridge, targets a single species and modifies its surrounding terrain as little as possible. To assist gliders in crossing busy roads or wide fields where they would be exposed to on-ground predators, wooden poles measuring six to twelve

⁵⁹ Hendershot, Don. "Hey, Can a Squirrel Get a Lift around Here?" Web log. *The Naturalists Corner* (blog), November 27, 2010. <https://thenaturalistscorner.com/hey-can-a-squirrel-get-a-lift-around-here/>.

metres in height were erected.⁶⁰ Their proximity to trees, their wooden texture, and their height, made them visible to the gliders. Though simple, the idea was successful, and gliders commonly utilise these poles.⁶¹ While this approach is still in a trial phase, it is already in practice in a variety of regions across the world, and has been recommended for the habitats of other gliding species (Fig. 28).⁶²

⁶⁰ Littlewood, N.A., Rocha, R., Smith, R.K., Martin, P.A., Lockhart, S.L., Schoonover, R.F., Wilman, E., Bladon, A.J., Sainsbury, K.A., Pimm S. and Sutherland, W.J. (2020) Terrestrial Mammal Conservation: *Global Evidence for the Effects of Interventions for terrestrial mammals excluding bats and primates*. Synopses of Conservation Evidence Series. University of Cambridge, Cambridge, UK.

⁶¹ Goldingay, Ross L., Brendan D. Taylor, and Tina Ball. "Wooden Poles Can Provide Habitat Connectivity for a Gliding Mammal." *Australian Mammalogy* 33, no. 1 (2011): 36. <https://doi.org/10.1071/am10023>.

⁶² Kelly, Christine A., Corinne A. Diggins, and Andrew J. Lawrence. "Crossing Structures Reconnect Federally Endangered Flying Squirrel Populations Divided for 20 Years by Road Barrier." *Wildlife Society Bulletin* 37, no. 2 (2013): 375–79. <https://doi.org/10.1002/wsb.249>.

Amphibian Underpass



Figure 29: Amphibian/reptile passageway through the practice of ground elevation.⁶³

Many locations with significant amphibian and reptile populations experience problems with roadkill. This is because of these animals' tiny scale, and correspondingly, how difficult it can be to see them. Figure 29 displays one of the several animal crossings

⁶³ Shepherd, Thalia. "Life Saving Animal Bridges and Crossings around the World." BigGlobalTravel, March 31, 2020. https://www.bigglobaltravel.com/adventure/animal-bridges-and-crossings-fb/?utm_campaign=Animals%2BBridges%2BLiatN2004%2BV1%2BPHS993%2BVV%3E6%2BEn%2BBig4%2B-%2BMobile%2BWW%2BFB&utm_source=Facebook&utm_medium=WC&utm_content=DC&pst=i_d6ffa6.

designed for use in such instances. Due to the minimal height restriction, these facilities blend into their surroundings and provide a means of movement beneath congested roads.⁶⁴ These simple technical improvements protect amphibians and reptiles from the dangers of fast-moving cars. The height offset is just enough to let the creatures in while making it tough to reach the level above. Furthermore, the dark, damp spaces function as a lure for their users.⁶⁵

These three scenarios demonstrate the need to tailor passageways to the specific needs of specific animals, rather than simply linking two places through a generalised land-bridge. This individualised approach to design for wildlife mirrors the design of human facilities, which studies its users rather than the population as a whole. Take for instance the elderly and retirement communities, children and playgrounds, chefs and cooking spaces: architecture for humans is specific to its users.

⁶⁴ Brehme, Cheryl, Robert N Fisher, and Alexandra Weill. "Animal Crossing: New Research Guides Efforts to Protect California's Amphibians and Reptiles from Road Danger." usgs.gov. Western Ecological Research Center (WERC), May 10, 2021. <https://www.usgs.gov/news/animal-crossing-new-research-guides-efforts-protect-californias-amphibians-and-reptiles-road>.

⁶⁵ Langton, Tom, Tony Clevenger, Cheryl Brehme, and Robert Fisher. "California Sensitive Reptile and Amphibian Highway Crossings." The Western Transportation Institute. California Department of Transportation (CALTRANS), 2021. https://westerntransportationinstitute.org/research_projects/california-sensitive-reptile-and-amphibian-highway-crossings/.

Fauna in 5044 Hope Side Road

My extensive exposure to the site used for this thesis allowed me to observe the animals present on it and grasp how each species navigates and interprets its surrounding space. Though I am aware that there are numerous additional species, my effort focuses on the larger mammals who would use the area most extensively and for whom architectures of passage are more critical. Smaller fauna are examined only briefly due to their lower travel radii: a bee or turtle is not impacted by the placement of buildings (although such things as overhangs and materiality will matter to them).

The 2016-2021 wildlife observation of 5044 Hope Side Road and its vicinity found geese, deer, turkeys, coyotes, and foxes to be the largest of the species spotted actively using the site. This section will attempt to explain these creatures' land use preferences (refer to appendix B for enlarged versions of the drawings).

Canadian Geese

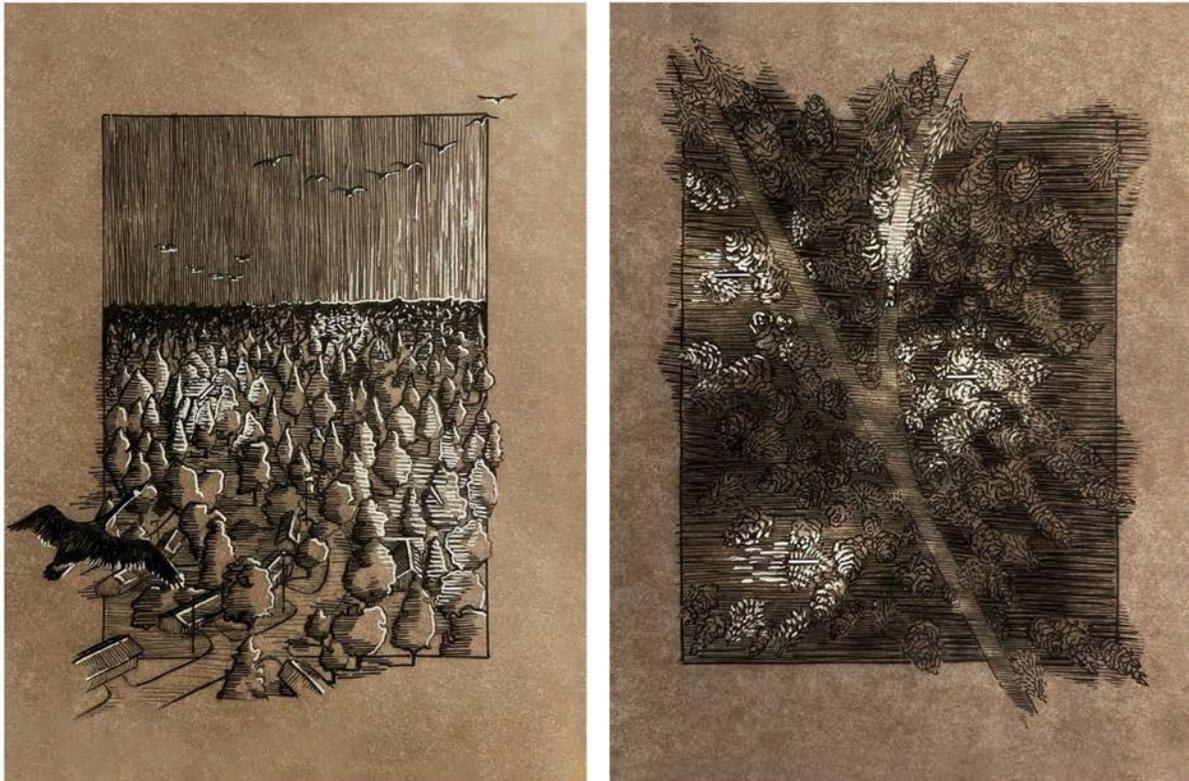


Figure 30: Geese aerial view of migrational path with artificial street light used as an example of memorable landmarks.

Unlike other birds which use the earth's electromagnetic fields to navigate, geese rely on their recollection of landmarks along their migratory routes (Fig. 30).⁶⁶ During their stay in Canada, they use two types of habitats: near bodies of water and in open fields. Their

⁶⁶ Mandell, Brian, Ashley Deese, Kate Echevarria, Katya Vines, and Jean Flanagan. "How Do Birds Navigate?" Smithsonian Science Education Center. Science and Technology Concepts Middle School, January 4, 2018. <https://ssec.si.edu/stemvisions-blog/how-do-birds-navigate#:~:text=Researchers%20have%20also%20found%20some,landmarks%2C%20such%20as%20the%20ocean.>

near-water nesting areas are often isolated or well disguised, either through ground elevation or dense vegetation.⁶⁷ These hiding places also intersect with large flat-scapes, hence why geese could be seen in city parks or near parking lots with accessibility to bodies of water.⁶⁸ When the goslings reach the age of flight and the flocks begin to gather for migration, they occupy fields. This enables them to cluster in large packs in well-observed regions, far from predators.⁶⁹

⁶⁷ “Canadian Geese Breeding Season.” Geese Managment. Geese Relief. Accessed March 29, 2022. <https://www.geeserelief.com/geese-management/geese-breeding-season>.

⁶⁸ WILD NEIGHBORS. “Why Do Canada Geese like Urban Areas?” The Humane Society of the United States. Accessed March 29, 2022. <https://www.humanesociety.org/resources/why-do-canada-geese-urban-areas>.

⁶⁹ “Geese Habitat And Food.” Geese Relief. Accessed March 29, 2022. <https://www.geeserelief.com/geese-problems/geese-habitat-and-food>.

White-Tailed Deer



Figure 31: A deer leaving a forested yard towards an open field (left). A visualisation of the view from a deer's eye; being herbivorous their focus is horizontal (right).

Ontario deer travel from open range (in the summer) to concentrations of woods (in the winter), where they find shelter and food. Deer have been found to travel up to ninety five kilometres to reach so-called "yards," which reach up to 500 kilometres in size. They spend the hot months in open fields, but when winter approaches and they must find alternative sources of food, they migrate to wooded yards, where they may enjoy both the comfort of winter food choices and tree shelter from the snow. Flatland yarding

behaviour allows deer to easily spot, and therefore guard themselves against, predators (Fig. 31). During the winter, the creation of snow trails benefits the deer and is critical for conserving their energy as they travel between food and shelter.^{70 71}

The Eastern Wild Turkey

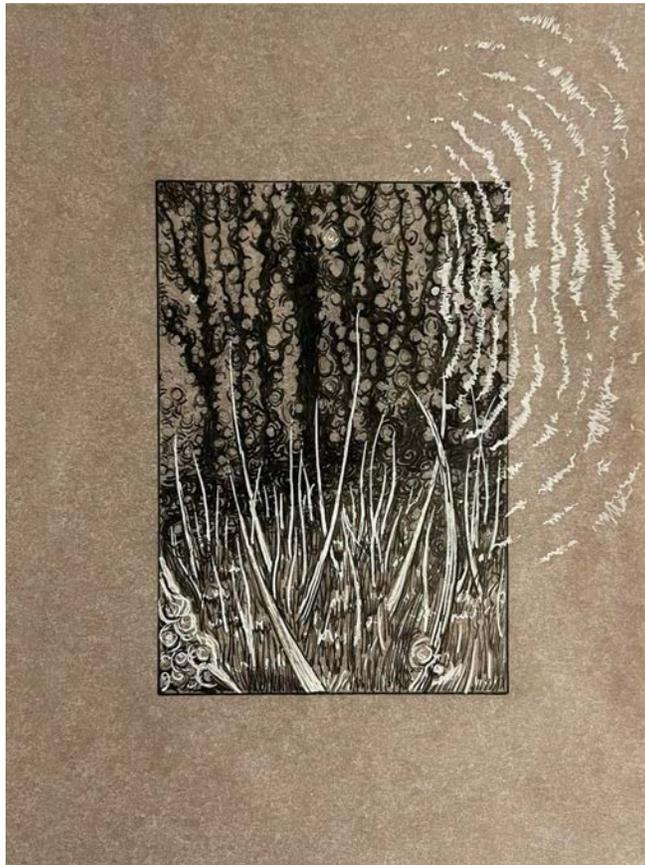


Figure 32: A distress call from a distant turkey warns others to flee from the ground, upwards to the tree branches.

⁷⁰ Humphrey, Bob. "Home Range Movements: Understanding Seasonal Deer Movement." Mossy Oak, November 14, 2019. <https://www.mossoak.com/our-obsession/blogs/deer/home-range-movements-understanding-seasonal-deer-movement>.

⁷¹ Ministry of Natural Resources. "Guidelines for Winter Feeding of Deer in Ontario." ISBN 0-7778-4932-1, n.d. https://www.ofah.org/wp-content/uploads/2015/04/MNR-Guidelines-deer_winterFeeding.pdf.

Eastern Wild Turkeys are similar to deer in their relocation patterns alternating due to food accessibility. The birds move throughout the year, and occupy areas ranging from 1.5 to 5.5 square kilometres. During the mating season, they prefer open grassland and agricultural lands near bodies of water. Otherwise, they go to open woodlands.⁷² Turkeys migrate through tree tops, relying on continuous belts of trees to roost and to avoid on-ground predators. They travel in groups and depend largely on each other's calls to notify them when it's time to flee (Fig. 32).⁷³

⁷² "Wild Turkey Behavior." The National Wild Turkey Federation. Proteus - NWTF. Accessed March 29, 2022. <https://www.nwtf.org/hunt/wild-turkey-basics/behavior#:~:text=Turkeys%20may%20use%20traditional%20roost,as%20they%20can%20comfortably%20perch.>

⁷³ Rossit, Tina-Louise. "Wild Turkeys in Canada." *The Canadian Encyclopedia*. Historica Canada. Article published December 13, 2019; Last Edited December 13, 2019.

The Western Coyote

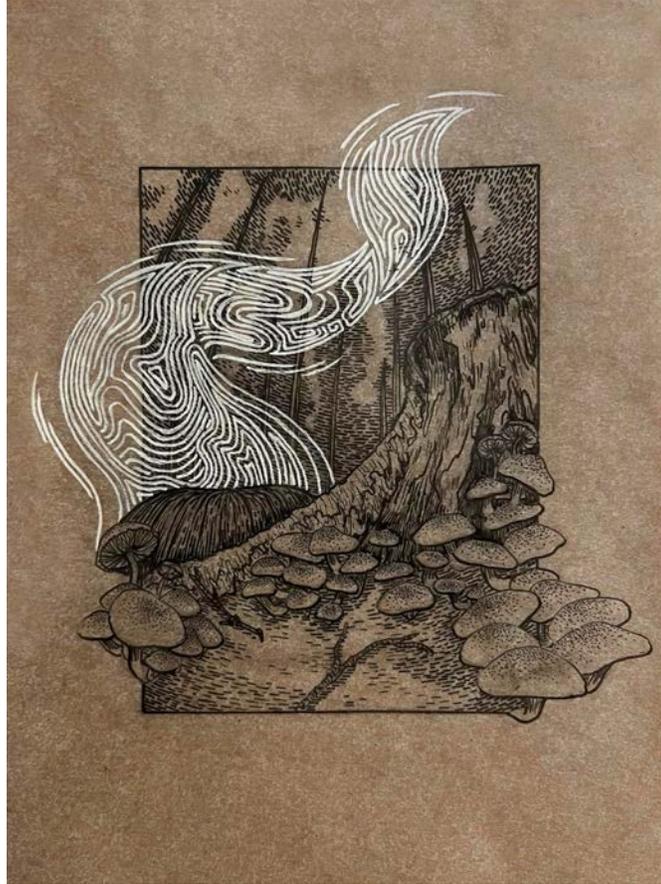


Figure 33: Territorial markings of a coyote; demonstrated through a visualisation of smell.

Dominant in Ontario, Coyotes are most common in areas adjacent to flatter greens. Sometimes, they use forested patches and shrubbery to hide (Fig. 33).⁷⁴ Their movement patterns mainly follow the edges of ravines, roadways, and green corridors, covering a distance of 10 to 15 kilometres. During the harsher winter months these borders may

⁷⁴ *The Urban Coyote*. <https://thamesriver.on.ca/>. This brochure was originally developed by the City of Kitchener. Accessed March 29, 2022. https://thamesriver.on.ca/wp-content/uploads/Coyote_factsheet.pdf.

expand either due to a lack of sufficient food, or the dispersal of territorial markings. The solitary coyote's movement patterns may expand to span up to 155 square kilometres.⁷⁵ Due to their ability to live in close proximity to humans, and to their carnivorous nature, coyotes are sometimes misunderstood to be a threat. However, this is rarely true, as they have only one natural predator: the human.⁷⁶

The Red Fox

Being nocturnal, foxes are much harder to spot in comparison to the previously mentioned wildlife. Their shyness and adaptability allows them to live closely to human settlements with minimal to no interaction. After their initial 10 to 400 kilometre dispersal following the pups maturity into adulthood, foxes stay within their newly chosen range for the rest of their lifespan. Red foxes prefer open lands to dense forests, occupying the natural or manmade edgings of the site (Fig. 34).⁷⁷

⁷⁵ "COYOTES (Canis Latrans)." discover-southern-ontario. SBI. Accessed March 29, 2022. <https://www.discover-southern-ontario.com/coyotes.html>.

⁷⁶ "General Information about Coyotes." General Information About Coyotes | Urban Coyote Research. Cook County Urban Coyote Research Project. Accessed March 29, 2022. <https://urbancoyotereseearch.com/coyote-info/general-information-about-coyotes>.

⁷⁷ Area Guide, The Couples Resort. "Red Fox (Vulpes Vulpes) Ontario, Canada." Red Fox Ontario, Canada - Algonquin Park Ontario Red Fox (Vulpes vulpes). Ontario, Canada. Accessed March 29, 2022. [https://www.couplesresort.ca/attractions/Articles/Animals/red_fox.htm#:~:text=Fox%20\(Vulpes%20vulpes\)-,Ontario%2C%20Canada,and%20much%20of%20North%20America](https://www.couplesresort.ca/attractions/Articles/Animals/red_fox.htm#:~:text=Fox%20(Vulpes%20vulpes)-,Ontario%2C%20Canada,and%20much%20of%20North%20America).

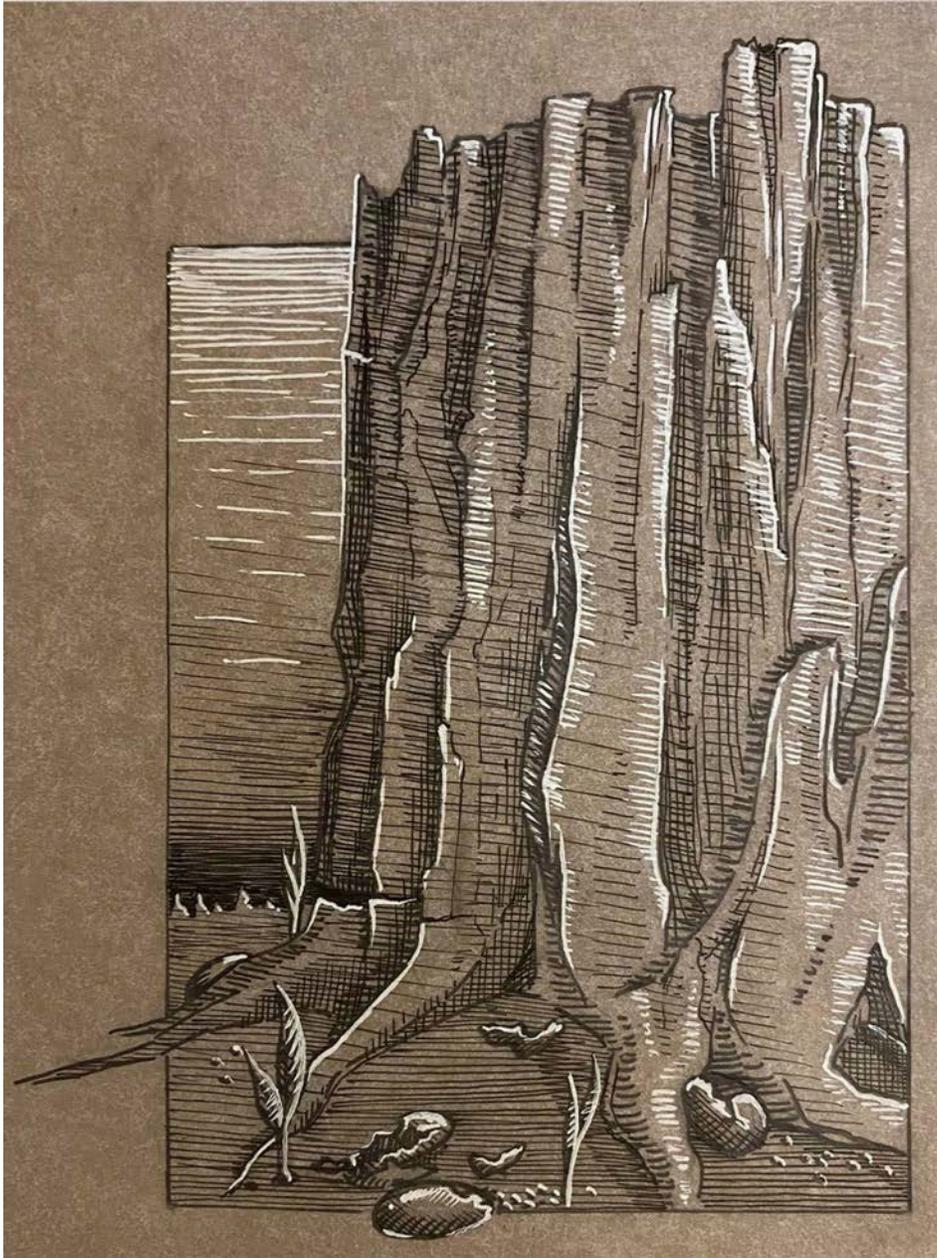


Figure 34: Being curious creatures, foxes may investigate wooded lands, but will keep away from tall shrubs. They prefer paths which stretch along rows of free standing trees.

As a result of these studies it was identified that many of the observed wildlife on the site share similar preferences in land use, especially towards open lands and open forests.

| | Nearing Water | Open Lands | Dense Shrubs | Open Forest | Busy Forest | Human Housing |
|----------------------------|------------------|---------------|-----------------|----------------|----------------|------------------|
| Canadian Geese | ✓ | ✓ | ✓ | | | |
| White-Tailed Deer | | ✓ | | ✓ | ✓ | |
| The Eastern Wild Turkey | | ✓ | | ✓ | ✓ | |
| The Western Coyote | | ✓ | ✓ | ✓ | | ✓ |
| The Red Fox | | ✓ | | ✓ | | ✓ |

Table 1: Primary species and their flora preferences.

Other Fauna

Additionally, firsthand observation revealed that smaller species prefer habitats nearing dense shrubs, and don't mind proximity to human dwellings (Fig. 35):



Figure 35: From left to right: bird flying towards its prey, snapping turtle view from beneath the water surface level, forested area seen through an insect's eye.

Variety of Small Birds

- Avoid large open spaces due to predators.
- Travel in space through a series of vertical points.
- Nest either on shrubs, trees or housing.

Snapping Turtles

- Inhabit water bodies and the touching lands.
- Use shrubs or open lands for nesting.
- Rely on a mixed environment for temperature regulation though sun exposure.

Ontario Frogs

- Inhabit water bodies and the touching lands.
- Use a mix of shrubs and open land for temperature control.
- Often share lawns with human users.

Wasps and Bees

- Though found everywhere, prefer busy areas due to larger vegetation variety.
- Often found nesting on human infrastructure.

Rabbits and Hares

- Often share lawns with human users.
- Use low vegetation to have full visibility of the surroundings.
- Nearing shrubs for fleeing purposes.

| | Nearing Water | Open Lands | Dense Shrubs | Open Forest | Busy Forest | Human Housing |
|------------------------|------------------|------------|-----------------|-------------|-------------|------------------|
| Variety of Small Birds | | | ✓ | ✓ | ✓ | ✓ |
| Snapping Turtles | ✓ | ✓ | ✓ | | | |
| Ontario Frogs | ✓ | ✓ | ✓ | | | ✓ |
| Wasps and Bees | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Rabbits and Hares | | ✓ | ✓ | | ✓ | ✓ |

Table 2: Secondary species and their flora preferences.

These patterns can be further observed in fauna's route studies done in the Abbottsville Trail, Kanata, located a five minute drive north-west of 5044 Hope Side Road (Fig. 36).

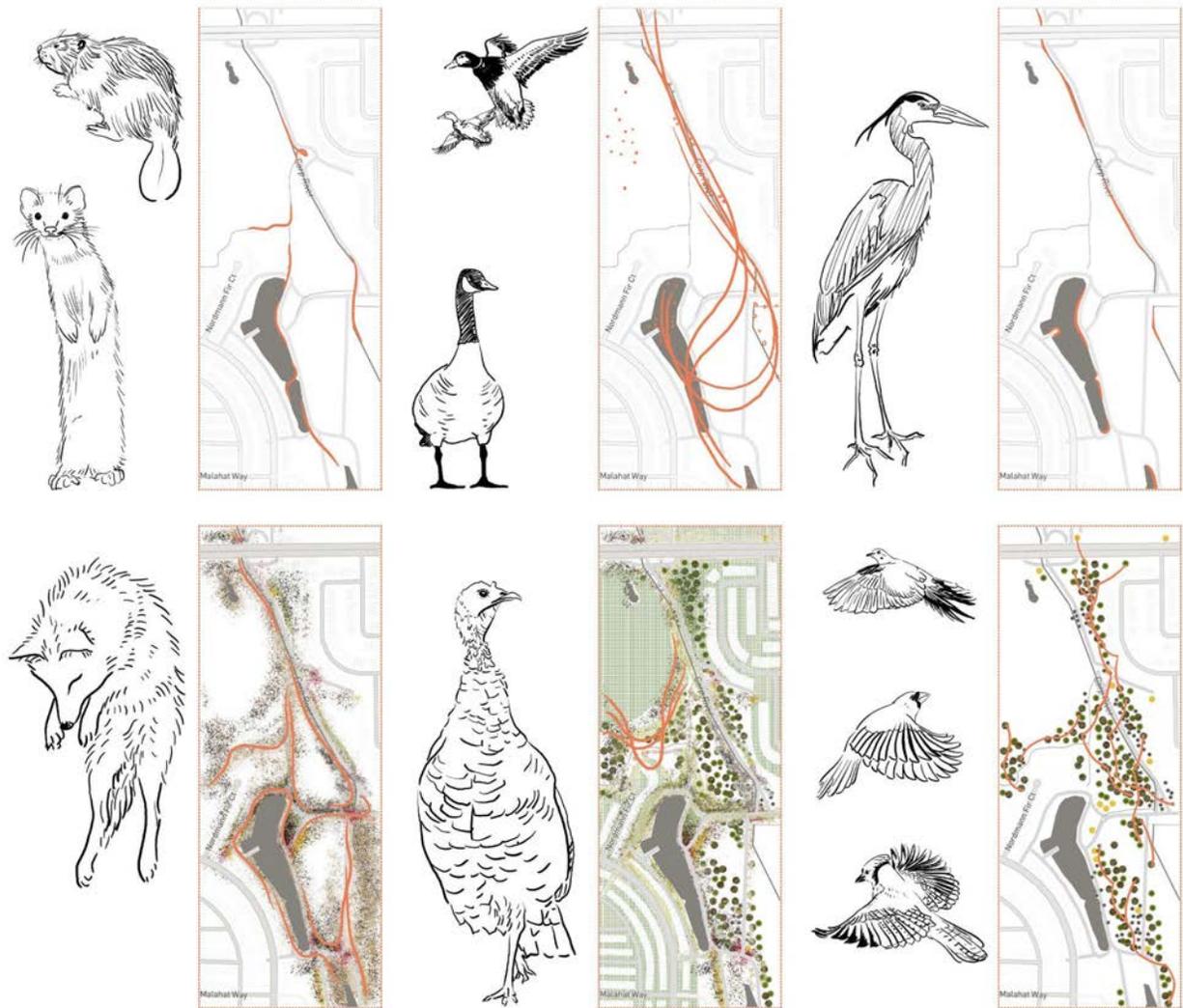


Figure 36: Abbottsville Trails fauna routes and the flora that might affect them.

Chapter 06

Bringing it All Together: The Master Plan

With a more complete understanding of how wildlife and seniors perceive vegetation, architectural environments, and space in general, the master plan began to take shape. Simultaneously developed and continually adjusted during the design process, it is difficult to establish a starting point for its description. As a result, the final master plan for the site (Fig. 37) is shown in the start of this chapter, and later broken down into several zones and scales and overlaid with information that demonstrates how it was accomplished.



Figure 37: The complete master plan of 5044 Hope Side Road.

Following the previously established guidelines of concentrating residential density at the top of the site and reserving its lower half for the migration of fauna, the site was split into two halves. The upper portion mirrors the Bridlewood suburbs, with a strong emphasis on human users. It operates as both a buffer zone for humans and a blockade for wildlife. The lower section makes use of a variety of foliage and a distinctive structure largely geared toward fauna, allowing for a limited extent of human habitation.

To understand this, admittedly controversial, division, we must recognize that if designed with fluid transitions in mind, the two areas would bleed into one another and promote an unhealthy environment in which an animal could be misdirected into the

suburbs. Such a misdirection would disturb the controlled environment desired by residents. The primary objective of this location is to provide wildlife with the safest possible route. Otherwise, this breakdown proposes several varying housing arrangements for nature-loving senior residents: living in a regulated setting with minimal environmental disturbances, living in close proximity to fauna-driven areas but with control over their level of exposure to it, or the option of living intervening with it. As a result, each side requires a unique architectural language.

The upper portion, which we will refer to as the *Golden Central*, is intended to be designed first (Fig. 38). Its contact with Hope Side Road and Eagleson Road guided its formation. *Golden Central* further dictates the urban layout of the more organically structured region to its south-east direction, which is to be designed second.

The Golden Central

This retirement "campus" incorporates a range of housing options and commercial - recreational amenities. The *Golden Central* is segmented into smaller program-specific fractions. The buildings are arranged in order of necessity: most major structures are placed in highly specific locations, while smaller nonetheless vital structures are used as adaptive gap fillers.



Figure 38: Highlighted top (north-west) half of the developed 5044 Hope Side Road, titled the *Golden Central*.

The Centre provides residents and visitors with commercial-recreational amenities. These programmes include, but are not limited to, swimming pools, gyms, cafés, meeting rooms, libraries, rental spaces, and a front office. Not only is it strategically located in the heart of the site, barely a fifteen minute walk from the campus's farthest point, but it also divides human activities from wildlife (Fig. 39).



Figure 39: The first structures placed on site: the Centre (brown), the apartment complex (purple), and the wellness resort (green).

At the furthest top-left corner, a tall apartment complex with a mixed-use first floor is placed, housing rental accommodations for seniors who are capable of functioning independently but may require some aid. Due to the building's size, it provides room for employees to store equipment and rest between the shifts. Its position also qualifies it as a living alternative within walking distance of "natural greenery," yet, in a regulated setting. Due to its "L" design, the inward portion of the structure will be used as a gated park for dog owners and inhabitants looking for a supervised outdoor space. Additionally, its height and position act as a noise and light barrier from the busy intersection.

A wellness resort was built on the opposite side of the Monahan Drain from the Centre, providing the nearest thing to a long-term care facility for seniors, complete with the monitoring of safety and well-being, assistance with daily activities, and 24-hour nursing and personal care. It is not, however, appropriate for seniors in their later years of life who require hospital-level care. Similarly to the Centre, the wellness resort serves as a hub for human activity on the one side and fauna guidance on the other, and allows seniors to live in a highly regulated atmosphere while allowing them access to outer vegetation.

The remainder of the structures are built to provide density and variety in senior living options and pragmatic accommodations, as well as to function partially as a barricade and guided corridor for the fauna (Fig. 40).



Figure 4o: The second wave of structures placed on site: apartment buildings (purple), commercial-recreational pockets (orange).

To avoid covering the remainder of the land with one- to two-story dwellings, the density of the site had to be addressed through a vertical mass of retirement homes, rental housing, and supportive housing that would appeal to similar demographics as the previously stated "L" shaped apartment complex. Apartment buildings also serve as vertical extrusions for bird species that prefer higher nesting locations, and as "scarecrows" for on-ground species. Their shape and placement are conceived so as to divert these creatures' flow away from areas of human density.

To accommodate the growing density, commercial-recreational areas are incorporated. Their location directs the urban population toward certain gathering spots and prevents dispersal. In certain cases, they are added as wider-spanning ground floors for the apartment buildings that preceded them in the design process. The altitudinal offset aims to reduce ground shadows and keep the building outlines lower and more approachable. In another situation, extending the Centre and linking it to the apartment buildings along Hope Side Road work as a Monahan Drain wildlife barrier. The far left location serves as a minor plaza that helps manage the height transition between the apartment complex and the naturalised vegetal areas. The latter also works as a mini-center for the south-west side of the site, keeping the traffic at Eagleson Road rather than bringing into the property.



Figure 41: Green facilities within the context of the developed master plan.

Green facilities are placed on either side of the wellness resort, to ensure a more tranquil, isolated setting for guests. These places may contain veterinarian clinics, miniature sanctuaries, and wildlife preservation programs, among other amenities. It appears most logical that the area that requires monitoring and care for animals be connected to the site that serves a comparable function for humans. These "healing" additions maintain the wellness resort's structural mission of managing the fauna flow near the Monahan Drain (Fig. 41).

It is critical to note that Monahan Drain water is now recorded as being of low quality. This thesis acknowledges it, but it is also conscious of the ongoing infrastructure that are already under development further up and down the stream.⁷⁸ Following that, if there is a need for it, the green facility facing the drain might be transformed as a water clarifying plant in the future.



Figure 42: Parking lots within the context of the developed master plan.

⁷⁸ RVCA. "Jock River Subwatershed Report 2016 MONAHAN DRAIN CATCHMENT." Monahan drain. Rideau Valley Conservation Authority, 2016. <https://watersheds.rvca.ca/subwatersheds-reports/jock-river/catchment-reports-jock-river/144-monahan-drain>.

Though they are clearings rather than structures, parking lots frequently receive a bad reputation (Fig. 42). The sprawling asphalt is viewed as a threat to nature and it is frequently proposed that lots be redeveloped as vertical towers.⁷⁹ However, I believe that this design, when implemented strategically, will benefit users of the site thanks to its use as clearings between structures, allowing for greater building offsets. Due to the area's traffic inviting programs, three locations on the property are chosen to house parking lots. The Centre's parking extends into the ground floor of connected structures, allowing the parking space to be partially covered. The parking area to the left serves as a visible clearing for wildlife arriving from the nearby farm field. It also clears the way for Eagleson Road traffic approaching from the side of the site which is obstructed by the apartment complex. Finally, the smallest of the three, with correspondingly reduced traffic, is positioned to accommodate the wellness resort and accompanying green facilities.

⁷⁹ Marshall, Aarian. "The Pandemic Prompts Cities to Rethink the Parking Spot." *Wired*. Conde Nast, March 11, 2021. <https://www.wired.com/story/pandemic-prompts-cities-rethink-parking-spot/>.

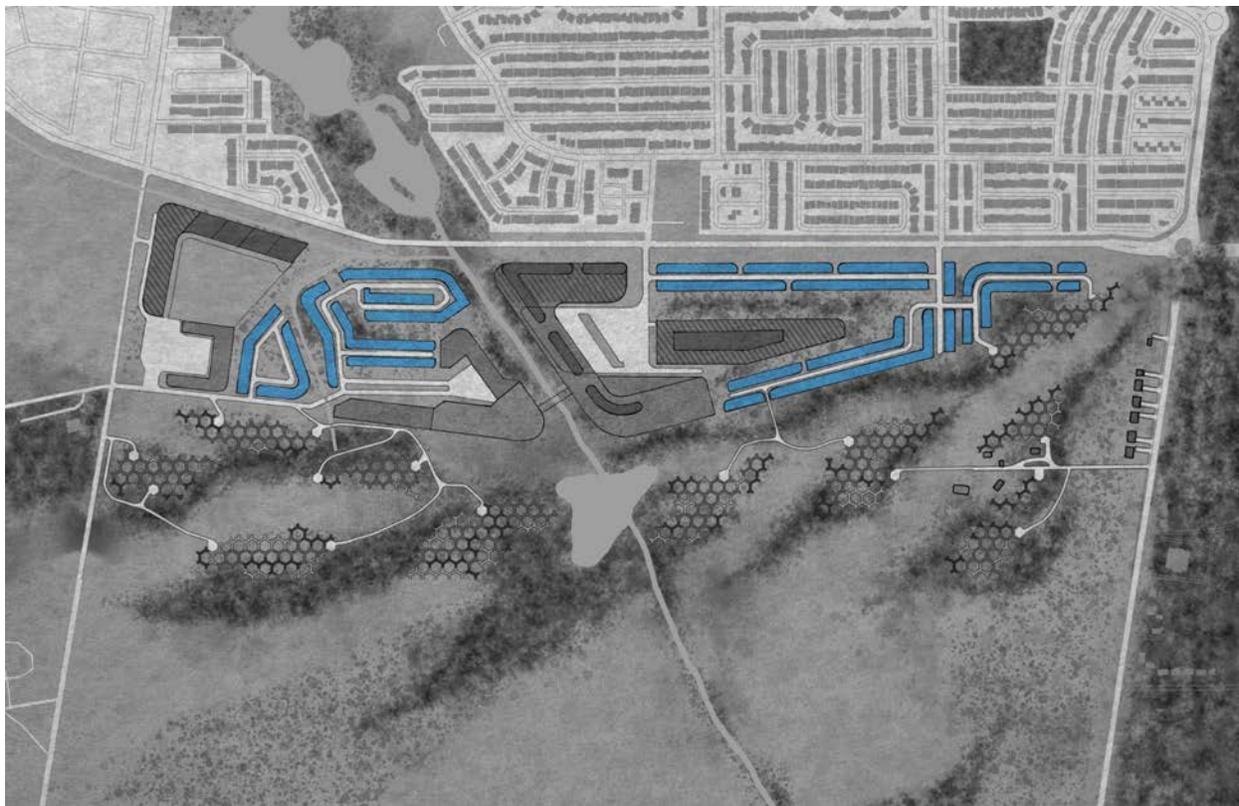


Figure 43: One- to two- story residential structures within the context of the developed master plan.

The remaining land is set aside for one- to two- story residential structures, including adult lifestyle communities and co-operative housing (Fig. 43). These areas are intended for homeowners who desire to live close to nature, while remaining near their community. Each lot must be accessible by roadway at one end, while the other end faces a "green" area of land. Apart from the fence enclosing the apartment complex's joint park, no continuous barriers are permitted on the site. This is done in order to prevent accidental obstacles in the way of fauna's travels or visual abstractions of the surroundings for vehicles. Furthermore, the avoidance of bounded lots of land enables outdoor interaction through space sharing.

The Ingot

A prototype of one of these single-story residential structures was created to illustrate their prospective arrangement into rows, as well as the views they may provide from their windows. The *Ingot* is merely one model of the several alternative layouts that could be created, each with a different number of rooms.



Figure 44: The *Ingot* apartment and the possible furniture layouts.

The *Ingot* is a one-bedroom apartment with an internal width of 3.3 metres and a length of 12.5 metres. It features a spacious kitchen, an open living area, an accessible washroom, washing machines, and sufficient closet space (Fig. 44). The bathroom is positioned in the apartment's centre to prevent blocking window light and aims to divide the space into two separate areas: a living room facing the street and a bedroom facing the greenspace. The two opposing doors are aligned with the corridor. However, the windowed ends to which they are attached may also function as entrances; both the door and the windows are affixed to the same framing, which lifts up in a manner similar to that of a vehicle trunk. The location of the living area enables inhabitants to open their doors to the exterior. Along with the open-upwards windows, this shift creates an opportunity for seniors with small at-home businesses or hobbies to repurpose the living room as a "shop." Additionally, these raised windows serve as an extension of the roofing, providing additional coverage and signalling the "shop" is open. The bedroom is located on the more secluded part of the house, with its windows facing the vegetated exterior. This offers inhabitants the rare opportunity to fall asleep and wake up alongside wildlife (Fig. 45). Due to the *Ingot*'s long, thin form with windows on opposite ends, it may be arranged in rows with other units. This configuration enables for a greater density (Fig. 46).

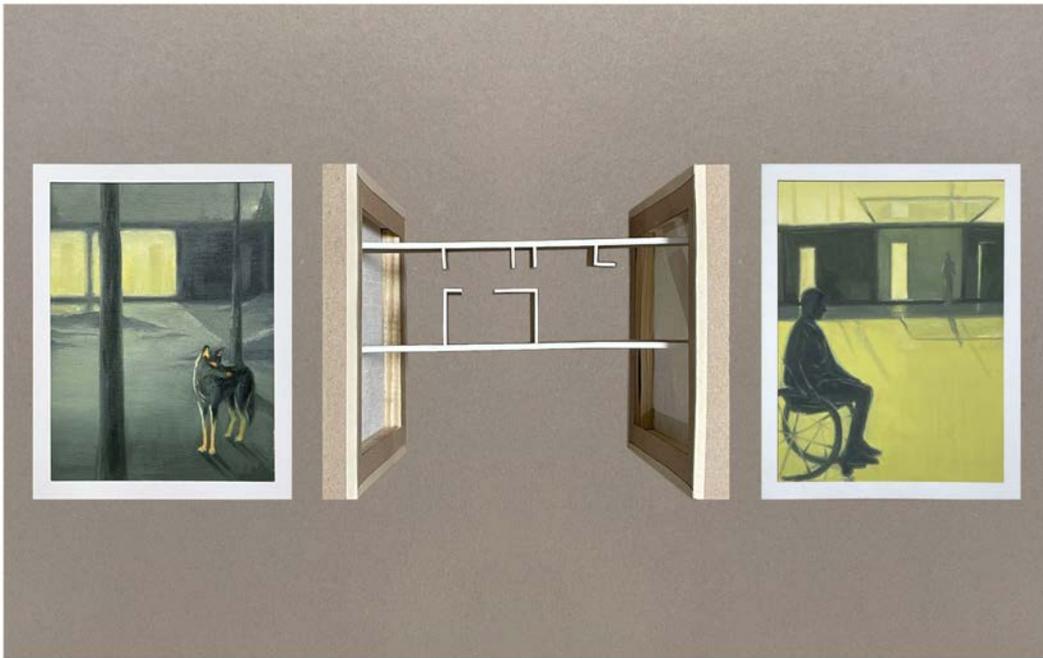


Figure 45: The unit in plan view and the exterior views from its windows, located on the opposite ends. One end looks at the night view of a wild coyote passing through a wooded section of the site. The second has its windows lifted, inviting the site's visitors to take a peek inside.

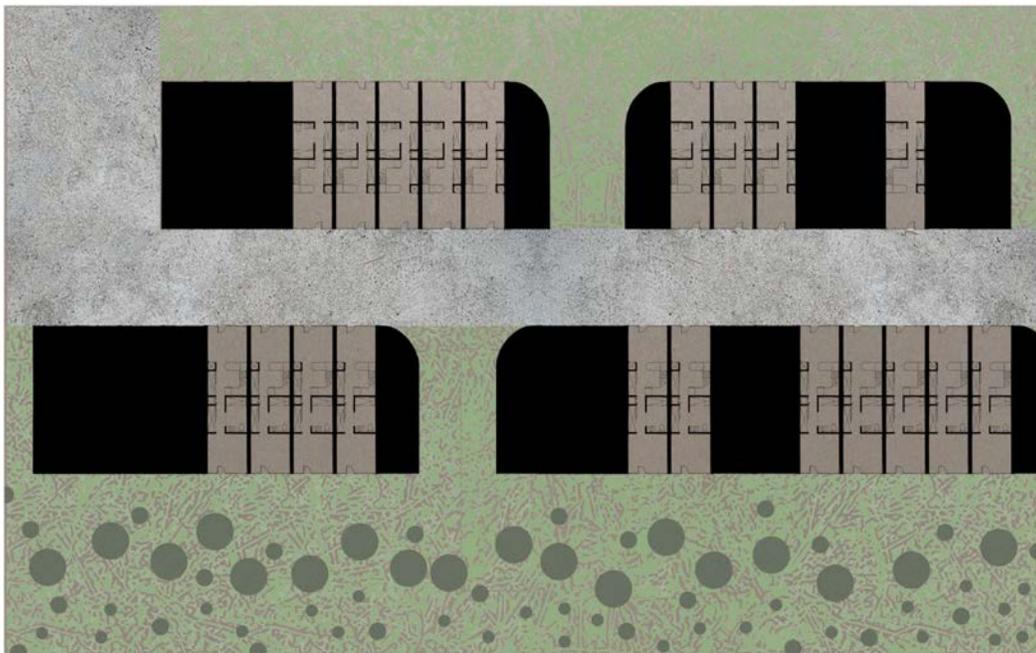


Figure 46: Example of *Ingot* arrangement within the rows of buildings. The blocked out areas show the locations of a differently designed unit which follows similar principles.



Figure 47: One- to two- floor housing classified into three varieties.

This housing is classified into three categories according to its significance and effect as path-making elements (Fig. 47):

1. Marked in blue: They serve as barriers to keep animals from entering the residential areas. They are located throughout the remaining boundary of the *Golden Central* and encircle the branch protruding from the Monahan Drain.
2. Marked in green: These are mostly planted on the interior of the zone and serve as guardrails, redirecting unintentional animal flow into the site.
3. Marked in red: Filling in the remaining land, these rows of structures act as terrain fillers, increasing urban density and limiting animal movement.

After effectively arranging the buildings, it is critical to develop secondary precautions to maximise the use of the green-marked housing systems, acknowledging that the location of wildlife arrival could never be entirely predicted (Fig. 48); fauna entering from the existing urban fabric via Hope Side Road (cases A and B) or on-site fauna having accidentally followed the drain in an upstream direction (case C).



Figure 48: Three possible scenarios of wildlife approaching the *Golden Central* from less likely, yet possible directions.

Cuts and Curves

Cuts were made at deliberate points to segment the continuous rows of buildings. These cuts are to be kept to a minimum to manage route control and forecast accuracy. Their installation not only gives a visual break for human users, thus removing the confined corridor effect, but also serves as emergency wildlife "doors."



Figure 4g: Three possible scenarios of wildlife manoeuvring through the *Golden Central*.

The earlier study of the site's fauna indicates that many species interpret urban zones and structures as alternate types of pathways. As a result, the structure's walls — especially at major edges of the built zones, and the added "emergency doors" are designed to accommodate movement, enabling its control (Fig. 49). Curved corners are to be utilised for deviating from the path through a point of turn. Sharp corners are to be implemented in situations where the animal must disregard the turn, most notably recognized in the building row cuts (Fig. 50). This is reinforced by the assumption that when an animal enters the defined safe zones, it will be less likely to spot the sharp slits or will choose to disregard them (Fig. 51).

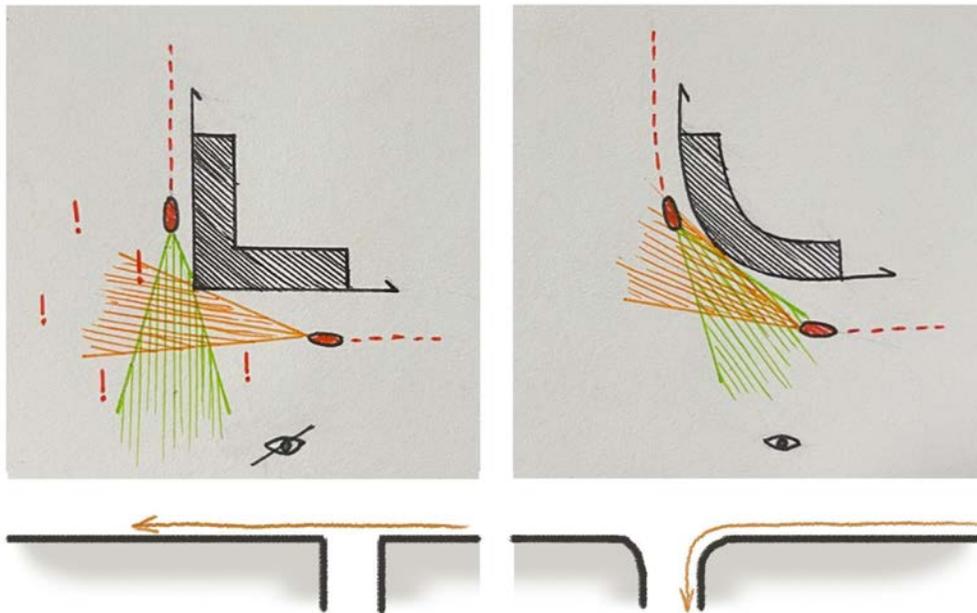


Figure 50: Curvature allows for greater observation, angles promote unpleasant suddenly and unawareness (Top). Curvature shows invitation while angles are ignored (Bottom).



Figure 51: A map showing the locations of curved and angled building corners in the *Golden Central*.

One unusual implementation of alike methodology is the installation of a bridge to connect the wellness resort to the Centre. It suggests that the Monahan Drain corridor's entry is undesired from the direction of the vegetated environment located lower on site. Coming from Hope Side Road, however, wildlife will fall into the corridor and will not object to passing under the bridge, as they head for the open lands beyond it.



Figure 52: Road pavement variety in *Golden Central*.

In order for the retirement community to be within walking distance of all necessary amenities, its location must be pedestrian-friendly. There can only be heavier traffic on the roads which connect the site's parking lots to exterior roads. However, each residence will be accessible by road to accommodate buses, Ubers and emergency vehicles. Asphalt will be used to pave all parking lots and the majority of roadways (marked red and pink). Grass pavers⁸⁰ will define certain locations (green). These would allow animals passing through the safety zones of the urban fabric to walk across the

⁸⁰ Hollow concrete pavers of which the alveoles can be planted with grass.

roadways and follow them rather than change directions. In addition, speed bumps will be placed by every "cut" between the structures to encourage pauses in regions prone to wildlife leakage (Fig. 52). Finally, these improvements will assist seniors by making the roadways safer.

The Emerald Stream

Following the completion of the *Golden Central* master plan, the site's bottom half was developed. Titled the *Emerald Stream* due to its resemblance to a river both in look and function, this zone is conceived to provide housing for humans, safe havens for animals, as well as to create migratory paths toward larger habitats. The filter territory itself is made of *Buoy Islands* (defined later in the chapter), containing *Boscages*, or, lands inhabited by trees or shrubs,⁸¹ and courtyard housing districts named the *Hives*. Each *Hive* is made of cell-like dwellings which will be called the *Saplings*. There can be more than one *Hive* per *Boscage*. It is the overall shape of the *Buoy Islands* and their placements on the site that guide the wildlife flow towards the protected wetlands to the Southwest of the site. In other words, migrating animals cannot pass through all portions of the *Emerald Stream* (Fig. 53). Rather, they must be guided by the islands along their way. That said, the housing districts, or the *Hives*, include waystations and

⁸¹ *Merriam-Webster.com Dictionary*, s.v. "boscage," accessed March 29, 2022, <https://www.merriam-webster.com/dictionary/boscage>.

spaces for animals to pause in, rest, and co-mingle with humans. These can be thought of as animal hotels.



Figure 53: Highlighted bottom (south-east) half of the developed 5044 Hope Side Road, titled the *Emerald Stream*.

The Grid

In contrast to the street-oriented and more traditionally urban *Golden Central* which is primarily designed for humans, the *Emerald Stream* is predominantly inhabited by wildlife. This implies that the grid employed in this zone must suit its users, streaming away from the conventional grain and fabric used in modern suburbs, and focusing on creating more fluid clusters of structures to accommodate the overall flow (Fig. 54). Additionally, the site must apply a variety of botanical tactics to accommodate the diverse range of users, keeping the number of highways to a minimum, and offering temporary or permanent homes for the passing fauna.

To weave the grid into the verdant tapestry of the site, it is decided that a singular dwelling form would be established that could be repeated and conjoined in a multitude of ways to adapt to varying site conditions. The design is inspired by the hexagonal honeycomb pattern which if disassembled, rotated, and rebuilt, will still maintain its basic architecture.

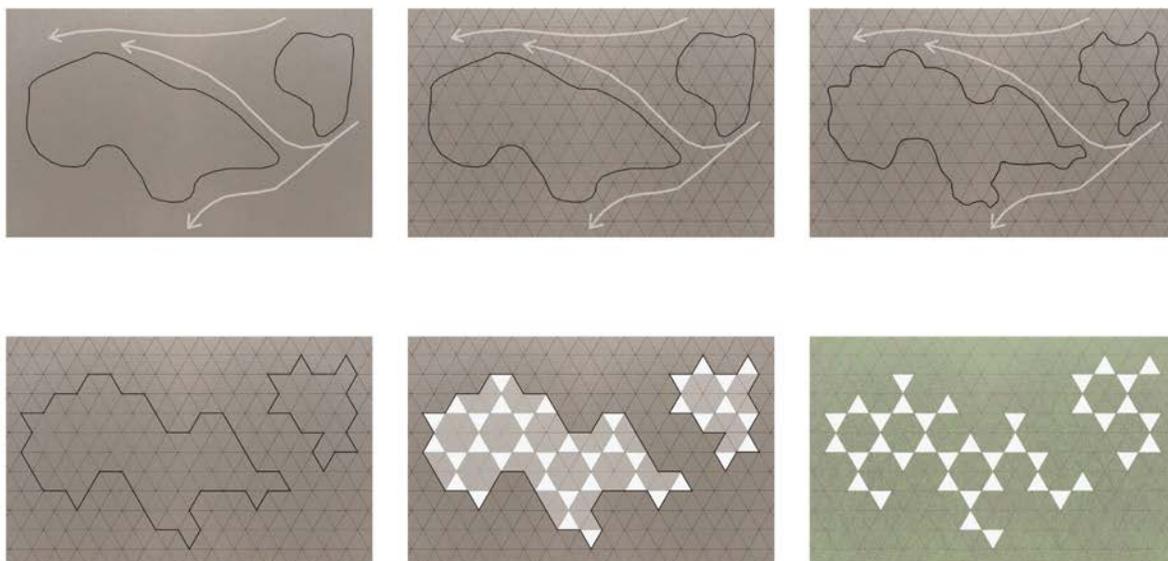


Figure 54: Shown above is an organic shape and the flow of movement around it. An overlaid triangular grid adjusts the shaping of the organic figure and fits proposed structures within it.

Due to the difficulty of implementing a hexagonal shape into a compact dwelling because of its obtuse angulation, the shape was to be broken down into more manageable triangular fragments. The triangular grid is explored in an organic form observed in island formations, but with the hexagonal shape reintroduced to create voids, or negative spaces.

The Sapling

The name “sapling” refers to the bee larvae which is held in the prismatic cells of the honeycomb, and additionally refers to a young tree like one of the ones which make up these urban islands. Named *Saplings*, the triangular housing clusters are to function as retirement life lease dwellings (defined closer to the end of Chapter 3), with each island having its own distinct community. Every dwelling is to have a standardised interior design that caters to the average residents' demands.

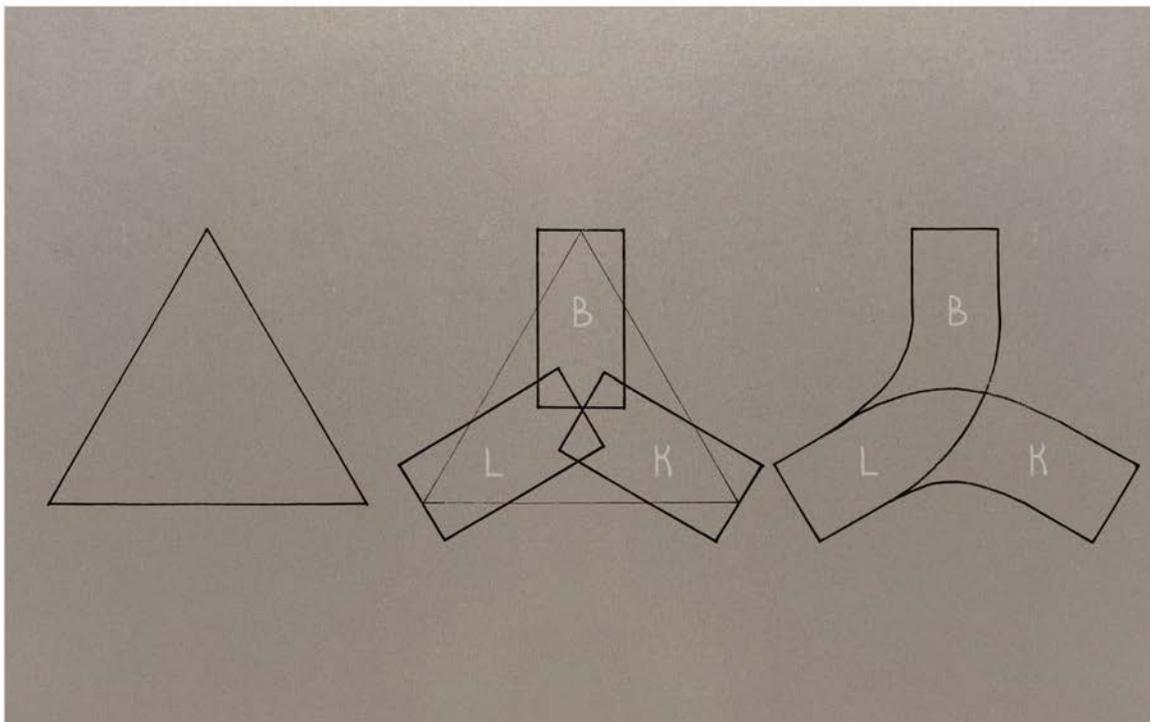


Figure 55: A breakdown of the *Sapling* into a bedroom, kitchen and a living room.

With three points, the triangular-shaped *Sapling* dwelling is divided into the three principal rooms to be found in every home: the living room, the kitchen, and the bedroom. These three rooms would retain their more conventional rectangular form (Fig. 55). While the bedroom and the kitchen stand independent, the living room must act as the hub of activity and link the other two spaces. Therefore curved walls were introduced. Similarly to how they were employed to sculpt the architecture within the community amenities in the *Golden Central*, these curved walls support flow, in contradistinction to the two angled walls. Thus, the “Y” shaped plans involve both curved and straight walls (Fig. 56).

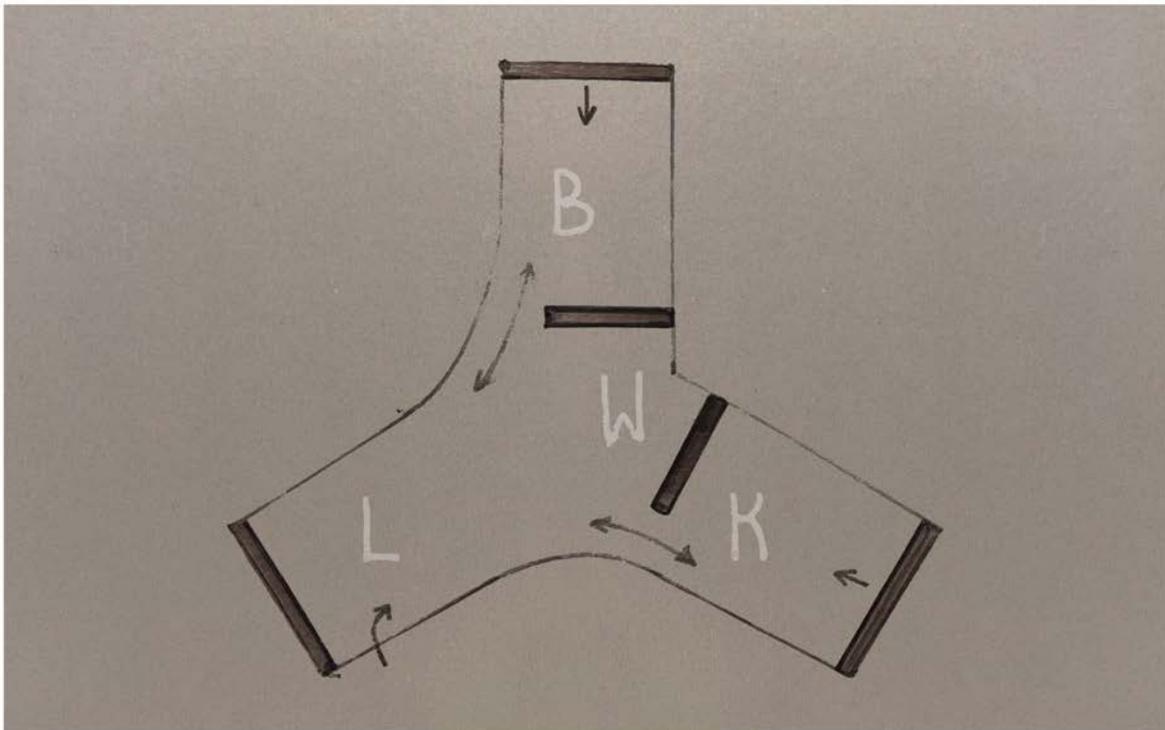


Figure 56: An addition of a washroom to the *Sapling* design.

The *Saplings* are to be connected through the edge at each branching room's end, structuring them into solids. Two of the solids, touching the straight walls, extend inward towards the centre, outlining the placement of the washroom. The washroom is designed to separate the bedroom and kitchen while maintaining visual connectedness with the adjacent living area (Fig. 56 and 57).

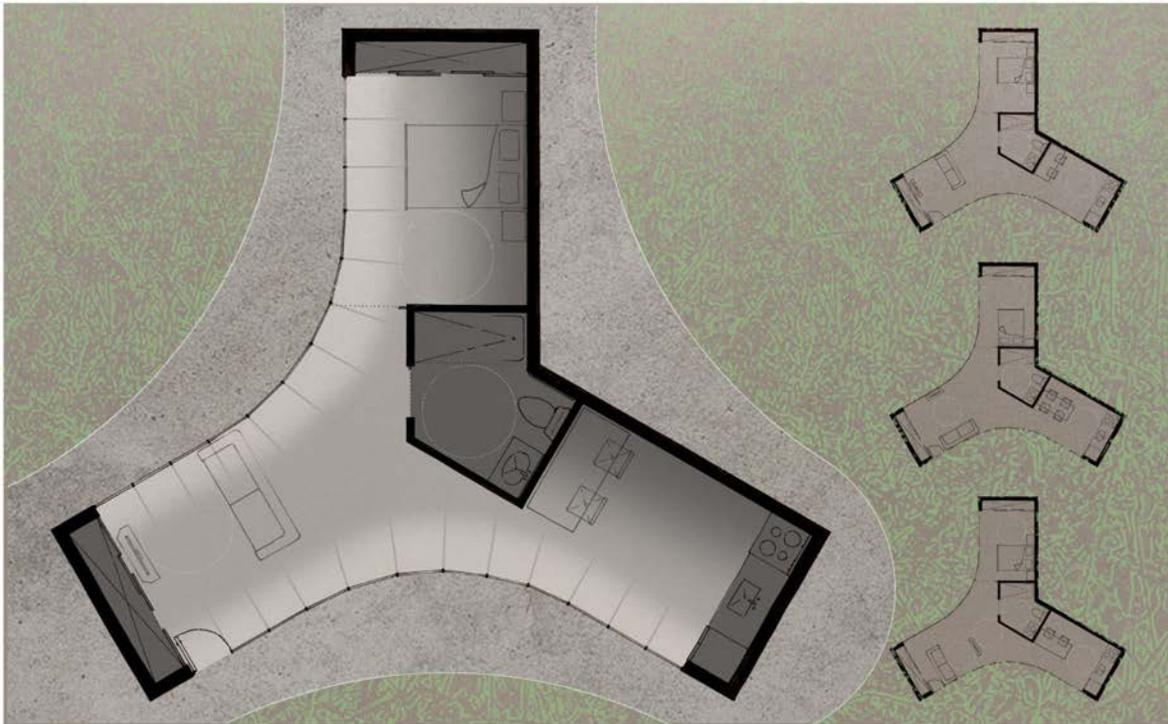


Figure 57: Final floorplan of the *Sapling* with a variety of furnishing options.

The unit's curving perimeter is glazed, with opaque walls defining the more private spaces. The main door enters into the living room near the closets, either from the side of the bedroom or near the kitchen, depending on the unit's position on the site. A path along the exterior of the perimeter wall is paved to allow for a continuous sidewalk (Fig. 57).

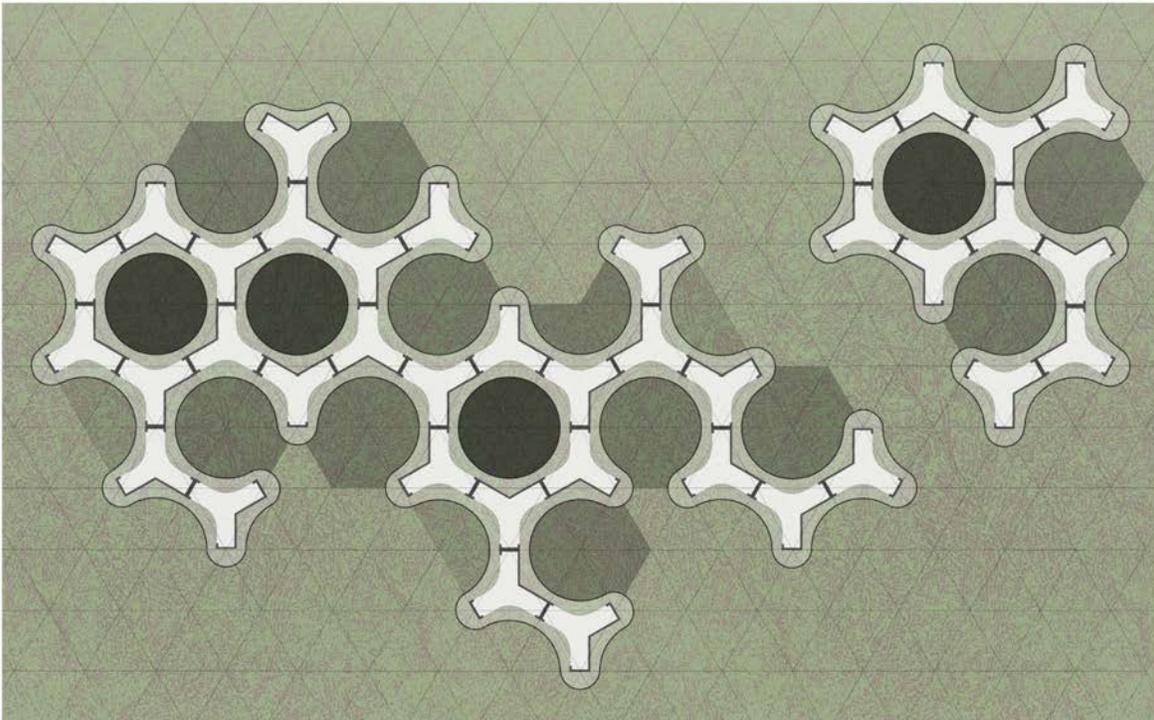


Figure 58: The grid layout of a grouping of *Saplings* illustrates the courtyard accessibility variations and the continuous perimeter pathwalk.

By inserting the designed cells within the triangular grid, the honeycomb pattern started to materialise and to yield courtyards of varying degrees of accessibility for animals. The more units per courtyard, the more separated the courtyard becomes. When there are three units per courtyard, the latter blends with the exterior land. When there are four to five units, the system fills in, and the courtyard becomes more inward-looking. Finally, six units fully enclose the courtyard which is thus completely isolated from the exterior flora and fauna (Fig. 58).



Figure 59: One of the urban islands from the site.

The Hives

The *Hives* are the clusters formed by joined *Saplings* (Fig. 59). Courtyards are not typical in Ottawa or Canada, it must be said, though Norbert Schoenauer and Stanley Seeman's *The Court-Garden House* made a convincing case for courtyard housing for Canada in the early 1960s.⁸² This thesis understands this, yet remains interested in the courtyard form because it provides sheltered habitats and allows for animal-human interactions within a quiet and private space. This scenario presumes that the human dwellers of the space are “animal people” – this is to say, people who want to live near wildlife, as well as to eat and sleep near them. These are the people who understand what is at stake in the modern urban development, and want to care for fauna and flora, for the greater good of society. The dwellers are caretakers in the broader evolutionary process of Ottawa's growth into a metropolis.

⁸² Norbert Schoenauer and Stanley Seeman, *The Court-Garden House* (McGill University Press, Montreal, 1962). I thank my advisor Janine Debanné for introducing me to this interesting work.

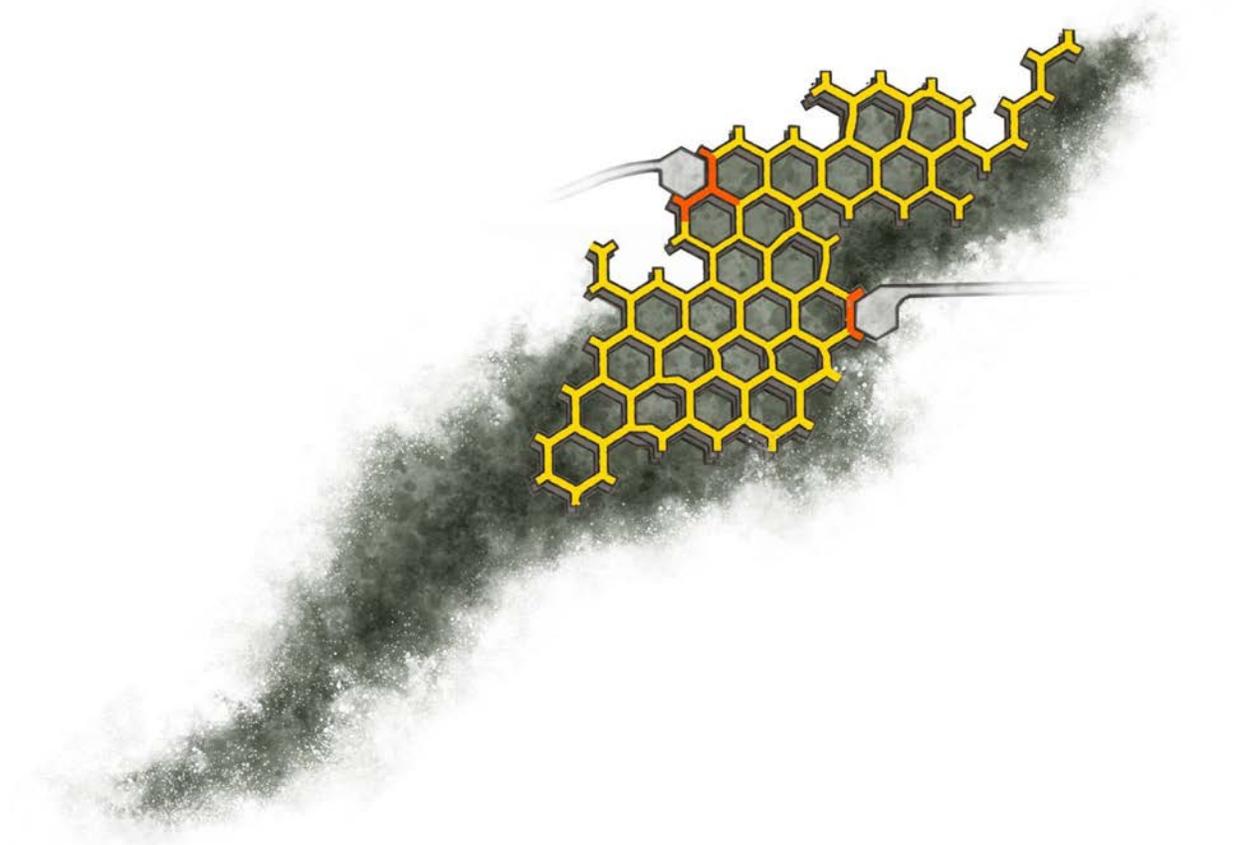


Figure 60: The *Hives*' components: housing cells (yellow) and worker cells (orange).

Apart from categorising housing courtyards into two categories: open-ended and totally enclosed, the units differ slightly in terms of programme, internal arrangement, and height. To appreciate the value of this variety, it is necessary to first comprehend the components of the *Hives*. Each *Hive* is composed of dwelling-cells and worker-cells (Fig. 60). Certain dwelling-cells' bedroom sections may be extended to two bedrooms by extending one of the three branching out arms of the pod. This could be done for elderly couples who wish to sleep apart or share space with housemates. Worker-cells hold the

majority of basic utilities, such as snow blowers, cleaning equipment, storage units, medical kits, and phone and internet access stations. Some are dedicated to garbage management, a crucial activity in a human-animal settlement. Enclosed garbage rooms and internal garbage storage allow for cleaner streets, creating a safer environment for the wildlife that might usually target human waste in their search for food. The communities of each *Hive* will decide upon worker-cell programs. For example, one *Hive* might choose to donate funds and rent out units for purposes such as 24/7 on-site care and assistance, while dedicated others to equipment storage, community activities, or other. On the interior, each dwelling-cell has a somewhat consistent arrangement. The worker-cells, on the other hand, are organised differently and do not require a washroom or kitchenette.

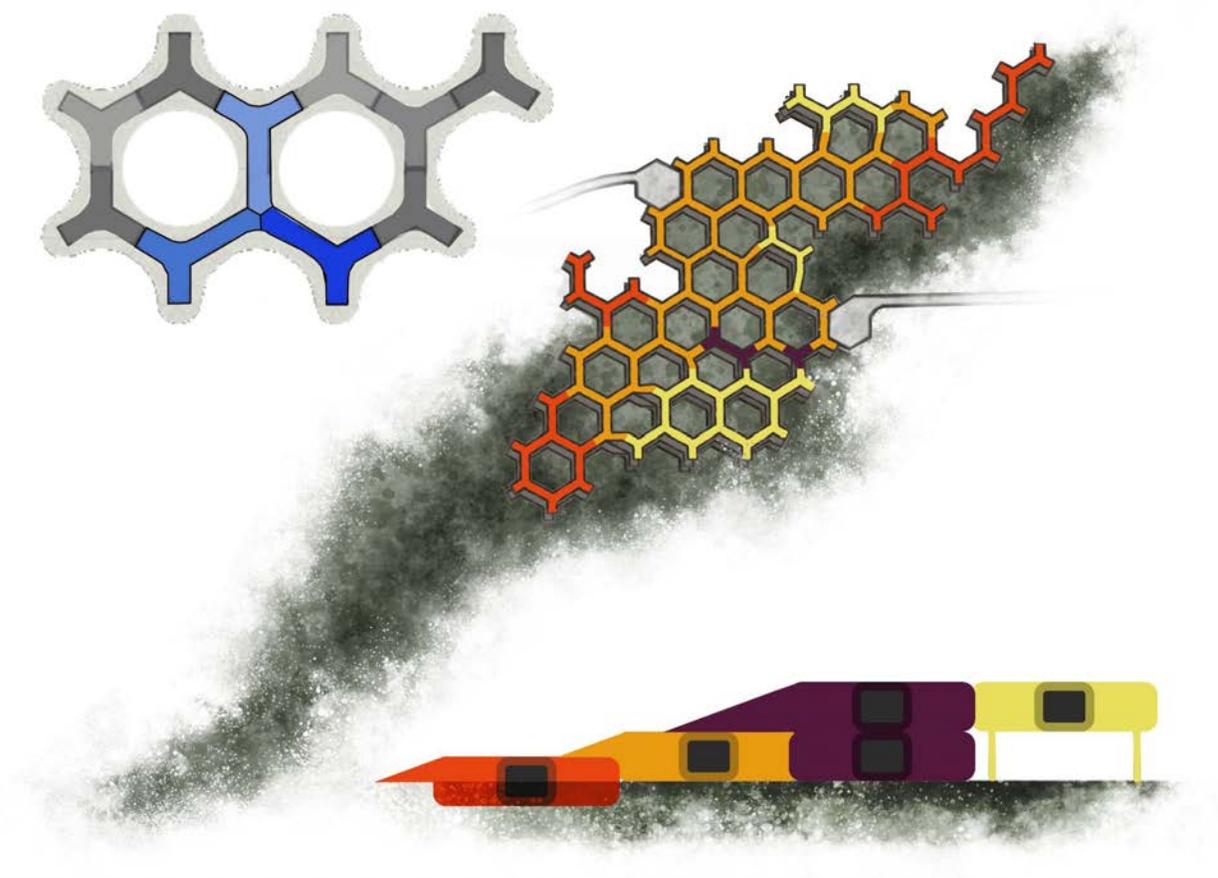


Figure 61: Half sunken units (red), ground units (orange), floating second - floor units (yellow), and double units (purple). A possible assembly of a two-bedroom unit variety (top left).

With a variety of programme and layout components in place, *Saplings* are also stacked to different heights. The height of the units is divided into four categories: half sunken units, ground units, floating second-floor units, and double units (Fig. 61). Each of these provides a distinct function for both humans and wildlife. Perhaps the most important addition to the in-*Hive* flow of both humans and animals is the construction of floating second-floor flats. The floating cells enable the islands to expand their radius. If left on the ground, these second-floor units would cut off access to the inside cells.

| | Fauna | Human |
|------------------------------------|--|--|
| Sunken Units | Located at the island's borders with their height low to the ground, these units allow for greater visual accessibility, therefore feeling more welcoming to the wildlife passing by. | Edged with a ramp, the cells allow the residents to climb onto and use the structure's green roofs. These <i>Saplings</i> also create a unique interior experience with an eye level view of the fauna. |
| Ground Units | Psychologically act as one floor dwellings, leading some animals to get closer and explore while others to ignore and continue their walk. | Act similar to one floor dwellings and are most easily accessible due to no need for stairs. |
| Floating Second-Floor Units | Act as optional locations for entrance, due to above coverage some animals might hesitate to enter (e.g. Turkeys), while others (e.g. foxes) may choose to go in and use the space provided as a shelter from the open field predators (e.g. eagles) | These units create on-ground access to the more internal-located <i>Saplings</i> within the <i>Hive</i> . As well they allow for housing above ground where the residents may observe the surroundings while having a less visually exposed interior, allowing for more privacy. |
| Double Units | At large they act as a blockade and visual intimidation from the <i>Hive</i> pushing animals away towards safer zones. | These combine the experiences of the ground and floating second-floor units. |

Table 3: Dwelling types used in the *Hive*.



Figure 62: Fully enclosed (deep red) and semi enclosed (light red) locations on site.

In turn, the concept establishes two distinct types of dwelling courtyards: open-ended courtyards and fully enclosed courtyards. We have already discussed the former. The latter, in turn, answers the requirement for yards not accessible to wildlife (Fig. 62). They might act as a safe space for pets or visiting grandkids, feature farming gardens, or just be fauna-free areas for relaxation. Though the anticipated audience would most likely prefer to be in contact with nature, these areas provided a choice, which is always nice. These two distinct types of places maintain equilibrium, which is critical for alternative developments such as the *Hive* (Fig. 63).



Figure 63: The human (orange) and non-human (green) paths through the *Saplings* and their courtyards.

The Dweller

As mentioned previously in the chapter, the *Emerald Stream* presents a number of "lease-life projects," each of which is represented by a *Hive* courtyard housing cluster. This implies that the residents of these villages are to be senior citizens. Renting to other age groups would be possible, though, through given consent from the *Hives* dweller majority. A simple Google search for the phrase "seniors and pet ownership" yields an abundance of information about the benefits of domestic pets for seniors, as well as the difficulties associated with pet ownership due to health concerns such as allergies, the

effort of maintenance, and fear of commitment. To make sense of the alternative development zone, it is necessary to define the expected inhabitants of this type of settlement. The next paragraph delves into this subject.

As with the variety of wildlife and their many motives for migration, people may be motivated to move-in to this habitation by similarly diverse factors. Clearly, this location has the potential to attract animal enthusiasts, environmental activists, zoologists, biologists, and even environmental radicals. However, it may also attract the wider public; seniors who wish to connect with animals but are unable to care for pets, couples who cannot agree on living completely isolated in the woods or near civilization, college students who desire a quiet environment but still have access to all amenities, and athletes who wish to go for daily long runs in a healthy setting.

The Buoy Island



Figure 64: Proposed flora for the site: lawn (green), weeds (yellow), shrubs (orange), trees (red).

Buoys, the brightly coloured floating structural aids commonly observed in seas, can function as markers, navigational course markers, border contours, or for other uses. *Emerald Stream* embodies all three. By connecting the *Hives* to the *Boscages*, these elegant island-like formations are created, serving as indicators of dwelling sites and aiding in wildlife navigation, while providing boundaries in some situations. The site's flora is classified according to height and density into four categories: grass, weeds,

shrubs, and woods (Fig. 64). While the *Golden Central* area with its predominantly green lawns is reminiscent of the Bridlewood neighbourhood across the road, the remainder of the site comprises the other three categories. With the exception of a few mixed patches of vegetation in the upper half of the site indicating regions where wildlife flow is likely, the bottom half and its adjacent sites provide a somewhat sharp line between land uses.

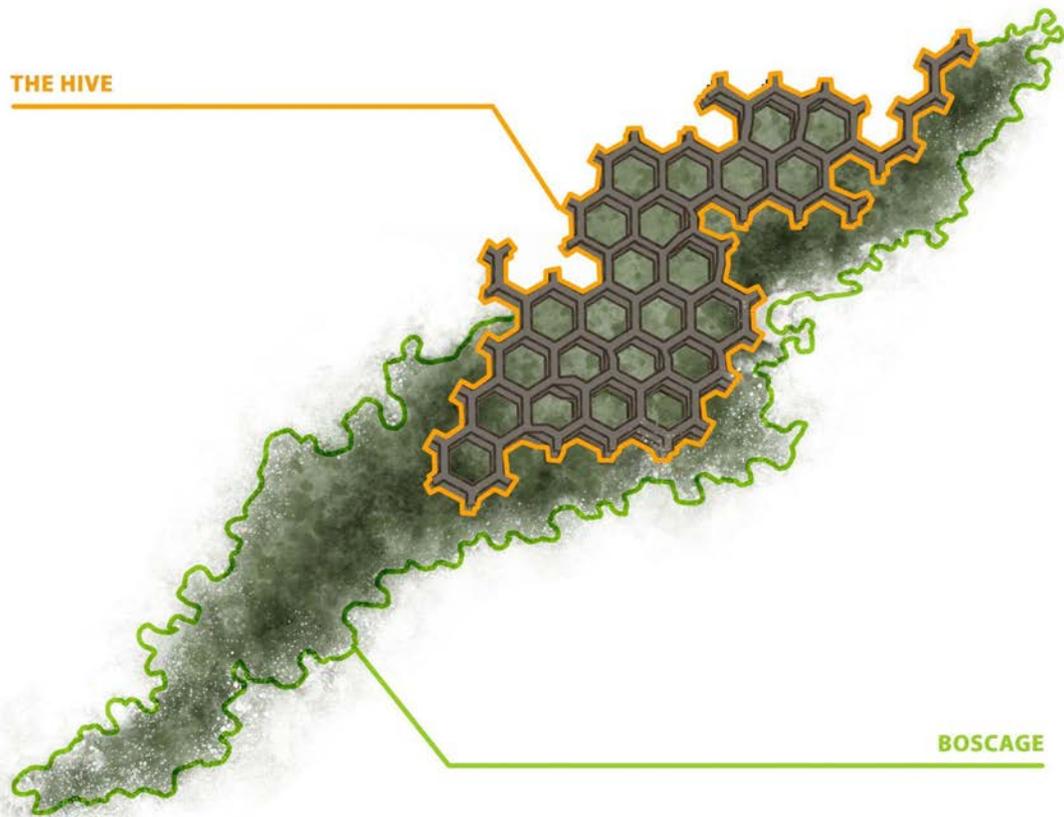


Figure 65: An example of one of the *Buoy Islands*, and its components.

5044 Hope Side Road, originally a meadow, has undergone a transformation following the analysis of animal migratory routes. Now there are added forests with bounding shrubs, and semi-continuous trails for animals which rely on this sort of flora to traverse. The open weeded area is to be maintained as well. The *Boscages*, in conjunction with the urban *Hives*, generate these strategically located *Buoy Islands*, which operate as guideposts and wayfinders for animals travelling from the northeast to the "meadows," while keeping them out of the urban areas (Fig. 65). Some of the slots in the islands are designed in such a manner that they can stand unnoticed or attractive depending on the approaching side, comparable to the *Golden Centrals* bridges' performance within the Monahan Drain corridor (Fig. 66).

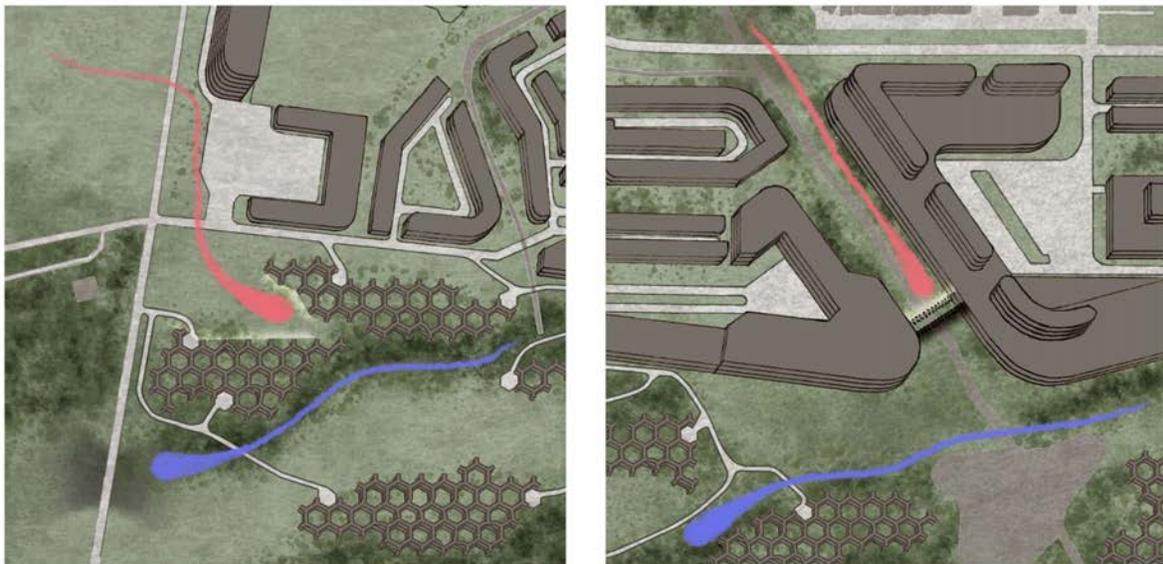


Figure 66: Red path: fauna arriving into the site. Blue path: on-site fauna ignoring exits. South-west *Buoy Island* (left). Monahan Drain corridor (right).

Though they are most accessible on foot, these *Buoy Islands* must also be able to be reached by vehicles. As a consequence, routes from the *Golden Central* pattern, as well as Old Richmond and Eagleson roads, were extended (Fig. 67). In some cases, they were delineating the *Boscages*, while in others, they were cutting across the open terrain. In contrast to the predominantly asphalted roadways at the top of the site, the ratio is reversed here, with grassed pavement predominating to allow for unhindered animal passage. Asphalt is applied only in situations where following the road's orientation aids animal movement.



Figure 67: Proposed roadways on 5044 Hope Side road. Pink: asphalted. Red: asphalted parking lots. Green: grassed pavement. Blue: speed bumps.

This thesis proposes a wide range of structures varying in scale and function, necessitating immense research that cannot be simply summarised. At this time, descriptions of the design and construction throughout this thesis have not broached the question of materials. This was deliberate because the focus and in-depth research here was on layouts and systems; mentioning materiality only briefly would not have been satisfactory. However, it is suggested that all construction and human intervention on the site should adhere to at least certain standards that benefit the site's ecology, or at the very least not harm it. Materials of wood and stone would certainly be central, but there might be other materials too, including perforated metal, natural rubbers, and linoleum. A further variety of materials could be explored to benefit the ecology of the site, either through sustainability or through the use of colour, used to affect faunas' as well as humans' physiological view of the space.

The repetitive form and compact scale of housing units such as the *Ingot* or the *Sapling* allow for off-site construction with minimal impact on the surrounding landscape. However, some of the *Saplings* recede into the earth. The specific plot of land located at 5044 Hope Side Road has already been modified by the agricultural field established upon it. In other words, the land is not intact and manipulations of the ground—including digging and relocating earth to achieve elevational changes and to submerge some of the structures – seems appropriate here. If the project were to be expanded or relocated to sensitive ecological areas, the design would need to be more cautious of its

placement on the earth and more careful of existing flora and environment. Furthermore, within the *Emerald Stream*, this thesis proposes an unconventional, non-orthogonal grid system and corresponding unit morphology. The street layout thus lacks hierarchy and way-finding might be challenging for some. Not all dwellers would be comfortable with the *Hives* proposed here and may prefer layouts with visual landmarks for easier orientation. They may also desire more conventional street and sidewalk arrangements with through-paths and shortcuts. From the wilderness side, although the design takes many measures to ensure fluid paths, including facade configurations that coax animal flow and passage, the courtyards could create dead-ends. This thesis recognizes that though this design might work on 5044 Hope Side Road, it would be important to further investigate and alter it for other sites.

The Golden Green Belt

With both master plans completed and the *Golden Centre* (the perimeter development along Hope Side Road) and *Emerald Stream* (the fluid-formed development on the interior of the site) interlinked, this thesis' overarching concept for the *Golden Green Belt* was established. Let us now consider the matter of unit-per-acre per density.

By examining maps of neighbouring Bridlewood it was possible to count the residences (there were close to 1573) and calculate its unit-per-acre density of eight dwellings per

acre. Due to the vertical density proposed in the *Golden Central* portion of this scheme, this thesis proposition's *Golden Green Belt* topped this figure: there are approximately 2290 units in total, producing ten dwellings per acre. Though my goal was to match the residential density of the adjacent Bridlewood community, this thesis proposition in fact surpasses it, and exceeds the initial estimates. When setting out to do this thesis, I had imagined that it would not be possible to develop a neighbourhood that privileged animal life and protected large amounts of green space that also produced densities equal to those of conventional contemporary Kanata suburbs. The discovery that not only was it possible to meet the City of Ottawa's density targets, but that animal-friendly designs could surpass them, was thrilling.

In terms of wildlife migration, a set of maps was created to demonstrate how an animal may travel around the site utilising both the structures and the flora as a means of navigation (Fig. 68).

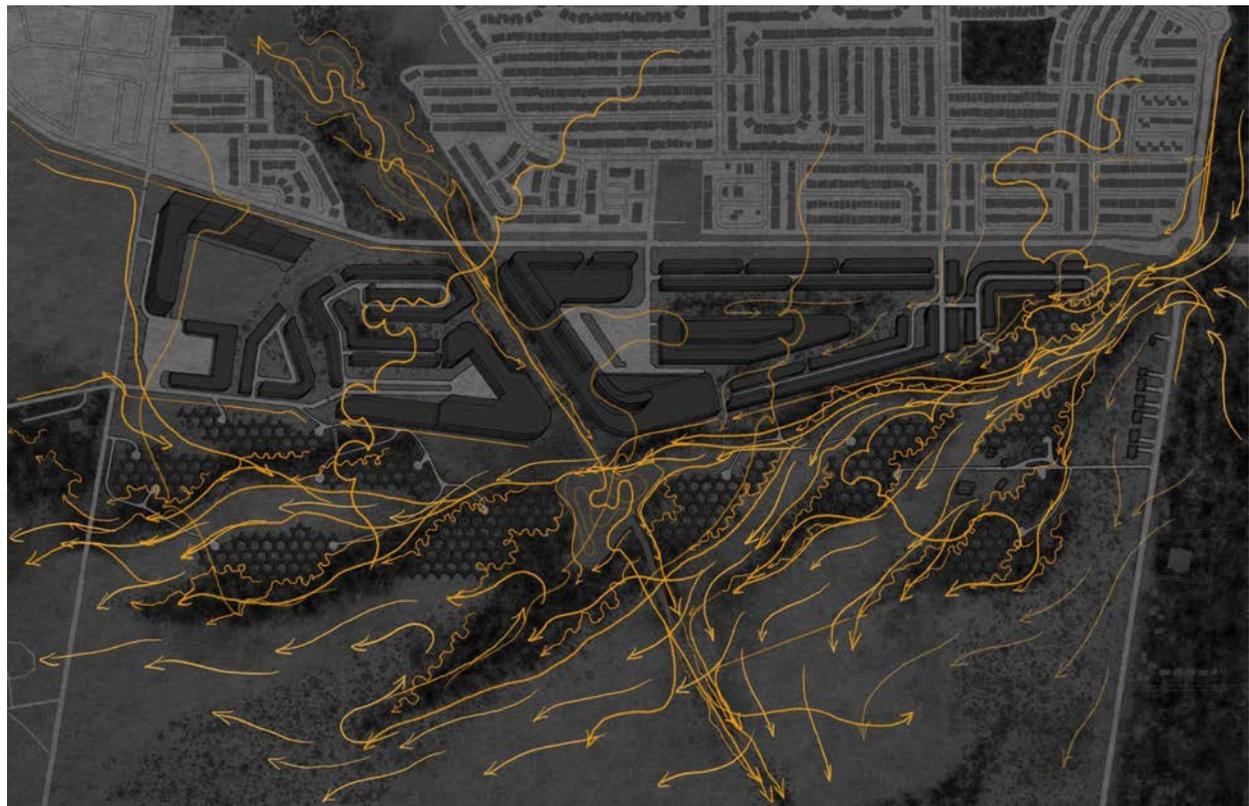


Figure 68: Fauna routes through structures and flora.

Softscaping is left out deliberately to promote organic path making by both the human and the non-human users of the site. This choice is heavily inspired by path studies at the Abbottsville Trail (see Figure 6g). Besides the minimal land disturbance, avoidance of paved surfaces allows for greater earth connectivity and environmental awareness. The feeling of changing soil beneath one's shoes, or even of creating paths oneself and altering the landscape as one walks, all create a unique and sacred experience for the users of the site.



Figure 6g: Avoidance of paved surfaces and creation of paths in Abbottsville Trail.

The “Keys”: Envelope Details with a Purpose

Along with urban planning, which this thesis has previously discussed, the architectural details of this proposition must express an interest in animal and human cohabitation also. These details, or building envelope intricacies, serve as "keys" to understanding the *Golden Green Belts'* dweller experience. In the following section, sets of drawings present four keys. The sets are composed of details (small drawings), a sectional scene (the largest drawing of the set), and a location map with a keyhole symbol showing the scene and details' location placed below the scene. The sectional scenes are hand drawn with black and white ink pens on tracing and bond paper. These drawings are made with three distinct layers: a sectional fragment of the building envelope, the human and animal experience of the architectural intervention, and closeups of the structure's features. These drawings are superimposed to create a scene of life in this place.

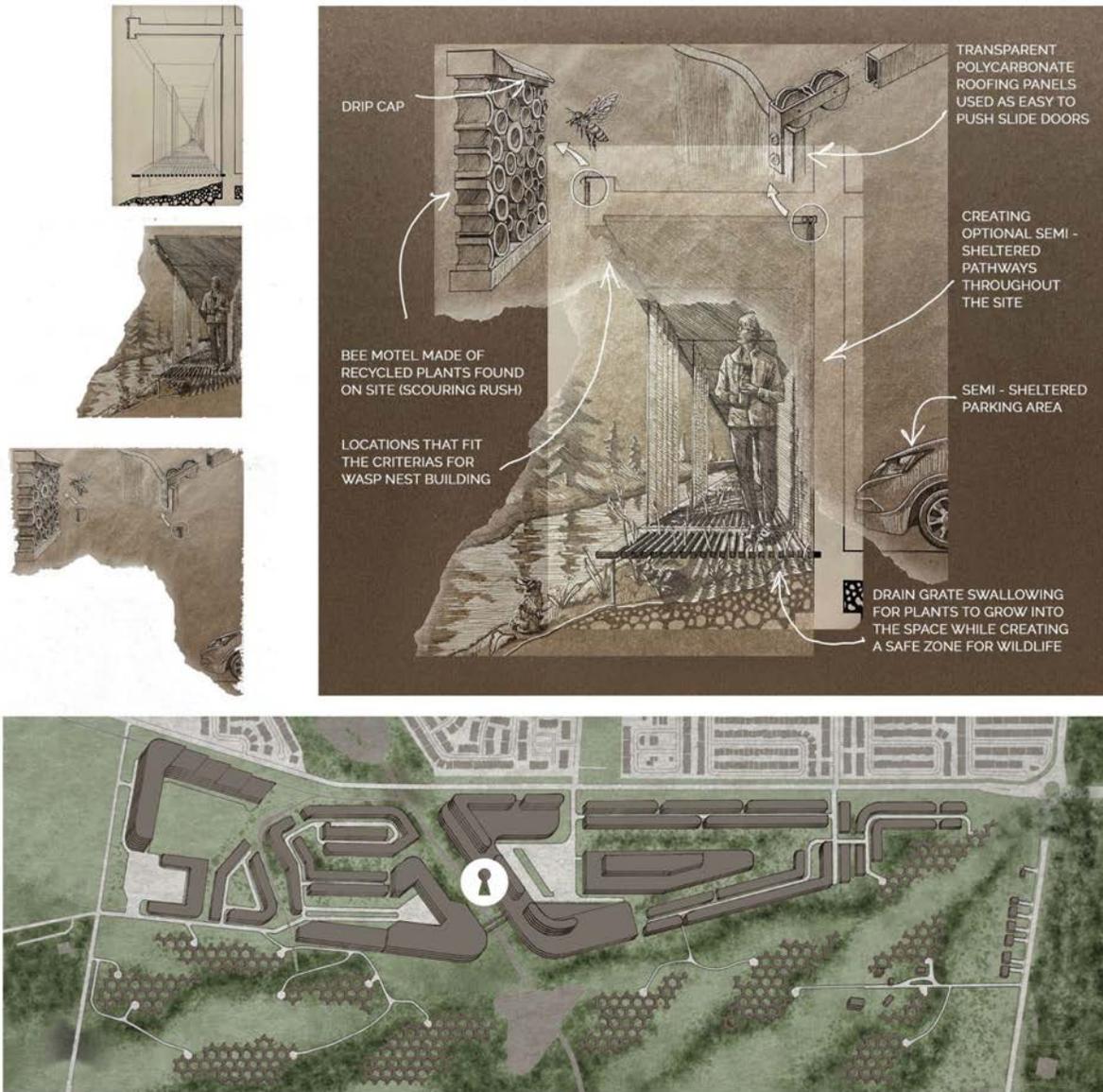


Figure 70: The first of the keys: permeation with the ground.

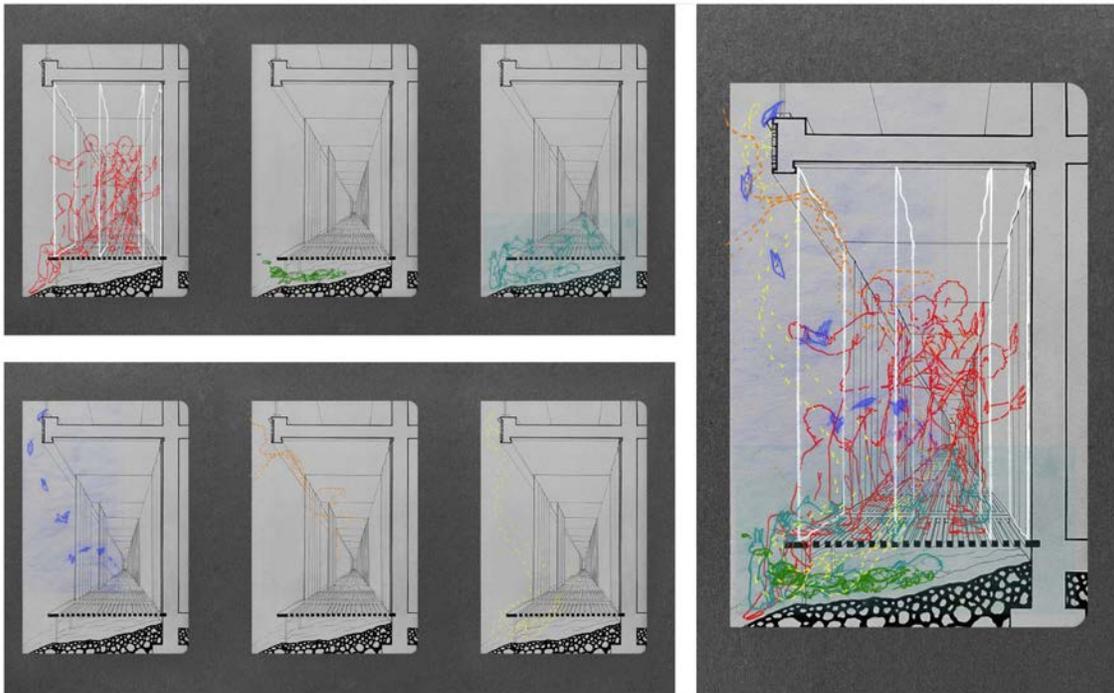


Figure 71: The first of the keys with the anticipated time lapse of different species using the space.

The first key depicts an open-concept corridor that runs along the right side of the Monahan Drain (Fig. 70). One of its sides faces the drain, while the other is a running wall with an inner parking garage at the backside. The corridor's base is slightly above ground and is composed of grates, which enable growing weeds to flow through the slits, creating an illusion of strolling in nature, albeit not quite. The second layer reveals additional features, like the automobile parked behind the wall, the bee-motel integrated into the envelope, and the sliding door mechanism used to shield against rain and snow. Finally, an additional set of drawings illustrates an anticipated time lapse of human and animal interaction with this structure, meant to demonstrate the actual notion of equality contained within the design (Fig. 71).

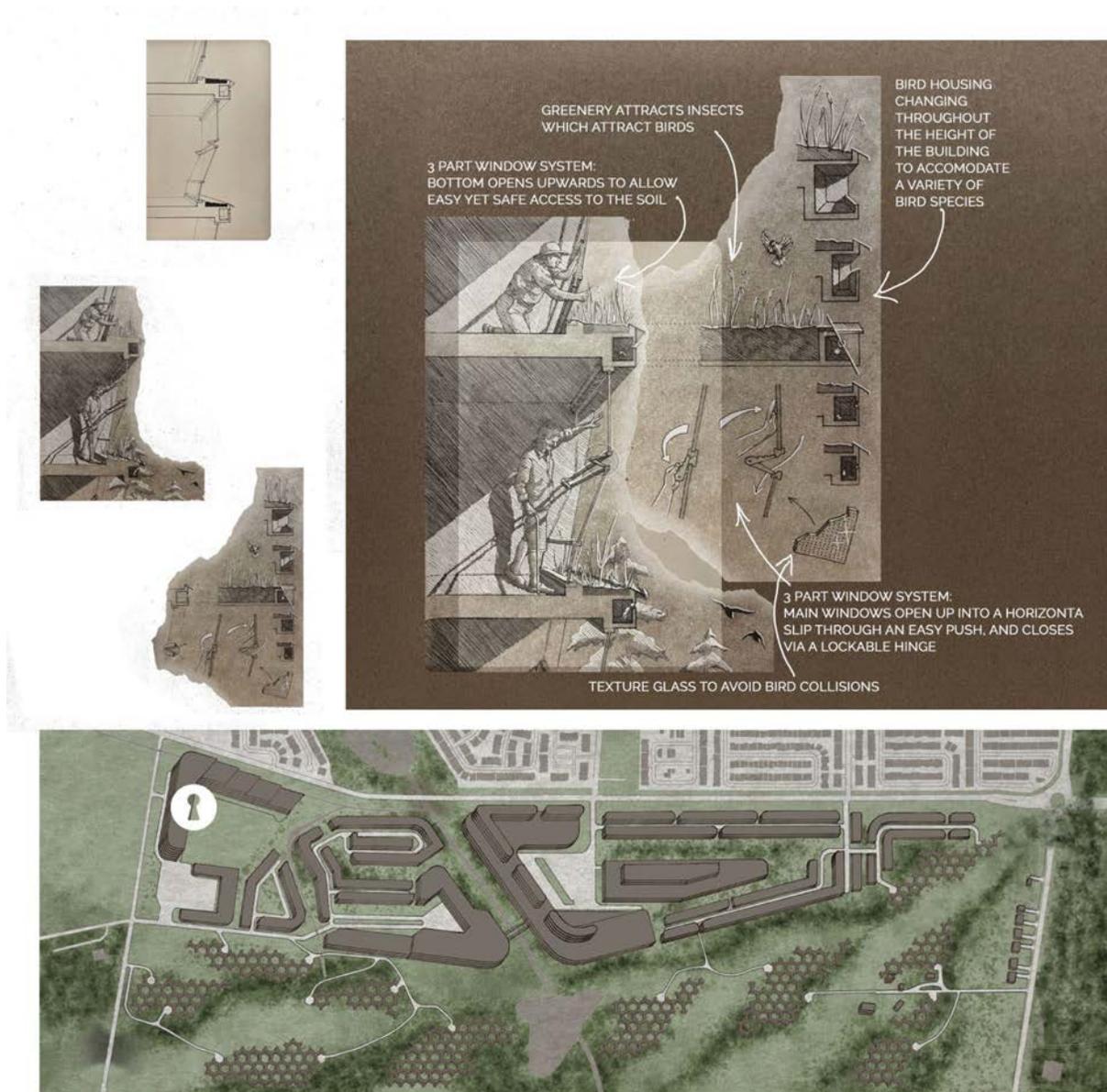


Figure 72: The second key: insects, birds and connections to air and sky.

The second key displays an east-facing fragment of the "L"-shaped tower located at the intersection of Hope Side Road and Eagleson Road (Fig. 72). The east-facing window seen in the illustration provides sun in the morning for human occupants as well as birds

who choose to nest facing this direction.⁸³ The envelope's window design is angled downwards to face the park underneath the building, while also providing horizontal space on the façade of each floor, which includes a small garden space. This garden is readily accessible by raising the bottom glass. The upper glass of the window is opened with a simple push, and closed by pulling on the integrated handle. The horizontal slit into which the window opens gives just enough airflow for the interior while keeping the opening thin enough to ensure the occupants' safety. The horizontality enables the slit to be positioned in such a manner that it is difficult for house pets to leap through, while also providing some separation from insects that may inhabit the incorporated balcony-gardens. For instance, wasps fly mostly horizontally when searching for entrances in solid barriers; hence, a vertical incision will be considerably simpler for a wasp to stumble across.⁸⁴ The envelope also acts as the basis for bird housing, inserted into the slabs. The form of these bird houses varies according to the building's height, with each housing type aimed towards a different species. This feature is inspired by the ornate bird palaces of Ottoman-era Turkey.⁸⁵

⁸³ Cranmer, Travis. "Mounting Birdhouses." Birdhouse Placement & Mounting Methods. Cranmer Earth Design. Accessed March 29, 2022. <http://www.earthdesign.ca/bipl.html>.

⁸⁴ Stürzl, Wolfgang, Jochen Zeil, Norbert Boeddeker, and Jan M. Hemmi. "How Wasps Acquire and Use Views for Homing." *Current Biology* 26, no. 4 (2016): 470–82. <https://doi.org/10.1016/j.cub.2015.12.052>.

⁸⁵ "Bird Houses in Turkey." Turkish Cultural Foundation. Accessed March 29, 2022. <http://www.turkishculture.org/architecture/bird-houses-104.htm>.

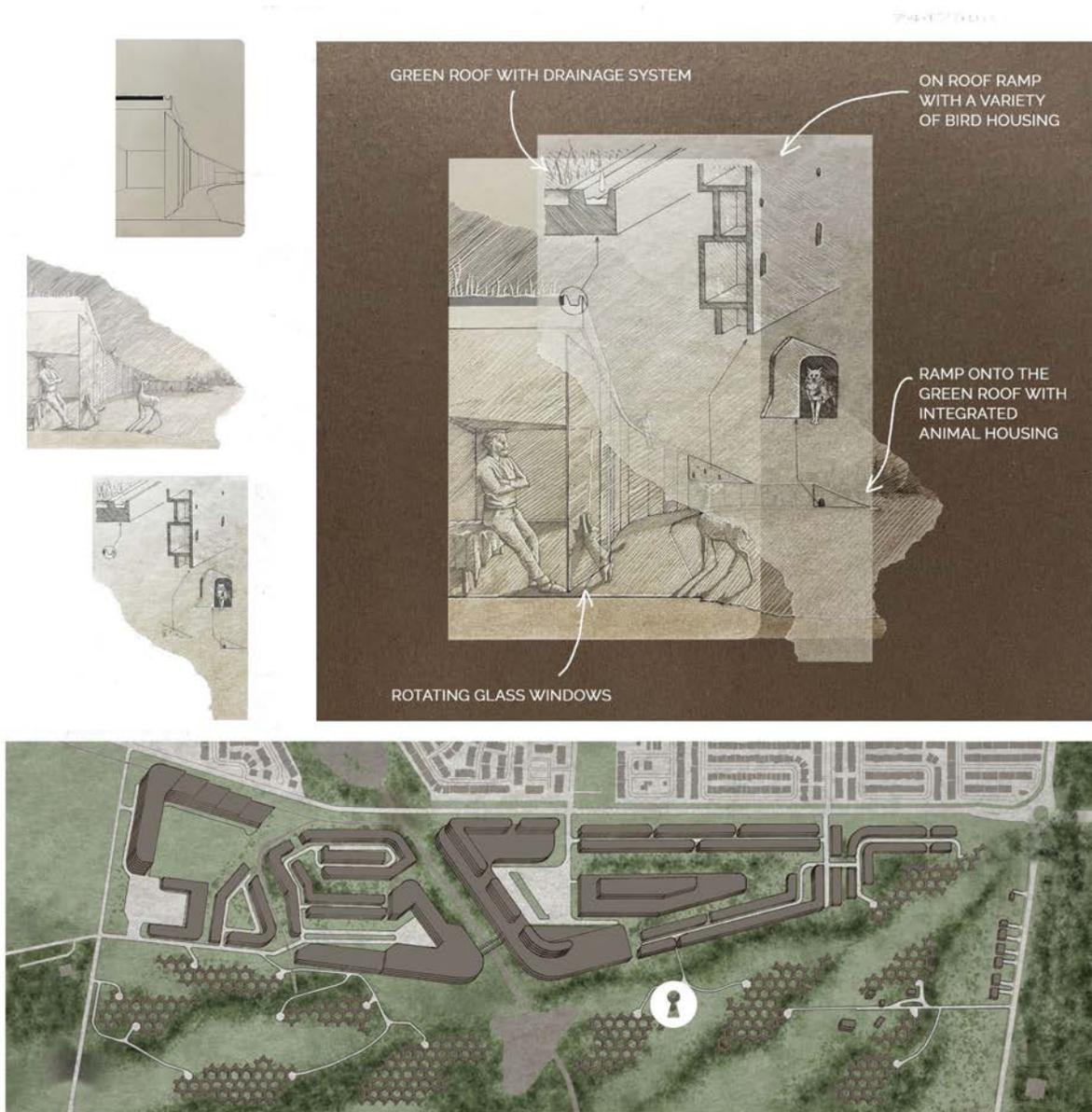


Figure 73: The third key: courtyards and shared living.

Key three illustrates a section of a *Sapling* dwelling in the *Emerald Stream* area. It shows wildlife that may enter the open courtyards and interact with the *Saplings'* residents (Fig. 73). The ramps leading from the ground onto the green roofs serve as shelters for fauna. In this illustration, the ramp is occupied by a coyote, although different sorts of wildlife may inhabit it in other locations. Ramps of a second variety are located on the green rooftops of the dwellings. Similarly to the envelopes of the "L"-shaped tower described in the previous key, the ramps double as bird housing for species that nest at lower elevations. While closed-concept courtyards are safe for pets to explore, this drawing depicts an open-concept courtyard that requires pet monitoring.

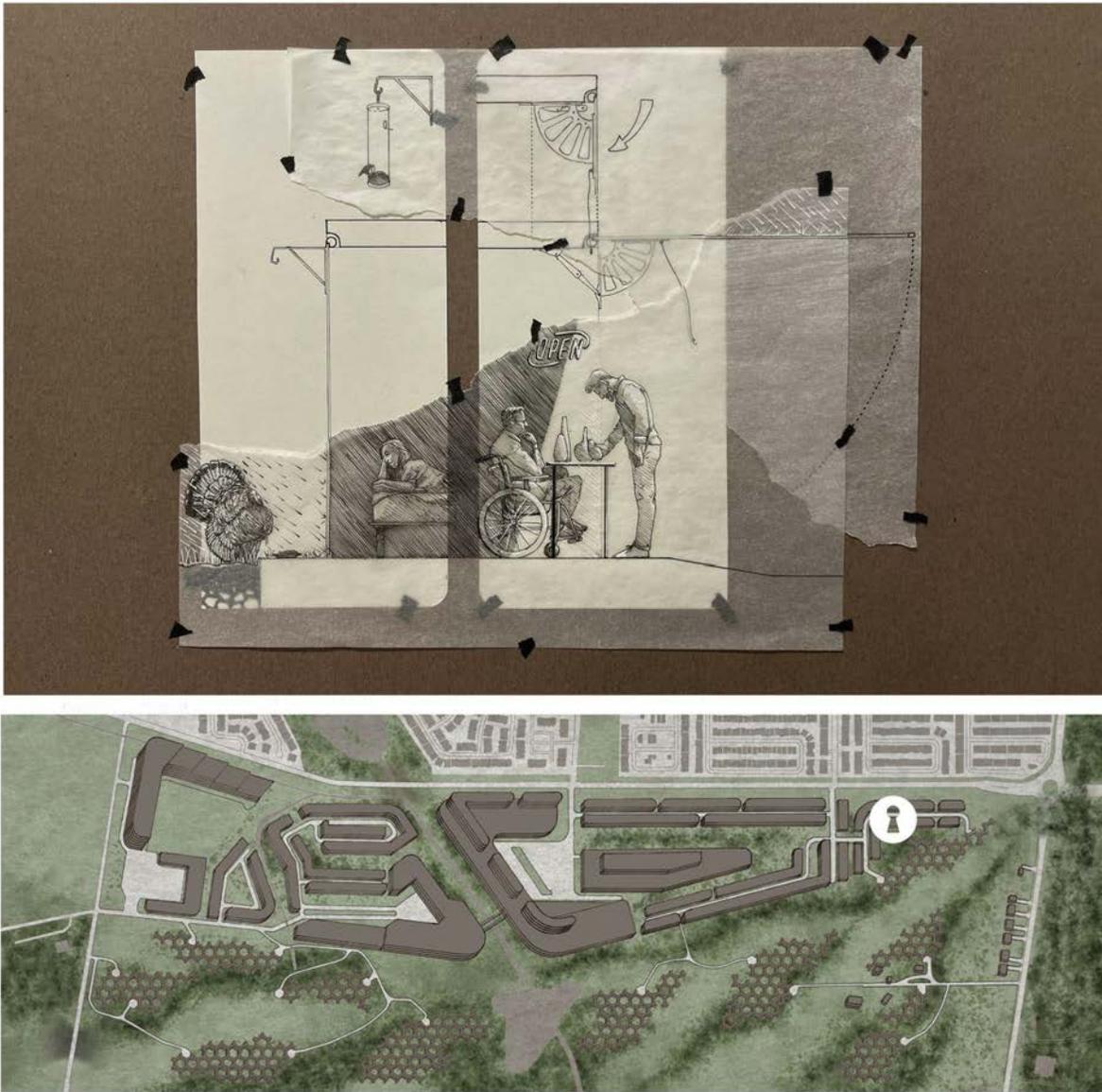


Figure 74: The fourth key: Juxtapositions and choices. Note the optional hanger for bird feeders.

The fourth key, which depicts both glazed ends of the *Ingot* dwelling, has a role distinct from other displayed keys (Fig. 74). The *Ingot* is located within the *Golden Central* regions which are designed to guide species to the safe internal zone where the *Emerald Stream* unfolds. According to this rationale, the function of homes is not to attract animals, but to act as barriers and guides in the process of animal-route construction. For the human dwellers, the unit is all about choice and preference. On one end, windows facing human-centric streets may be opened upward, converting the living space into a storefront. The windows, which now serve as a visual cue that the business is open, also provide protection from the elements for prospective customers. On the *Ingot's* other end, people awaken to views of nature and wildlife and, depending on whether or not they have installed a feeder, to the sight of birds.

Architectural design is intended to address both the animal and human worlds, providing shelter and offering space for both. Only by addressing life and neighbourhood planning at numerous scales can their design perform consistently and correctly for all species. The planning of the site as a whole addresses the life and migrations of large species, while attention to sensitive envelope design and details addresses smaller mammals, avians, reptiles, and insects. However, certain creatures, including humans, may lay within both categories. Coyotes will partake in both the neighbourhood's features at both the macro and micro scales, while frogs may enjoy more focused features within a smaller radius.

Chapter 07

Looking into the Future

Can the concerns addressed in this thesis be extended beyond the scope of a retirement community? I asked myself this question while conceptualising the *Golden Green Belt's* alternative development zone. First and foremost, why a senior community? There is something that happens to humans as they age. I often realise how our lives are intertwined with those of animals and with the processes of nature. When closer to death, humans see their destiny as not so different from that of animals: they too will end up in the ground sooner or later. It is this realisation with which this thesis works; the notion that being among animals may offer comfort and be more profoundly appreciated as one ages. It is important that the dwellers of this alternative development zone understand themselves as caretakers and understand their role in securing environmental survival for their "neighbours." Their choice to live in a zone of passage for animals and their choice to be subservient to them is a social decision; it is likely that the dwellers would hold these values and perhaps may make choices which revolve around sustainability and planetary survival. So, should it be extended? The shortest and most definite answer is "yes."

The strategy of employing two morphologies to achieve green space, unit density, and animal passage, was effective. This split into street-oriented bars and fluid swaths – as was achieved with *Golden Central* and *Emerald Stream* in this proposition – should be maintained for future sites that connect the *Greenbelt* with other green areas such as Ottawa’s southwestern wetlands (Fig. 75).

The *Golden Green Belt* here proposed cannot be replicated without adjustments. Each site is unique. Its design approach, however, could and should be reused. The division of a site into two zones – a street-oriented linear zone and a fluid, non-orthogonal interior zone – allows it to negotiate transitions from densely built areas to vegetated zones, to allow for the safe passage of wildlife. This proposition organised the land at 5044 Hope Side Road into two zones, however, in a different context, more zones might be needed. For example, in cases where there are pre-existing neighbourhoods along two of the site’s edges, the new neighbourhood might be divided into three zones, the flowing islands of an *Emerald Stream* wedged between two street-oriented *Golden Centrals*. The implication, here, is that development need not be in the hands of a solitary designer (Fig. 76). Whichever company purchases and develops the lots, they must be committed to an ecological vision. The lots must be designed with the best interests of wildlife in mind: migration routes must be studied, animal species identified, and fauna taken into consideration to the same degree as humans’ needs.

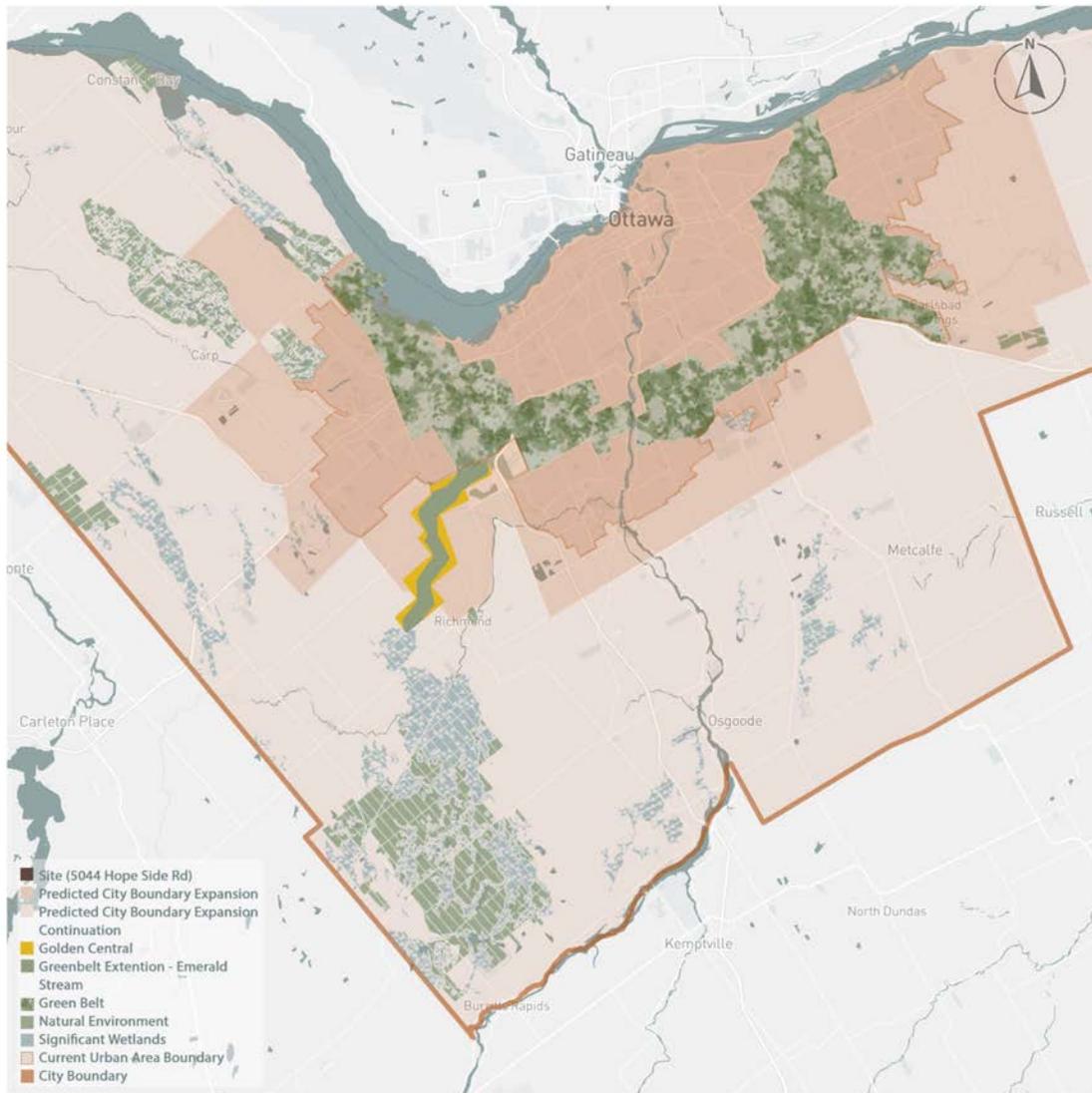


Figure 75: Alternative development zones developed to connect the *Greenbelt* to the significant wetlands and natural environments south of Richmond.



Figure 76: Current situation, a risk to avoid, and an alternative strategy for the future.

This thesis proposes that alternative development zones be constructed all across Ottawa's suburbs, and indeed throughout all of suburban Canadian cities. As this thesis developed, I became conscious of the enormous research required to properly design such an intricate environment. My thesis made a passing reference to animal psychology in relation to the design of an urban planning and building envelope. Much more could have been added to the intricate network of site analysis, animal perception of space, soil varieties, flora usage, landscaping, green material use in construction, etc. Similarly to how architecture and engineering began to divide in the mid-18th century to allow both streams to flourish independently yet collaborate, environmental design should do the same.⁸⁶ The topics for discussion of properly "green" architecture are virtually limitless. It is important for architects to realise that we are incapable of conducting this study on our own. Biologists, zoologists, and other subject-matter specialists must be involved in the design process, establishing a new standard for urban planning, neighbourhood form, and house morphology, in the future.

In Chapter 3: Retired Living, a thought process led to the choice of a retirement community as a suitable client for whom to test an alternative neighbourhood form that privileges the health and life of animals. Given that the thesis argues for connectivities between species, it would make sense to connect age groups. The neighbourhood requires a stable dweller, but that could happen with a mixed age-group population.

⁸⁶ P, Magyar. "Global Journal of Biological and Biomedical Research." Global Journal of Biological and Biomedical Research | The ISSN Portal, February 26, 2021. <https://portal.issn.org/resource/ISSN/2505-001X>.

With more time, a second phase of study would examine this idea with intergenerational housing instead of exclusively senior housing. These zones should be suitable for families, individuals, and people of all ages. Finally, I only hope that such ecological equality in design will be addressed in the future of any architecture and urban planning, for architects must speak on behalf of wildlife, and give voice to their cries for change!

List of Appendices

Appendix A

Preparatory Projects Completed in Previous Courses

I began creating drawings of the paths of animals and humans through the Abbottsville Trail (Fig. 77), studied the sites desire-paths systems (Fig. 78), and created a proposal for prototypical systems to help control the flow of the recorded species through the land (Fig.79).

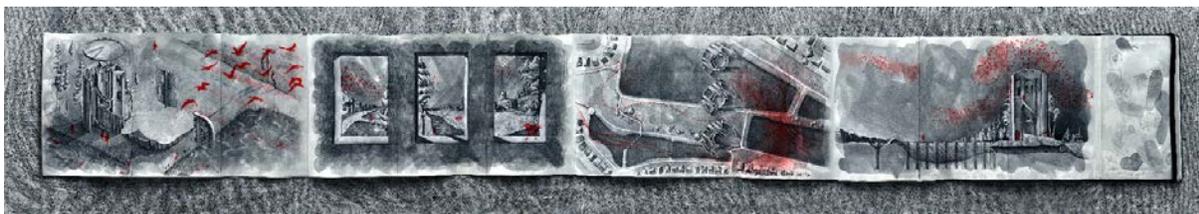


Figure 77: The work I completed in “The Sixth Continent, Bridging the Gap” in the fall of 2021 was the first to implement my observations of fauna’s migration paths across a Stittsville park located behind my house.⁸⁷ The drawings captured how animals adapted their paths through proposed architecture.

⁸⁷ Spiller Neil, ARCS5106 A, The Sixth Continent, Bridging the Gap, Azrieli School of Architecture and Urbanism, Carleton University, 2021.

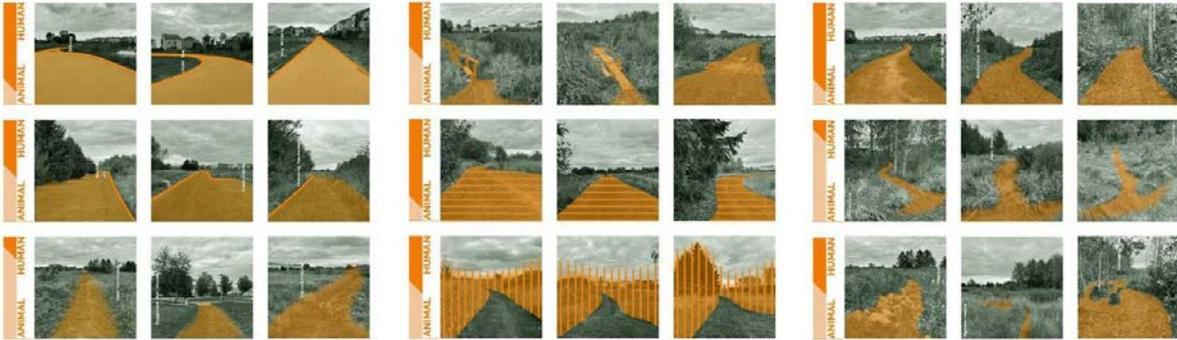


Figure 78: Study drawings done in the “Anatomy of the Field” course of 2021 spring.⁸⁸ Analysis of pathway systems in the Abbottville Trail using drawn overlays on photographs, comparing human and animal’s paths. These revealed different ideas of what is a “path” for each of the species.



Figure 79: Drawings developed in the 2021 winter course, “Black Flight”.⁸⁹ A series of prototypical small constructions to be implemented into the forest fabric to guide the flow of the inhabiting fauna.

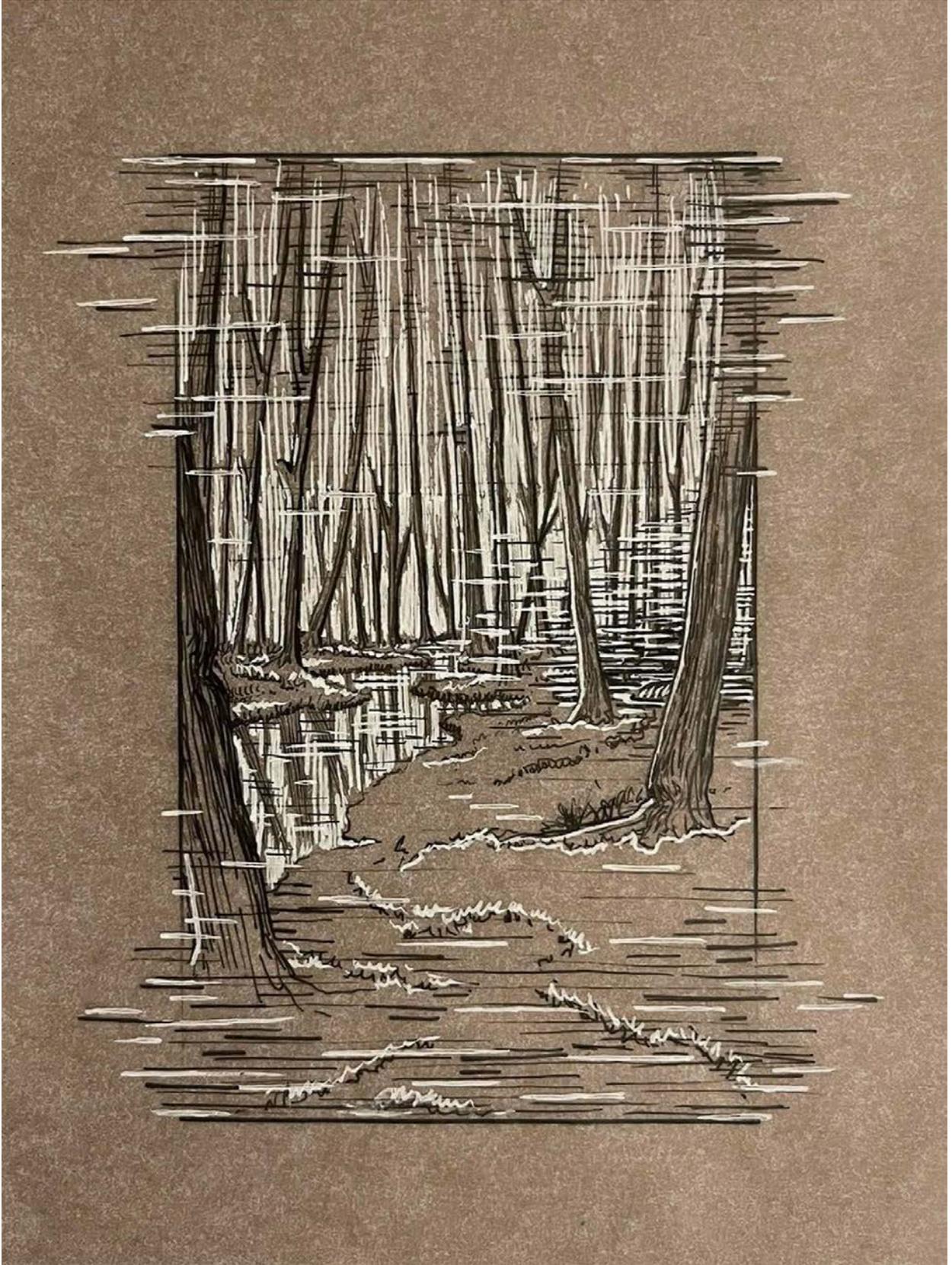
⁸⁸ Bernbaum Piper, ARCH5001, Anatomy of the Field, Azrieli School of Architecture and Urbanism, Carleton University, 2021.

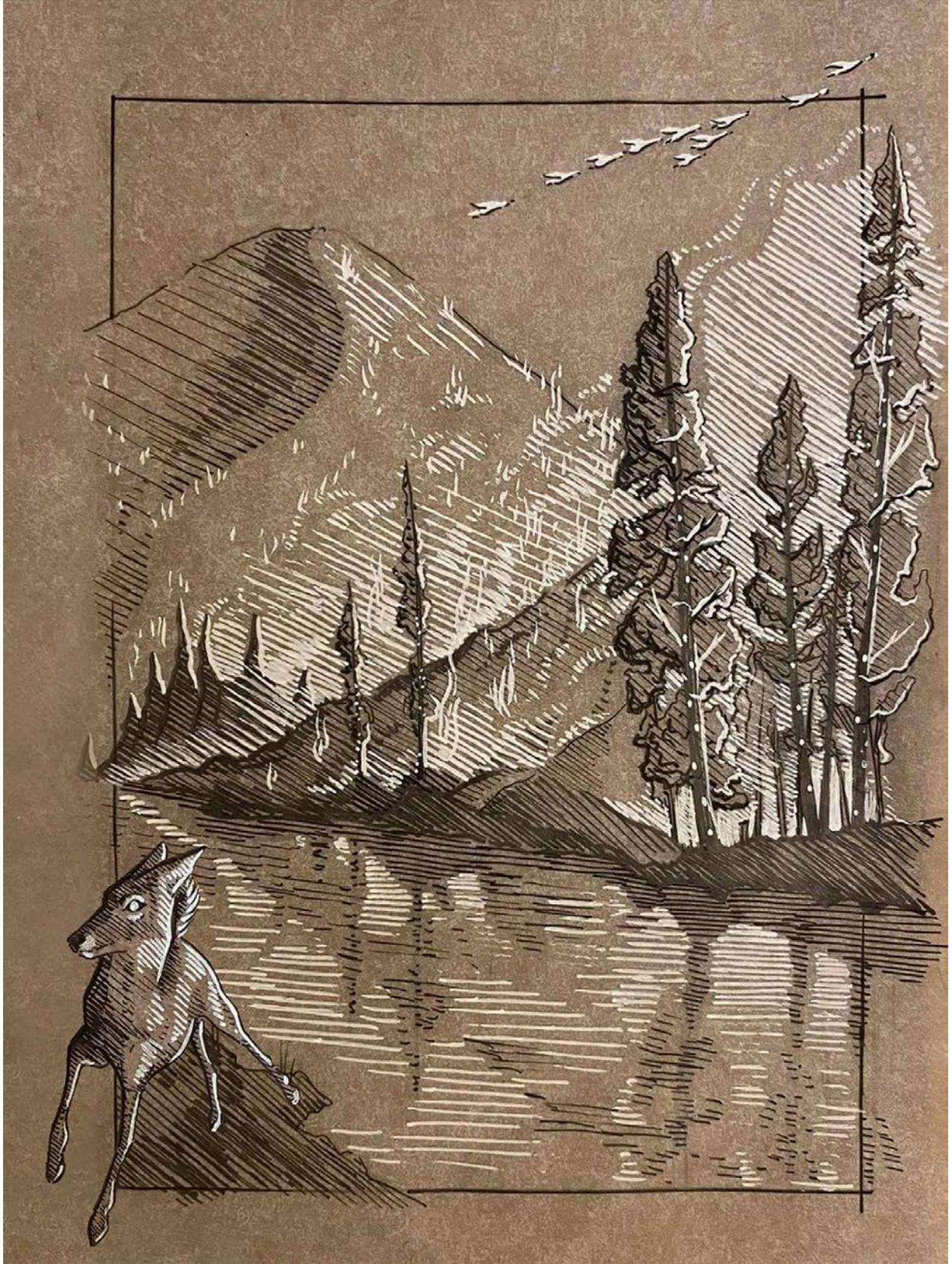
⁸⁹ Loewenson Thandi, ARCS5106 B, Black Flight, Azrieli School of Architecture and Urbanism, Carleton University, 2021.

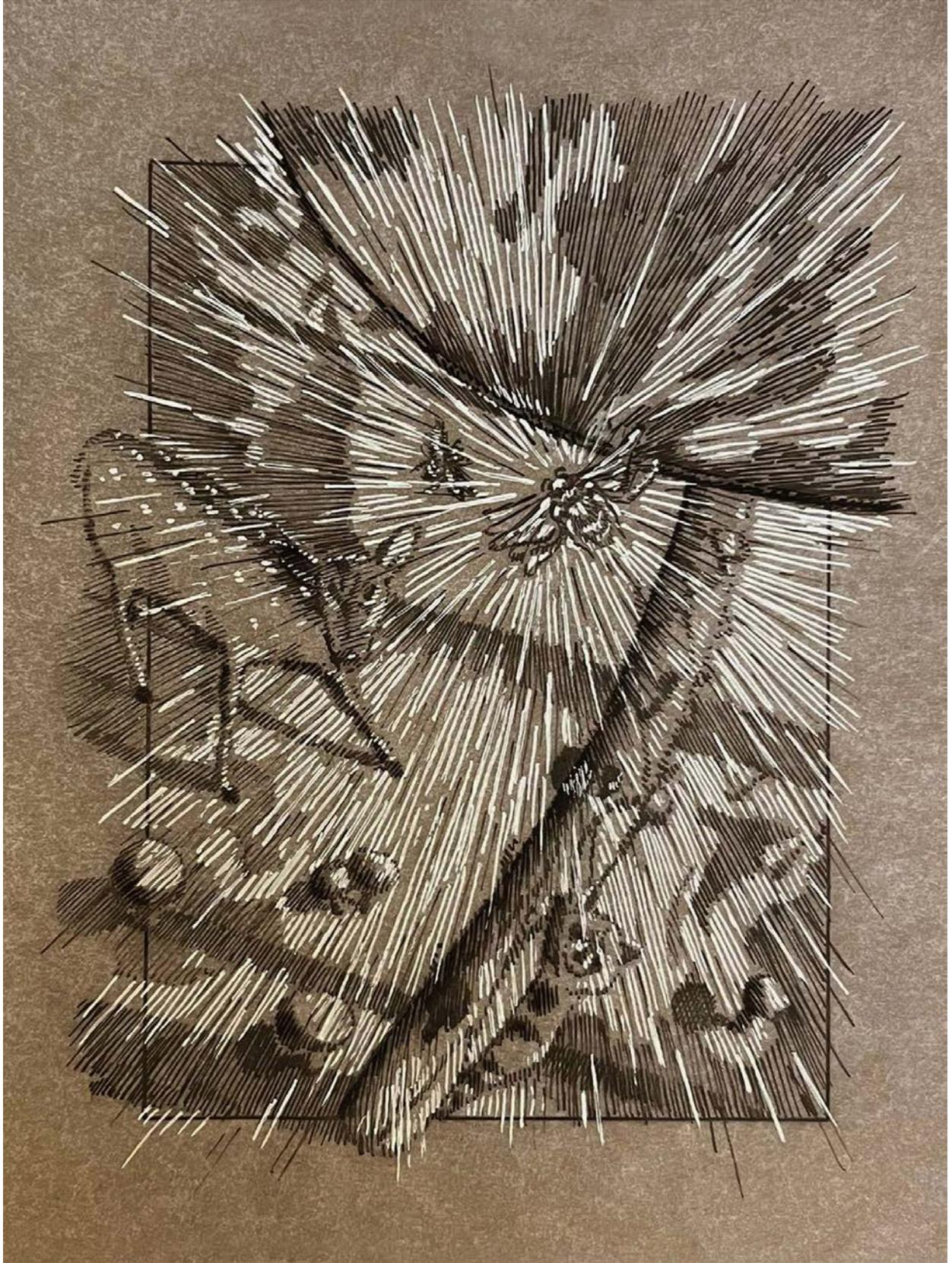
Appendix B

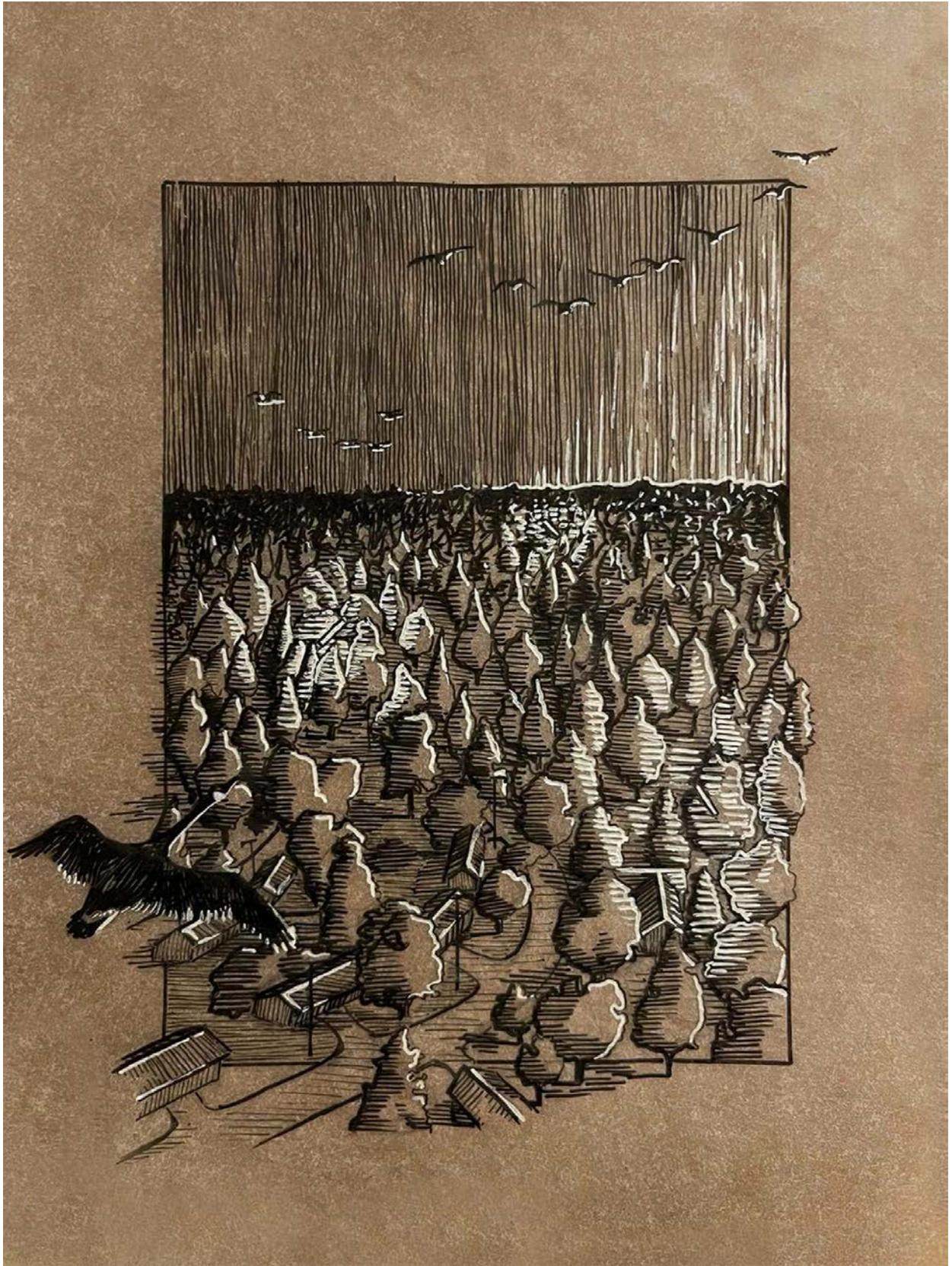
Enlarged Drawings of Approaching Fauna as Individual Users

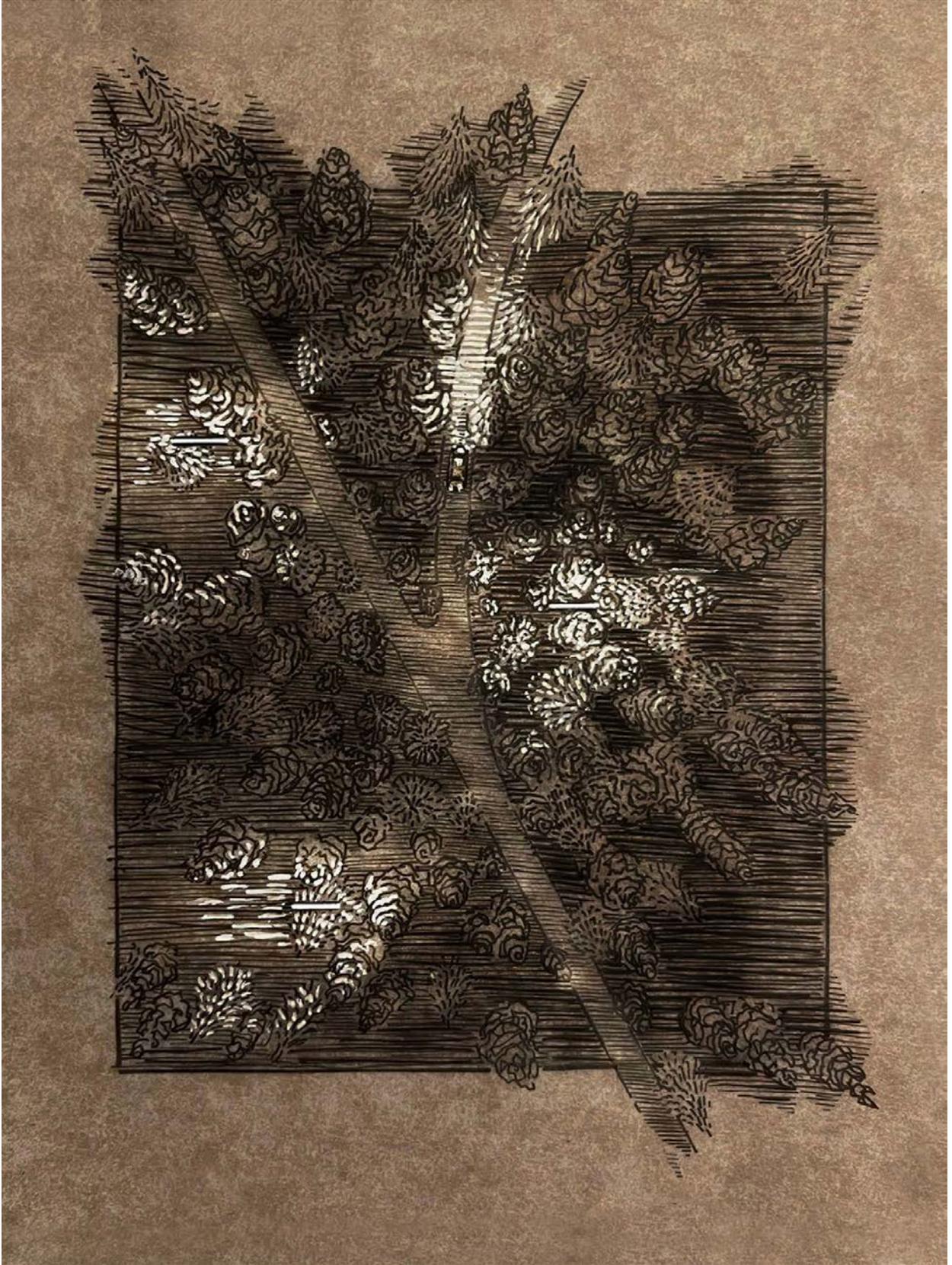
This appendix takes a closer look at some of the drawings shown and described in Chapter 5: *Approaching Fauna as Individual Users*. The drawings visualise how a variety of wildlife species may see the environments surrounding them.



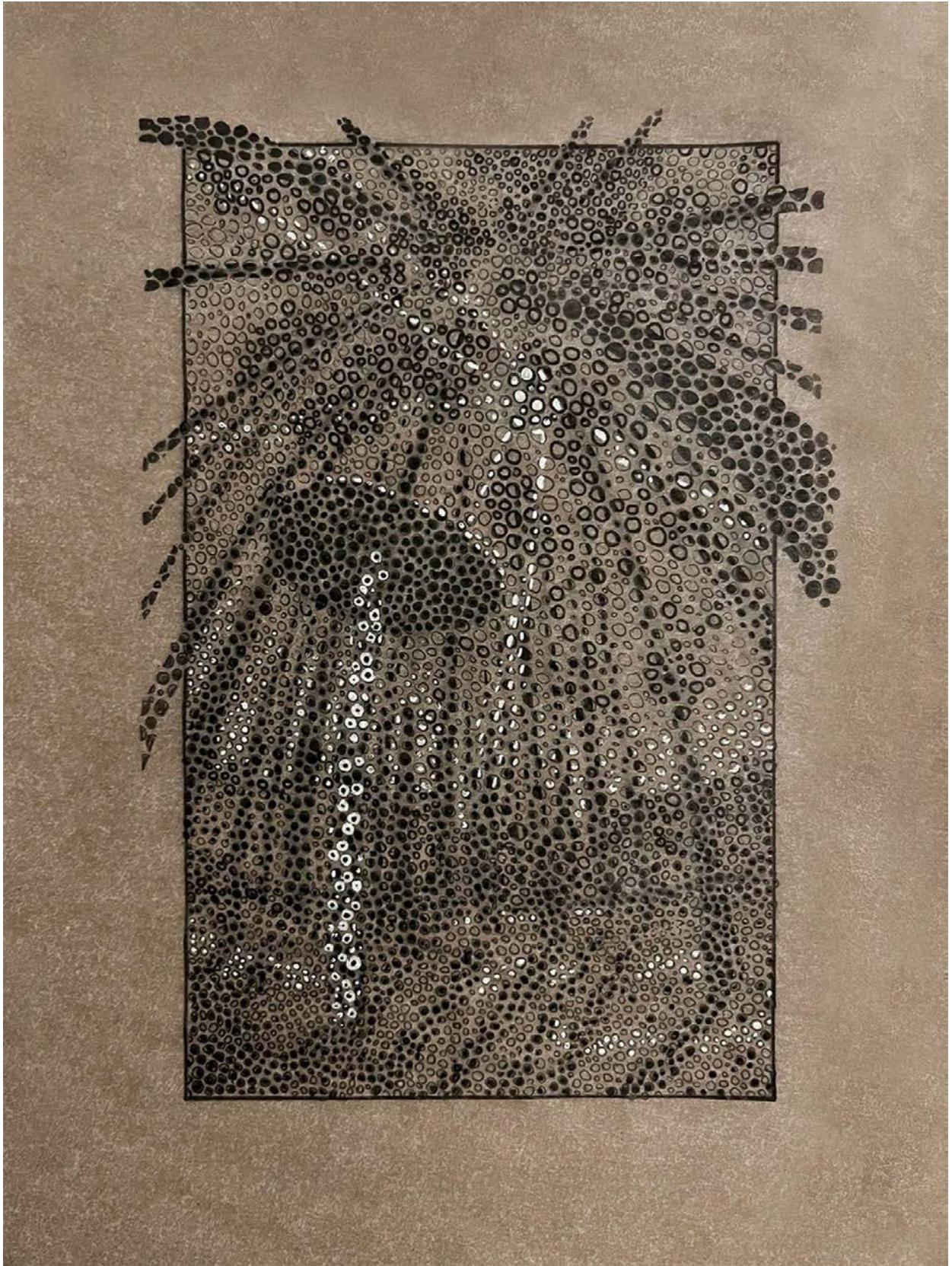












Bibliography

Books, Essays, Journals and Documents

Bratman, Gregory N., Christopher B. Anderson, Marc G. Berman, Bobby Cochran, Sjerp de Vries, Jon Flanders, Carl Folke, et al. "Nature and Mental Health: An Ecosystem Service Perspective." *Science Advances* 5, no. 7 (2019). <https://doi.org/10.1126/sciadv.aax0903> (accessed January, 2022).

Cartwright, Benjamin, Mathew White, and Theodore Clitherow. "Nearby Nature 'Buffers' the Effect of Low Social Connectedness on Adult Subjective Wellbeing over the Last 7 Days." *International Journal of Environmental Research and Public Health* 15, no. 6 (2018): 1238. <https://doi.org/10.3390/ijerph15061238> (accessed November, 2021).

City of Kitchener. *The Urban Coyote*. <https://thamesriver.on.ca/>. This brochure was originally developed by the City of Kitchener. https://thamesriver.on.ca/wp-content/uploads/Coyote_factsheet.pdf (accessed March 2022).

City of Ottawa. *Greenspace Master Plan: Strategies for Ottawa's Urban Greenspaces*. Department of Planning and Growth Management. Publication: 4-01. Ottawa, Ontario: Ottawa.ca, Publication, 2016, https://documents.ottawa.ca/sites/documents/files/greenspace_master_plan_en.pdf (accessed January, 2022).

Diamond Head Consulting. Rep. *Biodiversity Conservation Strategy*. City of Surrey, January 2014. https://www.surrey.ca/sites/default/files/media/documents/Surrey_BCS_Report.pdf (accessed May 2022).

Engemann, Kristine, Carsten Bøcker Pedersen, Lars Arge, Constantinos Tsirogiannis, Preben Bo Mortensen, and Jens-Christian Svenning. "Residential Green Space in Childhood Is Associated with Lower Risk of Psychiatric Disorders from Adolescence into Adulthood." *Proceedings of the National Academy of Sciences* 116, no. 11 (2019). <https://doi.org/10.1073/pnas.1807504116> (accessed February, 2022).

Eric A. Bays. Novatech. *5618 Hazeldean Road Planning Rationale & Integrated Environmental Review Statement*. Novatech File: 108195. Ottawa, Ontario: Statement, November 9, 2016, http://webcast.ottawa.ca/plan/All_Image%20Referencing_Subdivision_Image%20Reference_Do7-16-16-0020%20-%20Planning%20Rationale.PDF (accessed February, 2021).

Fahrig, Lenore. "Effects of Habitat Fragmentation on Biodiversity." *Annual Review of Ecology, Evolution, and Systematics* 34, no. 1 (2003). <https://doi.org/10.1146/annurev.ecolsys.34.011802.132419> (accessed May 2022).

Goldingay, Ross L., Brendan D. Taylor, and Tina Ball. "Wooden Poles Can Provide Habitat Connectivity for a Gliding Mammal." *Australian Mammalogy* 33, no. 1 (2011): 36. <https://doi.org/10.1071/am10023> (accessed February 2022).

Jacobs, Jane. Essay. In *The Death and Life of Great American Cities: Orig. Publ. 1961*, 6. New York: Vintage Books, 1992. (accessed May, 2021)

Kelly, Christine A., Corinne A. Diggins, and Andrew J. Lawrence. “Crossing Structures Reconnect Federally Endangered Flying Squirrel Populations Divided for 20 Years by Road Barrier.” *Wildlife Society Bulletin* 37, no. 2 (2013). <https://doi.org/10.1002/wsb.249>. (accessed February 2022).

Langton, Tom, Tony Clevenger, Cheryl Brehme, and Robert Fisher. “California Sensitive Reptile and Amphibian Highway Crossings.” The Western Transportation Institute. California Department of Transportation (CALTRANS), 2021. https://westerntransportationinstitute.org/research_projects/california-sensitive-reptile-and-amphibian-highway-crossings/ (accessed February 2022).

Littlewood, N.A., Rocha, R., Smith, R.K., Martin, P.A., Lockhart, S.L., Schoonover, R.F., Wilman, E., Bladon, A.J., Sainsbury, K.A., Pimm S. and Sutherland, W.J. (2020) *Terrestrial Mammal Conservation: Global Evidence for the Effects of Interventions for terrestrial mammals excluding bats and primates*. Synopses of Conservation Evidence Series. University of Cambridge, Cambridge, UK. (accessed February 2022).

Ministry of Natural Resources. “Guidelines for Winter Feeding of Deer in Ontario.” ISBN 0-7778-4932-1, n.d. https://www.ofah.org/wp-content/uploads/2015/04/MNR-Guidelines-deer_winterFeeding.pdf (accessed March 2022).

Norbert Schoenauer and Stanley Seeman, *The Court-Garden House* (McGill University Press, Montreal, 1962). (accessed May, 2022).

P, Magyar. “Global Journal of Biological and Biomedical Research.” Global Journal of Biological and Biomedical Research | The ISSN Portal, February 26, 2021. <https://portal.issn.org/resource/ISSN/2505-001X> (accessed May, 2022).

RVCA. “Jock River Subwatershed Report 2016 MONAHAN DRAIN CATCHMENT.” Monahan drain. Rideau Valley Conservation Authority, 2016. <https://watersheds.rvca.ca/subwatersheds-reports/jock-river/catchment-reports-jock-river/144-monahan-drain> (accessed March, 2022).

Sarmant, Thierry. *Histoire de Paris: Politique, urbanisme, civilisation*. Éditions Jean-Paul Gisserot. 2012. ISBN 978-2-755-803303. (accessed February, 2021)

Stürzl, Wolfgang, Jochen Zeil, Norbert Boeddeker, and Jan M. Hemmi. “How Wasps Acquire and Use Views for Homing.” *Current Biology* 26, no. 4 (2016): 470–82. <https://doi.org/10.1016/j.cub.2015.12.052> (accessed May, 2022).

Vieira Mejia, Catalina, Liubov Shirotova, and Igor Fernando Marques de Almeida. “Green Infrastructure and German Landscape Planning: A Comparison of Approaches.” *Urbani izziv* 26, no. supplement (2015). <https://doi.org/10.5379/urbani-izziv-en-2015-26-supplement-002> (accessed May 2022).

Zelenski, John M., Raelyne L. Dopko, and Colin A. Capaldi. “Cooperation Is in Our Nature: Nature Exposure May Promote Cooperative and Environmentally Sustainable Behaviour.” *Journal of Environmental Psychology* 42 (2015). <https://doi.org/10.1016/j.jenvp.2015.01.005> (accessed January, 2022).

Websites, Blogs, and Online Articles

Advanced Solutions International, Inc. "About Seniors Housing." AdvantAge Ontario - Advancing Senior Care. https://www.advantageontario.ca/AAO/Content/Resources/Consumers/About_Seniors_Housing (accessed February, 2022).

Area Guide, The Couples Resort. "Red Fox (*Vulpes Vulpes*) Ontario, Canada." Red Fox Ontario, Canada - Algonquin Park Ontario Red Fox (*Vulpes vulpes*). Ontario, Canada. [https://www.couplesresort.ca/attractions/Articles/Animals/red_fox.htm#:~:text=Fox%20\(Vulpes%20vulpes\)-,Ontario%2C%20Canada,and%20much%20of%20North%20America](https://www.couplesresort.ca/attractions/Articles/Animals/red_fox.htm#:~:text=Fox%20(Vulpes%20vulpes)-,Ontario%2C%20Canada,and%20much%20of%20North%20America) (accessed March, 2022).

Best, Chanel. "Ottawa's Planned Gold Belt Expansion: Who Does It Exclude?" *Kroeger Policy*, May 21, 2021. <https://www.kroegerpolicyreview.com/post/ottawa-s-planned-gold-belt-expansion-who-does-it-exclude> (accessed March 2022).

"Bird Houses in Turkey." Turkish Cultural Foundation. <http://www.turkishculture.org/architecture/bird-houses-104.htm> (accessed March, 2022).

Brandon, Emily. "Why More Retirees Are Becoming Renters." *Money.usnews.com*. © U.S. News & World Report L.P. February 26, 2018. <https://money.usnews.com/money/retirement/baby-boomers/articles/why-more-retirees-are-becoming-renters> (accessed February, 2022).

Breeding, Brad. "Senior Living Cooperatives Explained." Web log. *My Life Site* (blog), March 25, 2015. <https://mylifesite.net/blog/post/senior-living-cooperatives-explained-2/> (accessed February, 2022).

Brehme, Cheryl, Robert N Fisher, and Alexandra Weill. "Animal Crossing: New Research Guides Efforts to Protect California's Amphibians and Reptiles from Road Danger." *usgs.gov*. Western Ecological Research Centre (WERC), May 10, 2021. <https://www.usgs.gov/news/animal-crossing-new-research-guides-efforts-protect-californias-amphibians-and-reptiles-road> (accessed February 2022).

"CIHI Study Finds Depression in 44 Percent of Seniors in Residential Care Facilities." CMHA Ontario. Canadian Mental Health Association, June 24, 2010. <https://ontario.cmha.ca/news/cihi-study-finds-depression-in-44-percent-of-seniors-in-residential-care-facilities/> (accessed November, 2021).

Cornu, Ben. *13 Reasons to Keep Your Senior out of a Nursing Home*. Caring Senior Service, February 22, 2022. <https://www.caringseniorservice.com/blog/13-reasons-to-keep-your-senior-out-of-a-nursing-home-1> (accessed December, 2021).

"COYOTES (*Canis Latrans*)."
discover-southern-ontario. SBI. <https://www.discover-southern-ontario.com/coyotes.html> (accessed March 2022). (accessed December, 2021).

Faulkner, Kirsty. *Thousands of Christmas Island Crabs Use a Specially Designed Bridge to Make Their Way from the Forest to Breed in the Ocean*. Photograph. *Dailymail*. Christmas Island: Mail Online, November 14, 2017. Mercury Press.

<https://www.dailymail.co.uk/news/article-5080875/Millions-crabs-make-migration-trip-Christmas-Island.html> (accessed February 2022).

“Geese Habitat And Food.” Geese Relief. <https://www.geeserelief.com/geese-problems/geese-habitat-and-food> (accessed March 2022).

“General Information about Coyotes.” General Information About Coyotes | Urban Coyote Research. Cook County Urban Coyote Research Project.

<https://urbancoyoteresearch.com/coyote-info/general-information-about-coyotes> (accessed March, 2022).

Government of Canada, <https://www.canada.ca> (accessed March, 2022).

“Greenbelt.” NCC. National Capital Commission, November 12, 2021.

<https://ncc-ccn.gc.ca/places/greenbelt> (accessed February, 2022).

Hendershot, Don. “Hey, Can a Squirrel Get a Lift around Here?” Web log. *The Naturalists Corner* (blog), November 27, 2010. <https://thenaturalistscorner.com/hey-can-a-squirrel-get-a-lift-around-here/> (accessed February 2022).

Huetter, Robyn. *Seniors' Top 10 Fears of Ageing: Senior Living 101*. Senior Apartments: Independent & Assisted Living in West Seattle. Daystar Retirement Village, May 4, 2020.

<https://info.daystarseattle.com/senior-living-blog/understanding-your-aging-parents-seniors-top-10-fears#inability-manage-activities> (accessed December, 2021).

Humphrey, Bob. “Home Range Movements: Understanding Seasonal Deer Movement.” Mossy Oak, November 14, 2019.

<https://www.mossoak.com/our-obsession/blogs/deer/home-range-movements-understanding-seasonal-deer-movement> (accessed March 2022).

Malm, Sara. “Millions of Crabs Make Migration Trip on Christmas Island.” Daily Mail Online. Associated Newspapers, November 14, 2017.

<https://www.dailymail.co.uk/news/article-5080875/Millions-crabs-make-migration-trip-Christmas-Island.html> (accessed February 2022).

Mandell, Brian, Ashley Deese, Kate Echevarria, Katya Vines, and Jean Flanagan. “How Do Birds Navigate?” Smithsonian Science Education Centre. Science and Technology Concepts Middle School, January 4, 2018.

<https://ssec.si.edu/stemvisions-blog/how-do-birds-navigate#:~:text=Researchers%20have%20also%20found%20some,landmarks%2C%20such%20as%20the%20ocean> (accessed February 2022).

Province of Ontario, <https://ottawa.ca> (accessed April, 2022).

Raymond, T. “City Proposes New ‘Gold Belt’ to Limit Urban Sprawl,” 2021 CTV News.

<https://ottawa.ctvnews.ca/city-proposes-new-gold-belt-to-limit-urban-sprawl-1.5269851> (accessed March 2022).

Rosen, Jules M.D. "A Doctor's View: Depression in Long-Term Care Residents." Health Progress. Catholic Health Association Of the United States (CHA), December 2014. <https://www.chausa.org/publications/health-progress/article/november-december-2014/a-doctor%27s-view-depression-in-long-term-care-residents> (accessed November, 2021).

Shepherd, Thalia. "Life Saving Animal Bridges and Crossings around the World." BigGlobalTravel, March 31, 2020. https://www.bigglobaltravel.com/adventure/animal-bridges-and-crossings-fb/?utm_campaign=Animals%2BBridges%2BLiatN2004%2BV1%2BPHS993%2BVV%3E6%2BEn%2BBig4%2B-%2BMobile%2BWW%2BFB&utm_source=Facebook&utm_medium=WC&utm_content=DC&psl=i_d6ffa6 (accessed February 2022).

Shuster, Michael. *Why Seniors Fear Moving to a Retirement Home, Retirement Residence*. Ontario Real Estate Specialist Michael Shuster, November 3, 2021. https://shusterrealestate.com/fear_moving/ (accessed January, 2022).

"The Importance of Nature in Older Populations." Health, Making the case, Short reads. Nature Sacred, August 2, 2016. <https://naturesacred.org/nature-seniors/> (accessed November, 2021).

Todd, Zazie. "The Challenges and Benefits of Pet Ownership for Seniors." Edited by Gary Drevitch. Psychology Today. Sussex Publishers, June 19, 2019. <https://www.psychologytoday.com/ca/blog/fellow-creatures/201906/the-challenges-and-benefits-pet-ownership-seniors#:~:text=Research%20has%20shown%20having%20a,older%20adults%20a%20daily%20routine> (accessed December, 2021).

"Types of Housing." Canadian Mental Health Association. CMHA Ontario. <https://ontario.cmha.ca/documents/types-of-housing/#:~:text=Supportive%20Housing,-Referred%20to%20as&text=They%20are%20generally%20operated%20by,of%20support%20within%20the%20residences> (accessed March, 2022)

Un, Kit. *Fact Sheet: Bioretention Areas*. MAPC. September 15, 2016. <https://www.mapc.org/resource-library/fact-sheet-bioretention-areas/> (accessed January, 2022).

Weir, Kirsten. "Nurtured by Nature." *Monitor on Psychology*. American Psychological Association, April 1, 2020. <https://www.apa.org/monitor/2020/04/nurtured-nature> (accessed January, 2022).

"Why You Should Think about Moving to an Adult Lifestyle Community." Web log. *Blythwoodhomes.ca* (blog). Niagara Home Builders Association, September 30, 2020. <https://blythwoodhomes.ca/what-is-an-adult-lifestyle-community-and-who-lives-there/#:~:text=Adult%20lifestyle%20communities%20in%20Ontario,residents%20are%20in%20their%2040s> (accessed February, 2022).

WILD NEIGHBOURS. "Why Do Canada Geese like Urban Areas?" The Humane Society of the United States. <https://www.humanesociety.org/resources/why-do-canada-geese-urban-areas> (accessed March 2022).

"Wild Turkey Behaviour." The National Wild Turkey Federation. Proteus - NWTF. <https://www.nwtf.org/hunt/wild-turkey-basics/behavior#:~:text=Turkeys%20may%20use%20traditional%20roost,as%20they%20can%20comfortably%20perch> (accessed March 2022).