Resettlement: Using Place-Based Architecture to Create Modern Agricultural Communities

by

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Contents

Abstract

Suburbanization has homogenized the development and organization of rural communities in North America and around the globe. By focusing primarily on providing automotive circulation characterized by low population density, the utility and amenity networks required to support communities are stretched to undesirable limits (sprawl) that can negatively impact local economies, natural resources and opportunities for active pedestrian movement. Homogenized building processes can also lead to a loss of architectural reference to communities' sense of place formed by their unique histories, landscapes and cultures. This thesis looks to repair those frayed connections through architectural intervention by thinking of a locale's unique attributes first and then responding with regionally sensitive design complemented by a pedestrian focused plan. By creating a visually discernible and tactile celebration of culture and history, communities can reintroduce, enhance and update ways of life that are more applicable to their immediate environment, can foster higher levels of self-sufficiency and can encourage an engaging and social community organized to accept and adopt technological changes of the near and distant future.

Acknowledgements

Chapter 1: Introduction

Disclaimer

Before beginning this chapter it is necessary to make some statements regarding its tone. It highlights the unintentional consequences of optimism and enthusiasm regarding the potential of the automobile and has a negative outlook on suburban planning as a result of the research. However, it is not intended to point the finger or to lay blame on any individual or group.

As this technology became more accessible, people naturally wanted to take full advantage of it and that led to its proliferation throughout society. It gave individuals increased freedom to access an extended environment, easier access to services and the ability to commute to population centers for work. This and the following chapters establish that this was done without a sensitive and modern understanding of potential side effects. This thesis outlines those side effects and highlights how we can be proactive in reversing them. We simply did not have the knowledge then that we now have at our disposal and this presents a great opportunity for change.

A Globalized Type

Throughout human history different groups and individuals have been developing microclimates through building that align with their perceived set of needs at a given time. These needs are shaped by their natural environment, cultural and political influences and any technologies available to them (Rossi 1982, 35). Different *types* of buildings, defined

by Moneo as "a group of objects characterized by the same formal structure" (Moneo 1978, 23), were developed by combining unique natural influences with individual societies' evolving aesthetic desires (Rossi 1982, 40).

In the Renaissance, the organic, place-focused development of many medieval communities began to change. Although technologically limited, these places were designed by using a deep cultural understanding of the opportunities provided by their immediate local context. Planners of new colonial powers began to replace this method by designing entire communities and cities using predefined formal arrangements and building types with an increased focus on recognizable aesthetic features and functional programmatic layouts. Community "grids" of roads and parks were developed and then filled in with buildings, signifying a shift to more globalized community types in the following centuries (Gehl and Koch 1987, 45).

As these layouts shifted and changed during the Industrial Revolution, so did the economic factors that influenced where people lived. In the late 19th century, "suburbs" began to develop just beyond city limits. They presented a unique economic opportunity to those with less financial freedom: small, independent communities with an abundance of cheap land. As more people opted to move to these communities, the amount of services that they offered grew as well (Hayden 2004, 12). The "triple dream", defined by Hayden as the combination of having a house, land and community, also presented significant financial

opportunities for individuals and groups who could figure out how to provide this affordably and for profit (Hayden 2004, 8).

During the first half of the 20th century, companies like Sears began to sell pre-designed kit homes like Spanish colonials, craftsman bungalows and the New England cape cod home. The "mail-order" and "self-built" suburbs that they created hastened the erosion and erasure of place-based knowledge of local building traditions. These vernacular building languages and their related materials were replaced in the name of efficiency and mass production (Hayden 2004, 97).

The transportation landscape in developed nations was also changing dramatically. General Motors, through a marketing campaign known as "Futurama", sought to convince the public that there were immense benefits to connecting their landscape and associated points of interest by an endless network of roads (Hayden 2012, 4). Personal automobiles would provide on-demand freedom of movement over great distances via this new road network. Unfortunately, this has encouraged "scattered development", especially in North America where vast unpopulated spaces prime for development were plentiful. By inadvertently requiring new communities to have unrestricted car access, the space per home and service - now inclusive of the automobile - began to increase (Hayden 2012, 11-12).

As the built environment adjusted to the automobile, functionalist zoning ideals would increase the already expanding spaces between the home and places of work and service. Although practical when considering

speed of transportation, these changes did not consider the physical and social health benefits of the tighter, more organically formed organizations characterized by medieval communities. Pedestrian streets and squares, natural gathering and meeting places when supplemented by proximal living and working populations, were lost to grids of access roads that prioritized automotive efficiency (Gehl and Koch 1987, 48). Due to the sprawling nature of this new model, including an increase in multiple-lane roads at higher speeds, perceptions of pedestrian travel become both unrealistic and unsafe (Hayden 2004, 155-156; Burden and Litman 2011, 37-38). In recent decades, testing this model has revealed specific negative impacts that may not have been immediately apparent upon conception.

Impacts

Economic

During the past century, many suburbs have become what Hayden calls "edge nodes". These are flat, vast population centers with sprawling retail, office and residential space separated into restrictive programmatic zones (Hayden 2004, 155-156). Due to the built nature of malls and strips typical of edge nodes and their associated parking lots, plans tend to be "scaled to the truck or car, never to the pedestrian". This leads to future problems for redevelopment, making it difficult to strategically densify community program because of the scattered nature of their organization and lack of concentrated locations of living populations (Hayden 2004, 172).

The automotive focused planning model typical of edge nodes also increases financial strain on individuals without unfettered access to personal vehicles. It requires local populations to allocate a significant portion of funds to purchase, repair, insure and fuel their cars to travel between everyday destinations (Burden and Litman 2011, 37-38). In order to maintain the roads on which these vehicles drive, communities must devote a large portion of tax dollars to supporting single use transportation. As population density decreases, the tax responsibilities per individual inhabitants and families must increase (Burden and Litman 2011, 42).

Another issue is how different levels of income inhabit and move within the stretched suburban model. As shopping centers and public amenity spaces grow, rent and home values of nearby neighbourhoods increase as wealthy people are attracted to relocate. Poorer individuals are then forced to move to more affordable homes in the "urban fringe", increasing the associated travel time and costs with accessing these supposedly inclusive places (Montgomery 2014, 282-287). Simply allowing access to all does not address underlying problems associated with geography-related costs of transportation exacerbated by a sprawled settlement pattern.

Communities' abilities to provide public services and amenities in edge nodes are also affected if they continue to sprawl instead of densifying. Suburban layouts require more space per inhabitant, meaning that more resources must be allocated to maintain

and provide associated modern utilities. Emergency services and schools are also affected as a balance between time to access, building costs and any required access roads must be met (Montgomery 2014, 57, 334). These added short- and long-term costs mean communities have less funds available for public amenities like parks, libraries and other public facilities (Montgomery 2014, 90). Public transit in these regions also becomes more expensive and inefficient since they require more scattered access points to ensure their accessibility (Montgomery 2014, 235).

Social Environment & Physical Health

Another cost associated with a suburban lifestyle is the time required to travel between destinations. As individuals spend more time commuting, they are much less likely to participate in community events and gatherings (Montgomery 2014, 67). Parents with long commutes to work are also limited in the amount of time that they can spend with and supervise their children (Montgomery 2014, 70). When running routine errands that are accessible only by vehicle, this time is diminished even further and requires additional planning.

Suburban streets are also frequently designed for more traffic than they need to carry, leading to wasted space that could be used for other programs or activities through consolidation of parking locations and driveways (Appleyard 1980, 115-116). When residences exist along the main arterial roads required to connect suburban neighbourhoods, inhabitants tend to have fewer personal relationships with their

neighbours because of higher noise levels associated with traffic. These relationships are even less likely with neighbours that live on the opposite side of busier streets, as they are separated by a consistent stream of cars (Appleyard and Lintell 1972, 98).

Traffic can also have a negative impact on inhabitants' perceptions of the safety of pedestrian movement in suburban communities, impacting opportunities for exercise while travelling between destinations. As the frequency and speed of vehicle traffic increases, people are less likely to walk or cycle between destinations for safety concerns (Jacobsen, Racioppi and Rutter 2009, 369). Road safety programs have also been found to raise these fears rather than mitigate them as they reinforce the priority of vehicular travel and highlight the dangers associated with walking or cycling nearby (Jacobsen, Racioppi and Rutter 2009, 372). The scale of power centers, typical suburban shopping locations characterized by separate box-stores, strip malls and associated parking lots, are also perceived as too large and unappealing in a pedestrian sense for people to walk between locations. There is little room for greenways and the constant, unpredictable flow of vehicles makes them feel particularly unsafe (Lorch 2005, 379).

A similar effect can happen in suburban neighbourhoods where homes are located a significant distance away from neighbours, errands and public services. The longer the walk or bicycle ride between destinations, the more difficult it becomes to delegate enough time to access them within a busy schedule.

It also becomes more difficult to transport goods or justify daily trips. The unfortunate reality is that what was once perceived as a convenience is beginning to encourage restrictive and inactive lifestyles through functionalist segregation (Todd and Todd 1994, 115).

Natural & Agricultural Environments

The scattered development typical of modern suburbs requires the conversion of large amounts of natural and agricultural lands as human populations grow and move (Hayden 2004, 182). This "low-grade urban tissue" rapidly encroaches on valuable natural assets as well as any local historical knowledge of how to use them sustainably (McHarg 1969, 80). Until recently, this form of development has been communicated as an economic driver, simultaneously promoting the construction of multi-lane highways to connect these new communities resulting in an even greater loss - and segmentation of - natural lands (Hayden 2012, 4-5). These road networks prioritize traffic frequency over ecological impacts through a "spurious cost-benefit formula" that focuses primarily on immediate monetary gains (McHarg 1969, 31).

The conversion of farmlands to suburban neighbourhoods was partly the result of improvements in the processing and transportation of agricultural products around the globe. These suburbs and their associated grocery stores provide stable and predictable consumer markets for producers who can take advantage of them (Van der Ryn 1986, 37). Unfortunately, this creates a system where the costs associated with long distance transportation of goods

are unloaded on individual consumers who pay a premium for imported products. Even if a suburban population made the decision to produce food locally, they would have to weigh the cost of sacrificing other natural or built environments for new agricultural land. Unless these items were grown in clusters near predefined groups of homes (which would require a higher level and dispersion of individual expertise and time) then there would still have to be centralized community purchasing points accessible by vehicle.

Humans have also come to a crossroads where they must address issues of hunger and malnourishment while adjusting their relationship to the natural world. According to the Food and Agriculture Organization of the United Nations (FAOUN), 815 million people are suffering from hunger and one in three are malnourished. Diminishing natural resources, water shortages and loss of fertile soils as a result of current and past patterns of living need to be addressed (FAOUN 2018, 4). Suburban living patterns negatively affect these factors as they require more space per person when compared to densifying (Montgomery 2014, 57). If farmlands are continuously lost due to increasing and scattering populations, then more natural lands must be sacrificed to compensate for losses in agricultural production, compounding associated problems with climate change.

Erosion of Place

Constructed and modified environments serve as reference points and memories of the cultures and histories they serve. They show how humans adapt

to different landscapes for their own benefit (Rossi 1982, 34). When this is done sensitively with regard to a specific region's historic virtues and natural uniqueness, it can promote a sense of stewardship of that environment. One of the major issues of the modern suburban typology is the sameness in form, material and layout regardless of geographic location (Van der Ryn 1986, 36). When types of building and community organization are transplanted onto a landscape without consideration of its individual qualities, the importance and potential of the surrounding nature can be blurred or lost as built references to that nature fade or are replaced.

By importing a suburban typology and its associated functional programs, there is a risk of implying that they are requirements for individual and community prosperity without considering the place-based opportunities presented by unique natural and cultural landscapes. Without inhabitants' input in the development of their communities, the new human ecosystems shaped by imported built environments can become common, traditional and perceived as essential to the lifestyle they simultaneously create and propagate. As inhabitants and future generations become accustomed to these environments, change becomes even more difficult and threatening (Montgomery 2014, 217).

If suburban communities are developed on agricultural lands, they also inadvertently promote an idea that those lands are expendable without consideration to their local, regional and global importance and

potential. This could happen regardless of the form of development, but if there is an explicit statement communicating researched net benefit(s) of that change, made easier by strategic, place-based sustainable development and architecture, then the resulting outcome can be positive. What should be done is selectively considering which imported technologies are applicable to unique cultures and their natural and agricultural landscapes.

Thesis Question

Can place-based architecture and novel programmatic layouts help transition rural suburban communities to better serve and benefit from their unique natural and cultural environments?

Chapter 2: Opportunities

A Historic Framework for Modern Application

In medieval European communities characterized by pedestrian density, there is much more human activity at ground level (Gehl and Koch 1987, 35-36). The dimensions of the spaces that separate buildings invite pedestrian movement by virtue of the distances between points of interest (Gehl and Koch 1987, 40). These qualities have been revived in community design through studies showing the many benefits of density to individuals and society as a whole.

In a planning sense, the medieval community provides a universal human framework for an accessible and social community scale. Although the modern suburban planning strategy is also implied to be universal, it serves the needs of the automobile and its accessibility first, while prioritizing the speed of its own development through a mass-produced design language and associated kit of parts. This inorganic design strategy neglects to recognize - while potentially erasing - the unique natural and cultural landscapes of the regions in which it is imported and applied.

This chapter will begin with a discussion of many of the opportunities and benefits associated with providing density in old and new communities. In the precedents section, two specific examples will be used as concrete representations of the strategy's overall potential, followed by suggestions on how that could enhance the success of imminent economic changes

in future agricultural communities. Architecture is then presented as an opportunity to connect these goals by enhancing the sense of place and stewardship of each individual community through program and building. Chapter three will present a specific site to test the thesis.

Pedestrian Scale Benefits

Natural Environment

Density in communities has been found to have a number of ecological benefits. In suburban environments, the prevalence of detached homes results in a higher level of energy consumption per person. This is also affected by the number of private vehicles, since they are more of a necessity for travelling within these areas (Holden 2004, 101-102). In regions with smaller, dense communities that are more favourable to pedestrian movement, energy consumption and emissions per person decrease (Holden 2004, 105; Burden and Litman 2011, 39).

In order to combat and shift development from suburban sprawl, Holden suggests that communities be developed by using the strategy of *decentralized concentration*. This favours dense, geographically smaller communities focused on pedestrian accessibility (Holden 2004, 105). A synonymous urban term is the *polycentric city*, where numerous clusters of similar services exist in many neighbourhoods, as opposed to one central downtown cluster. This leads to a significantly smaller ecological footprint as many daily errands can be accessed by walking or cycling (Holden 2004, 106). By pulling residential, commercial

and light industrial locations in existing and new rural communities closer together, the peripheral areas beyond the lived community boundaries could be used for agriculture or returned to nature.

Economic

By creating dense communities, the total distance of roads and associated utilities networks required to connect inhabitants and services are reduced. Savings relating to the lower maintenance of these systems can be reallocated to improve walking and cycling networks, public transit and other community services and amenities. These changes have been shown to increase commercial activity, private investment, tourism and social capital. There are also increases in social equity as a result of greater affordability and easier access to services and jobs (Burden and Litman 2011, 39).

In Seaside, Florida, a dense residential community planned using New Urbanist thought, there was significant skepticism of its economic viability as it was being planned. The community was designed to be accessible for pedestrians, with all residential areas within walking distance from the town centre and beaches nearby. These small residential lots were assumed to be less desirable to the typical Floridian beach-front condominium (Hayden 2004, 206). In 1982, lots were sold for $15,000. In 2008, the homes on these lots were being sold for over $1 million with many approaching $2 million (Montgomery 2014, 327). What this suggests is that the accessibility and pedestrian layout of Seaside is a significant factor in its

attractiveness to potential buyers. The lack of supply driving up prices also indicates a significant demand for the associated lifestyle.

Programmatic and building patterns in dense communities are also much greater generators of tax revenue per unit of land than the box-stores common to suburban communities. In a study in Ashville, North Carolina, planners were able to prove that dense, mixed-use development contributed seven times more income per acre in property taxes. These developments also provided 12.5 times as many jobs per acre as a box store (Montgomery 2014, 306). Parking could be combined into single lots on the periphery of dense communities since distances between stores and services would be greatly reduced.

Social Environment & Physical Health

Recent research has discovered that the most important factor in decreasing levels of happiness is the gradual loss of social connections (Bartolini, Bilancini and Pugno 2011, 1053). Separate research also found that long-term perceptions of personal well-being are highly influenced by social capital (Bartolini and Sarracino 2014, 251). Living environments with higher distances between buildings and destinations have been found to encourage people to be less socially active, exacerbating this issue (Gehl and Koch 1987, 33).

Research suggests that pedestrian friendly neighbourhoods are more conducive to regular human interaction (Freeman 2001, 74). If a neighbour is within a short walk of a friend or acquaintance, access to a

car becomes less of an issue in meeting one another, leading to fewer restrictions on the timing of these interactions. Improved pedestrian access augments community cohesion through positive reinforcement (Burden and Litman 2011, 39).

Many modern "community centers" in suburban areas are merely locations for programmed community gatherings that lack the pedestrian accessibility required to increase their viability as spontaneous points of human interaction (Moore et al. 2001, 102). In a community that prioritizes density and pedestrian movement, its cumulative spaces and buildings become that center as a result of their accessibility and proximity, complimented by the various programs within them. The resulting "low-intensity contact" provides a starting point for the growth and development of more intimate and practical connections between different individuals' personalities, knowledge and expertise. Maintaining these relationships becomes much less demanding since meetings do not have to be as strictly planned (Gehl and Koch 1987, 21).

Density that prioritizes pedestrian transportation also encourages passive activity. If integrated into daily life, active transportation between close destinations can achieve recommended amounts of daily exercise (Jacobsen, Racioppi and Rutter 2009, 369). By providing the opportunity to walk or cycle to amenities and services, residents can be physically active while running errands instead of having to plan separate times for both. These changes can enhance an inhabitant's quality of life and reduce the risks of

developing chronic disease (Pate, Pratt and Blair 1995, 406).

Community Precedents

In this section, unique community layouts are examined for their potential application in new rural communities characterized by density. They serve as examples of potential and highlight how previously discussed benefits can function elsewhere.

Blue Zones

Blue zones are towns in a few specific regions of the world that have stumbled upon pristine health by environmental factors and relative isolation from Western influence. They are located in: Ikaria, Greece; Okinawa, Japan; Ogliastra Region in Sardinia, Italy; Nicoya Peninsula, Costa Rica; and Loma Linda, California (Buettner 2015, 21). The communities are characterized by common factors which contribute to long life spans and excellent physical and mental health. These include: local environments that provide *access* to personal vegetable gardens and affordable, fresh produce; a strong sense of *community* that is inclusive throughout old age; and a built environment that encourages individuals to be *physically active* (Buettner 2015, 85; Fastame et al. 2018, 13; Panagiotakos et al. 2011, 6). If access to healthy food and active lifestyles can be provided through program and modern technology, then positive results demonstrated by the blue zones could be replicated in modern communities. In new and existing rural communities in environments favourable to agriculture, programmatic changes to promote access to foods

becomes even more feasible.

Houten, the Netherlands

As some communities grapple with expansion, regions with little undeveloped land at their disposal are forced to densify and pedestrianize. Houten, a municipality near Utrecht in the Netherlands, has developed a unique strategy to maximize land use and increase accessibility while simultaneously promoting healthy lifestyles.

Houten was planned to promote bicycle and pedestrian transportation through use of dedicated pathways with direct routes from residential areas to the community center. Car access was restricted to the periphery of central public spaces and traffic rules prioritize *active transport* (Foletta 2019, 48). Children are taught about bicycle safety and associated health benefits when they are young to further cement its importance (Foletta 2019, 51). Because of the community layout, cycling is also the most time-efficient method of travelling to and from daily errands (Foletta 2019, 48).

Public gathering places are prevalent throughout the community plan. In the community center, a large plaza encompassed by shops and services is used for outdoor markets and performances. This is complimented by an adjacent train station connecting pedestrians to nearby communities for day trips and other services. Smaller parks and playgrounds are dispersed evenly within the community so that all neighbourhoods can *access green space by foot* (Foletta 2019, 50).

Research has shown that Houten's initial planning processes and consistent reinforcement of pedestrian and cycling importance have been successful in encouraging *active transportation*. There are 3.4 bicycles per household and only 2% of households have no bicycles (Foletta 2019, 56). Although three quarters of residents travel to work by car, 55% of all trips between destinations are made by walking or biking (Foletta 2019, 57). *Accessibility and proximity* to services and amenities are a significant contributing factor as well. Grocery stores specifically are less than one kilometre away from half of Houten's population. Many residents use trailers and baskets attached to bicycles for transporting purchases (Foletta 2019, 58).

Future Economic Potential of Rural, Agricultural Communities

Current suburban layouts and associated lifestyles make it difficult to replicate blue zone levels of health (Buettner 2015, 86). As discussed previously, the priority placed on automobile access is a hindrance to opportunities for active movement and promotes a sprawling built environment that encroaches on agricultural and natural lands. However, a pedestrian environment that borrows features from blue zones, Houten and medieval towns could create healthy rural communities while simultaneously *preserving* the farmlands that drive their economies and shape their cultures.

The Food and Agriculture Organization of the United Nations indicates that rural communities will require greater funding and access to relevant *education and technology* in order to transition to more sustainable

farming practices. Revolutionized agricultural industries can provide an increase in economic opportunity for rural inhabitants through new specialized jobs and generate funding to enhance infrastructures, services and amenities in other aspects of community life. This should also result in making rural agricultural communities more self-sufficient and lessen their reliance on imports from other markets and producers (FAOUN 2018, 16).

The Netherlands has been particularly active in transitioning their agricultural economies to more modern practices. Only the United States exports a higher total dollar value of produce (Schrumm 2019, 20). This is impressive given the relative size of each country in terms of both land and population. By partnering university programs with local farms, water and chemical fertilizer usage has dropped in the production of certain vegetables by 90% and 97% respectively. Drones, automated tractors and intelligent monitoring can isolate specific needs of individual plants and distribute resources accordingly within ideal greenhouse environments (Viviano 2017).

Rural communities could leverage existing strengths by creating research and *community education* programming that helps them transition to modern agricultural practices. By decreasing their ecological footprints through decentralized concentration, they could maintain or increase their total economic potential by saving farmland while also providing benefits associated with pedestrian environments to their populations. Architecture can serve as a concrete

representation of these changes, marrying future programmatic requirements to history embedded within each community's unique cultural and natural landscapes.

Architecture of Place

The homogeneity of layout, aesthetics and segregated functions across the suburban landscape has resulted in a lack of varied opportunities for stimulation. By implementing pedestrianization strategies, communities can increase the likelihood of social variation through a human environment rich with interaction (Gehl and Koch 1987, 23). Through this interaction, inhabitants can more easily share skills and knowledge that enhance and encourage the development and growth of a specific place. The suburban environment not only ignores the uniqueness of place when imported, it also removes crucial opportunities for inhabitants to spontaneously consider its situational appropriateness.

It is important to accept that there may be some resistance when presenting a community organization option or design language that does not explicitly resemble what people have become accustomed to (like the modern suburban environment). However, if enough benefits are communicated through sensitive design, it is possible to encourage people to accept and adopt change (Montgomery 2014, 281).

In the case of this thesis and its relationship with rural agricultural communities, change can be encouraged by implementing the previously discussed benefits relating to health, economy, social connectivity and

preservation of nature through *accessible* community design. In order to connect these to an individual place, architecture can serve as a visual and tactile translator of an environment's potential by referencing important cultural attributes through building and program (Moore et al. 2001, 98). These built representations can be generated by identifying a region's *monuments* - objects that signify important moments in the historical development of a place and its culture. As a culture evolves over time, so can the meaning of these monuments and their respective forms, inviting their use as inspirations for architectural bridges between programmatic changes of the past, present and future (Rossi 1982, 87).

Chapter 3: Site

Site Selection

Chapters one and two identify the importance and potential of prioritizing *pedestrian accessibilty* through densification. This can be achieved by densifying existing community frameworks or by creating new developments which have a *density of complete program*. The former involves filling gaps in functional zones with a more diverse program of services, amenities and dwellings with the hope of increasing access. Although this benefits the new residents within these dense clusters, associated issues with the existing stretched neighbourhoods have not been addressed as they are still a significant distance from town centers. It also does not show how neighbourhoods themselves could be redesigned if they were brought closer to the community centers.

In new developments characterized by pedestrian density, community programs are created on a blank slate, providing an opportunity for designers to consider the entire community network. It also provides an opportunity for architects and community members to redefine the aesthetic nature of their built environment at a distance from the mass-produced suburban style. For this reason I have chosen to design a development from scratch and use it as an example for potential. Findings could then be adopted in other communities as needed instead of addressing a single community in a way that may not be applicable to others.

I have chosen the Annapolis Valley, Nova Scotia

as a location for this development. "The Valley" is an agricultural region rich in history that produces a significant amount of the province's fruits and vegetables. As a result of development patterns in the last century, its farmlands are under threat of increasing suburban sprawl. The resulting community layouts also lack opportunities for passive pedestrian movement and create accessibility issues with amenities and services.

Ecological Context

The Annapolis Valley is a 140km-long strip of lowland in the western half of mainland Nova Scotia that runs parallel to the South coast of the Bay of Fundy. The North and South mountains that border the valley provide shelter from maritime weather systems, resulting in longer, warmer summers compared to the rest of the province (Neily et al. 2017, 163). This creates a microclimate that is particularly favourable for agriculture, resulting in the conversion to farmland of most of the wooded lowlands. A variety of trees are native to these areas, but most have been lost to clearing. However, as some farmlands are abandoned, regrowth has happened naturally. Dyked salt marshes converted for agriculture constitute 16,000 acres of the farmland, including those from the historic Acadian settlement in Grand Pré at the East end of the valley (Neily et al. 2017, 164).

Acadian Influence on Place

When Acadian settlers from France arrived in Port Royal at the beginning of the 17th century, they brought with them marshland reclamation technology

in the form of dykes (Butzer 2002, 454-5). This allowed them to access the many nutrients trapped in salt marsh soils once they were drained, creating ideal agricultural plains that did not require fertilization (Bleakney 2004, 20-1). The resulting crops produced hay for feed, a wide variety of fruits and vegetables and flax and hemp for clothing (Bleakney 2004, 22).

Building the dykes required help from many members of the settled communities. Large sod blocks were dug from the marshland with specially designed spades that could cut through the tightly woven marsh grass roots (Bleakney 2004, 33). They were then transported to the fringes of the reclaimed land to be stacked and packed together, supported by logs driven vertically into the ground. A "living sod wall" was placed on the exterior sides of the dykes (Bleakney 2004, 46). The tightly woven roots would regrow from the wall and "act as natural rebar" to hold the dyke's shape (Bleakney 2004, 27). At points in the dykewall that ran perpendicular to natural drainage creeks, sluices were inserted to allow excess water to exit into the Minas Basin (Bleakney 2004, 46). These were made by placing hollowed timbers at the base of the dyke, reinforced by planks and sheathing and including a one-way door that would keep water at high tides from entering back in to the reclaimed lands (Bleakney 2004, 54). The abundance of agricultural land created by modifying the landscape with this technology allowed the Acadians to establish and grow multiple successful settlements (Butzer 2002, 458) with diverse professional populations to meet individual and programmatic needs (Butzer 2002, 455).

Lewis Parker, *Dyke building at Grand Pré c. 1750*, 1982 (Landscape of Grand Pré 2018).

The most successful reclaimed farmlands were the 3,000 acres located at Grand Pré (Landscape of Grand Pré 2018). Settled in 1680, community members developed a unique settlement pattern as a result of the landscape. Typical French settlements provided families with long, narrow plots of land, including water access at one end and wooded areas to harvest for construction and clear for agriculture (Landscape of Grand Pré 2018). Because of the size of the reclaimed land at Grand Pré and its productive potential, it was reserved exclusively for agriculture. Settlements and homesteads were built on the adjacent uplands, overlooking the vast communal plain towards the Minas Basin and Cape Blomidon (Butzer 2002, 458).

No built homesteads of the Acadians at Grand Pré remain today, as most were burned during the mass Acadian expulsion by the English in 1755 (Landscape of Grand Pré 2018). However, similar Acadian examples constructed during the same time period still stand in areas that had remained under French control (Village Historique Acadien 2019).
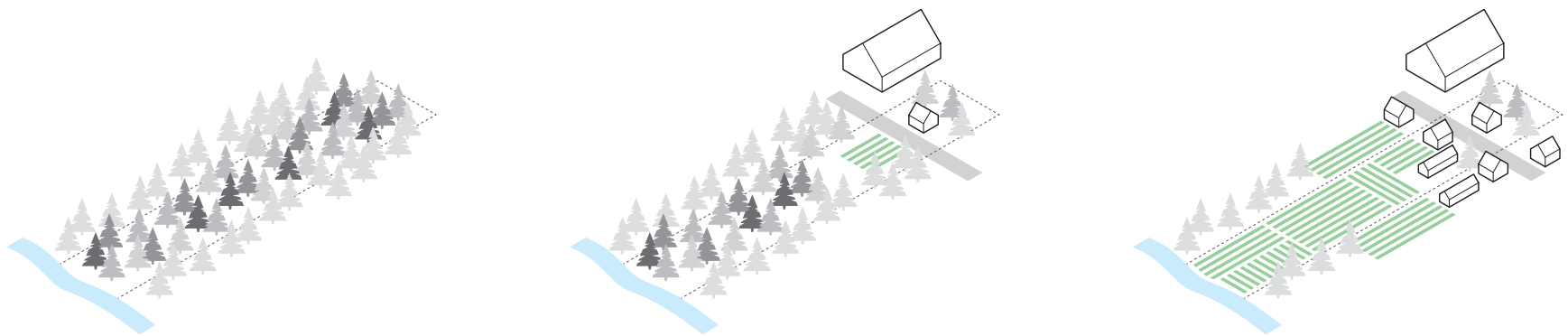
Diagram of the stages of a typical plot of land in French settlements. Long, wooded property with access to water. Seigneur (primary land holder) builds central mill to process wood for construction. More plots are then allotted and cleared over time. Adapted from Landscape of Grand Pre 2018.
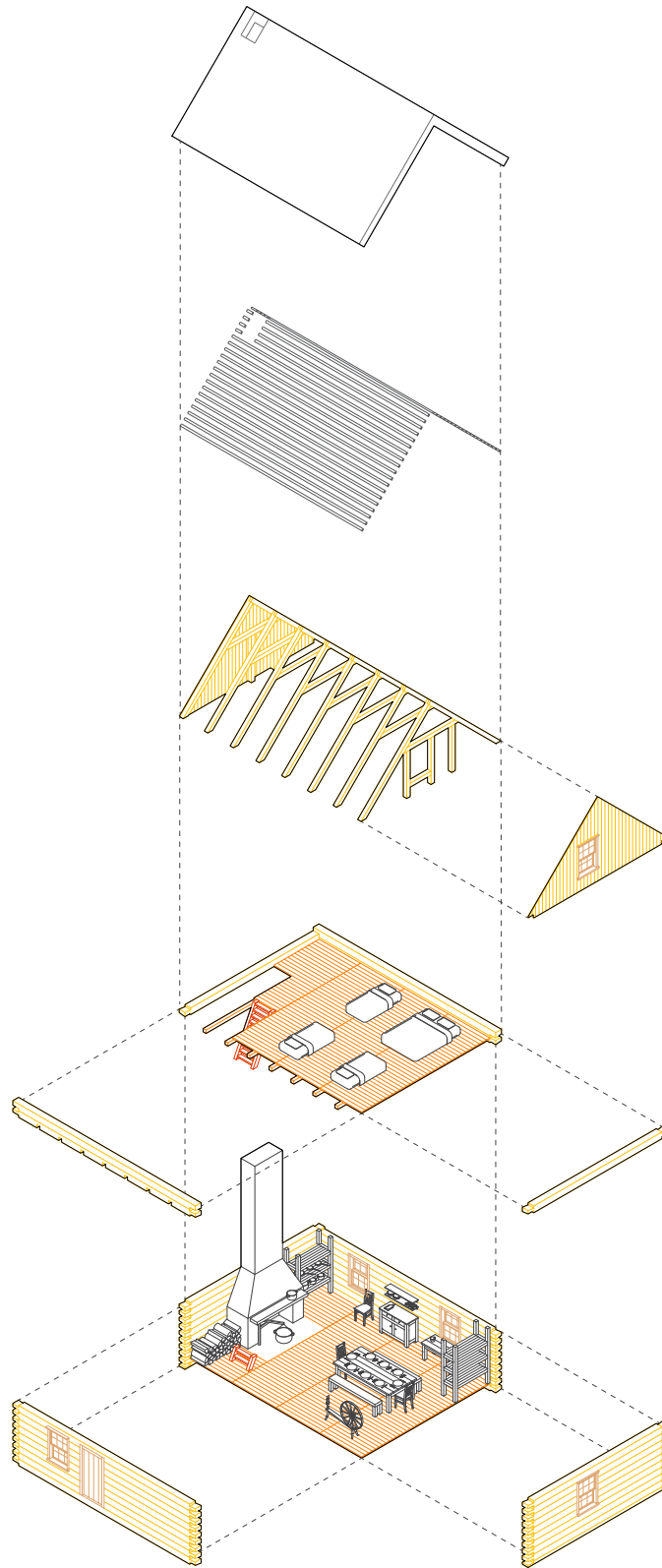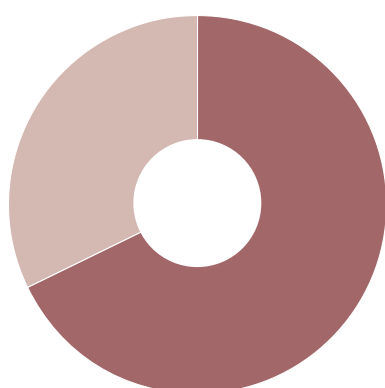
Exploded axonometric of an Acadian home. Dovetail joined timber walls enclose open concept living underneath a sleeping loft. Heat trapped in the stone hearth would keep the loft warm at night (adapted from Martin House, Leighton, Robichaud and Laroque 2006, 14-5).
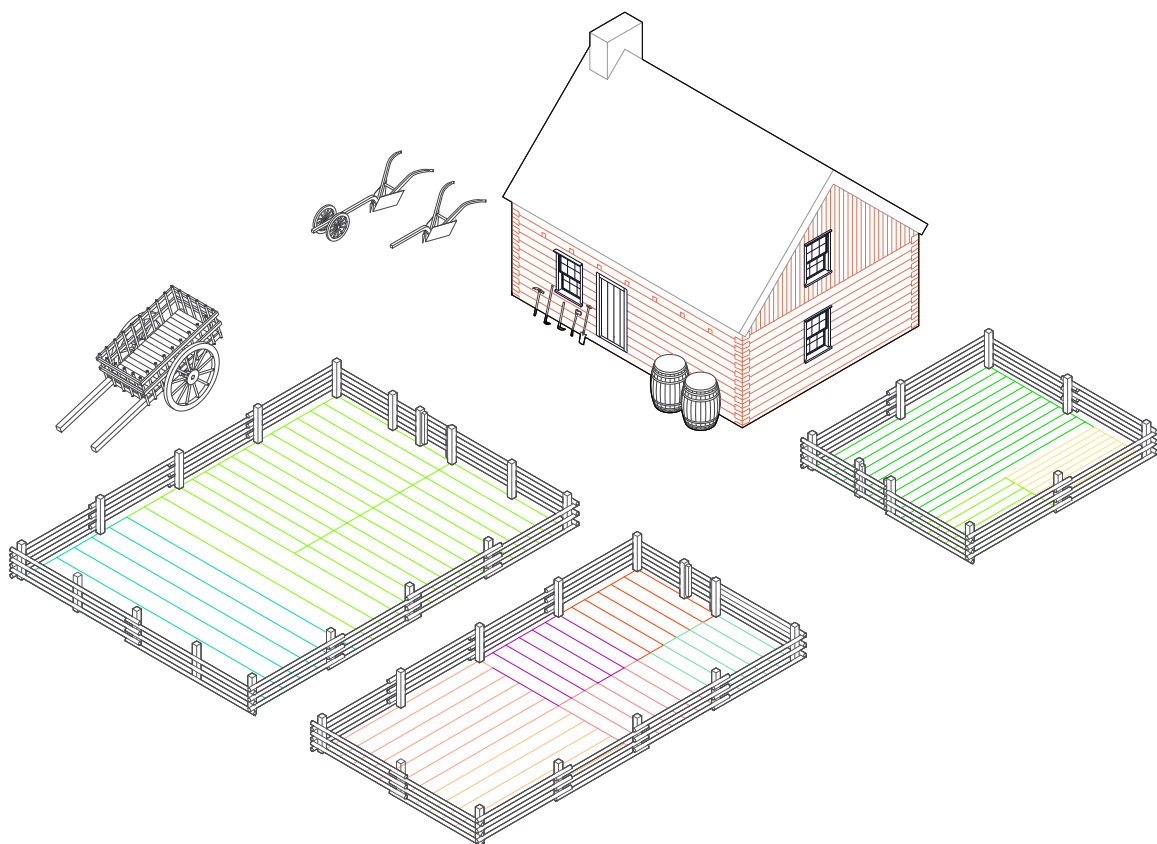
Axonometric of an Acadian home and yard. Kitchen gardens were used to grow vegetables and herbs nearby. Tools are shown including hand-ploughs and dyke making tools (adapted from Bleakney 2004, 20-46).

Agricultural Tradition

After the expulsion, the New England planters that resettled Grand Pré and the surrounding area continued the practice of dykeland agriculture. Their descendants would use the same methods until the adoption of larger mechanical vehicles in the 1950s (Bleakney 2004, 4). This area is now a part of Kings County, which makes up the East half of the valley.

In terms of current fruit and vegetable production, this region is particularly important. Of the 6,768 acres of vegetable crops in Nova Scotia, 4,328 are in Kings County. The majority of fruit production excluding blueberries is also located in this area, totalling 5,853 of the province's 7,439 acres of crops (Statistics Canada 2016a). Grape and wine production has been steadily increasing in recent years as well, creating new opportunities for tourism (Withers 2016).

Many of the weekly markets in larger Annapolis Valley towns and in Halifax sell produce from Kings County farms. In addition, "farmer's markets", small grocery style stores selling fresh produce, operate daily in towns and villages throughout the county. Many farms also have plots designated as "u-picks", where inhabitants and tourists can pick fresh products themselves at a discount. In New Minas, a higher traffic suburban commercial center in the county, farmers and their workers will park in lots along the main road selling fresh fruits and vegetables picked by workers that morning or the evening prior. Local fishermen set up similar stands, with fresh and affordably priced catches of lobster, haddock, scallops and many others

Fruit Crops	Acres
Kings County	4753
Rest of N.S.	2258

Vegetable Crops	Acres
Kings County	4328
Rest of N.S.	2440

available by the pound. This option of buying readily available local produce benefits both producer and consumer, as intermediaries charging shipping costs and convenience mark-ups are removed from the transactions.

Unfortunately, the province of Nova Scotia as a whole is falling short of a goal for inhabitants to have local food products account for 20% of their total food expenditures. Recent programs for procuring local products at Dalhousie and Acadia Universities have seen moderate success, but farmers are still struggling to meet the demands of other large-scale institutions (Hoffman 2019). A recent study by the Royal Bank of Canada (RBC) has concluded that the entire country's global share of agricultural exports have fallen over the last two decades and faces an impending skills and labour shortage as farmers age and agricultural production shifts to data driven methods (Schrumm 2019, 2). RBC identified the Netherlands as a model to follow, highlighting their proactive strategies to increase productive capacity and ability to export associated knowledge and technology (Schrumm 2019, 25). This suggests unique programmatic opportunities for communities in agricultural regions. Accessible research facilities geared towards public engagement could promote self-sufficiency as well as increase awareness about the importance of agriculture to local and provincial economies. In Grand Pré, it could promote a new way to celebrate the Acadians' historic propensity to innovate.

Map of Canada highlighting census regions with significant agricultural activity in green and their relation to major transportation routes. Adapted from Statistics Canada 2016c.
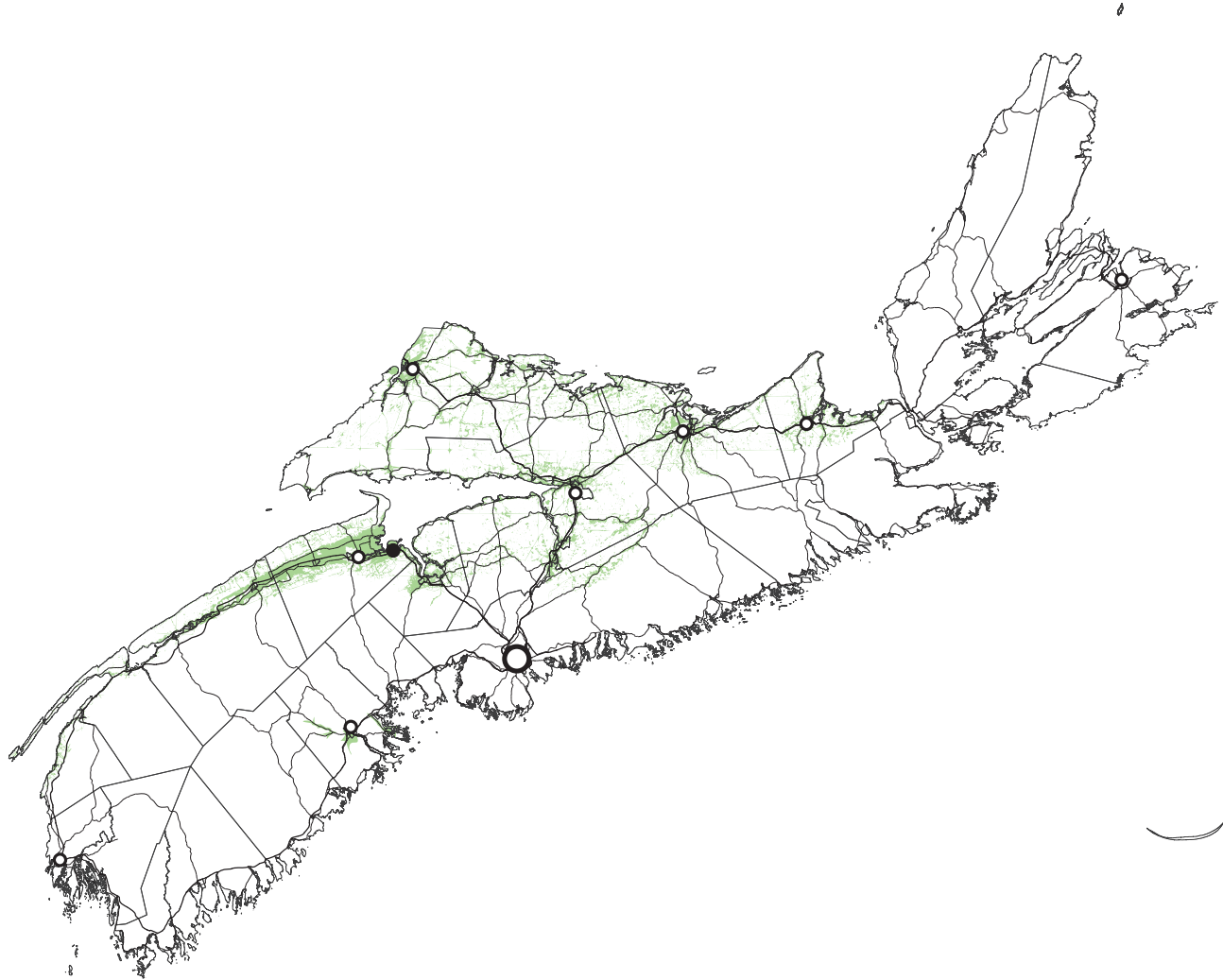
Map of Nova Scotia highlighting agricultural activity in green and their relation to major transportation routes. Population centers indicated by circles with white centers. Site indicated by black circle. Adapted from Statistics Canada 2016c.

Suburban Threat

As highlighted in the first chapter, suburban development has a tendency to encroach on agricultural lands. They are already cleared and flattened, making them cheap to develop. They also provide instant monetary gains for farmers who may be experiencing financial difficulties. As global populations rise, more space will inevitably be required. How we decide to use that space can greatly impact our environment in positive or negative ways.

Given Kings County's agricultural importance, it is necessary to consider how it is developed in the future to mitigate losses in production. It is one of only two counties in Nova Scotia outside Halifax that has a growing population (Statistics Canada 2016d). By studying satellite images in the region over the past two decades, it is also evident that new homes are being added using the suburban model, with many neighbourhoods being built on farmland. As mentioned previously, this requires increased funding for stretched utility networks and greatly reduces opportunities to increase accessibility and pair passive exercise with everyday errands. If farmlands are to be developed, then serious consideration must be given to how they can have a net positive impact on the regions that they exist in.
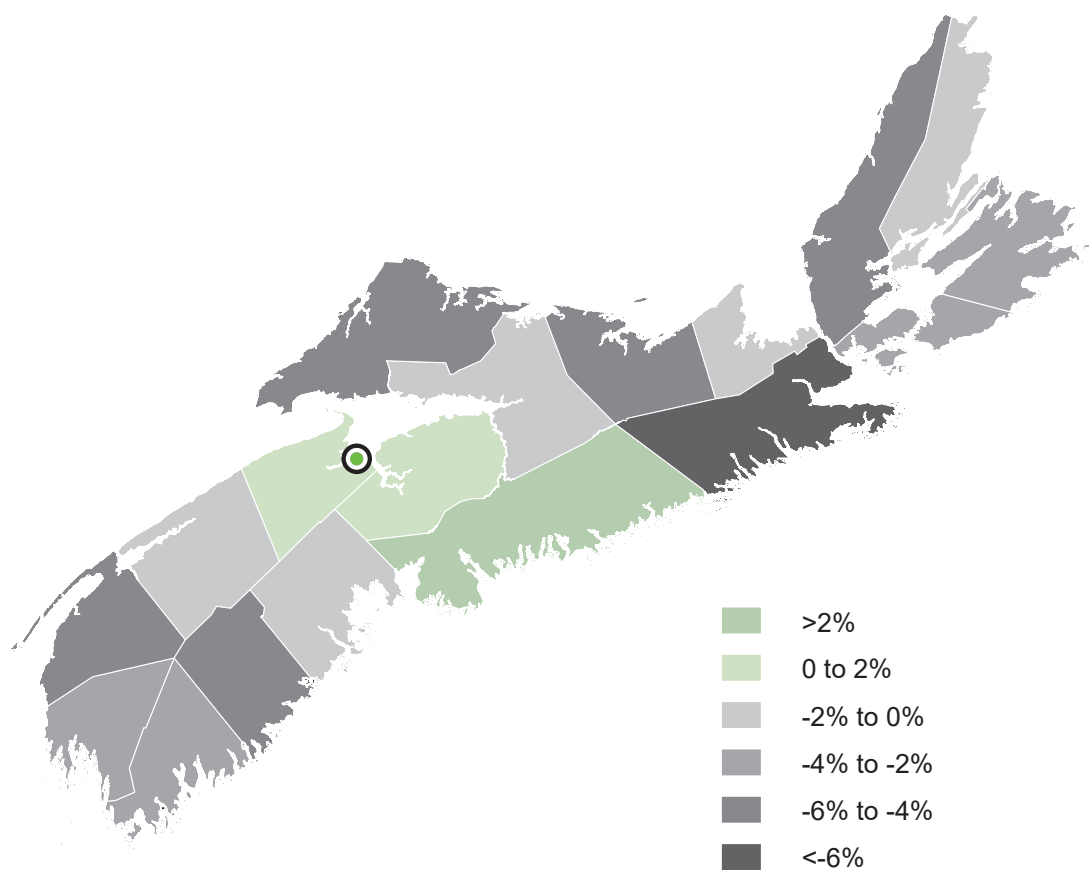
Nova Scotia population change by county, 2011-2016. Adapted from Statistics Canada 2016d.

Satellite image with emphasis on change in land use from agriculture to suburban residential from 2002 to 2017 in Port Williams, Nova Scotia. Adapted from Google Earth.
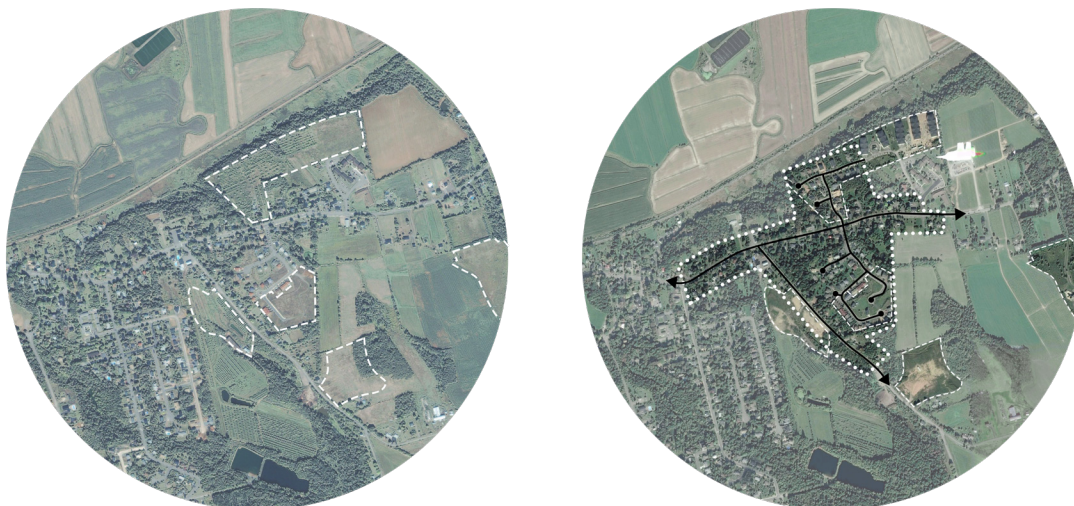
Satellite image with emphasis on change in land use from agriculture to suburban residential from 2002 to 2017 outside Wolfville, Nova Scotia. Adapted from Google Earth.

Site Location

> The 'view of outside' includes the taste of the air, the level of sound, recollections of other places and people, and knowledge of the town structure. What we let into our selected environments should help us to "place" ourselves specifically in a broad context. (Moore et al. 2001, 95)

The site for this development is located on the very upland hills that the Acadians first settled at Grand Pré in 1680. It provides a new community access to prospect, a visual connection to the very lands that support their unique agricultural lifestyle. In this sense it acts as a cultural monument, one that is lived with and evolves as the communities that it supports do as well. Other inspirational monuments are the organizations of farm buildings that are visible throughout the region and from the site.

The site currently exists as a public lookoff. Inhabiting it does not have to make it exclusive, instead it can expand the potential opportunities for how it is experienced through varied public program and architecture to foster positive regional change.


View of farm building clusters near site looking south from Grand Pré, 2019.

The site also consists of a strip of farmed grassland used for silage. Although agricultural, its choice is strategic. As the hill faces north, it is not ideal for many other agricultural uses. These grasslands are also prevalent throughout the province, suggesting growing them in Kings County is not a necessity (Statistics Canada 2016b). It can therefore be concluded that the impact on food supply would be minimal when compared to other fruit and vegetable crops that require a more specific climate. Densifying the site with community gardens landscaped to increase sun access will boost the net positive benefit as inhabitants can have proximal access to nutrition similar to blue zones.

Drone view of Grand Pré looking towards Minas Basin and Cape Blomidon, Jamie Robertson (Landscape of Grand Pré 2018).
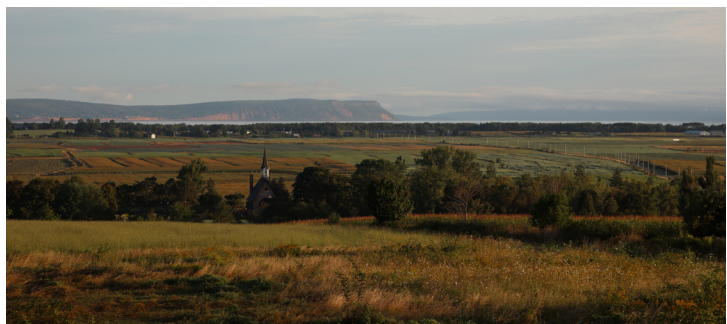
View from top of site looking across Grand Pré towards Cape Blomidon, 2019.

Satellite image highlighting rectangular site situated in regional context with white border in bottom center. Dyked farmlands darkened. Extent of high and low tides indicated by light and dark water respectively. Adapted from Google Earth.

Chapter 4: Program

The program for this new development must be accessible through pedestrian focused design to highlight its densified potential compared to typical suburban sprawl. Elements included are inspired by the site's surrounding region, its culture and its historical connection to agriculture. They are housed in two different types of building clusters.

The first is at a scale similar to clusters of farm buildings in the region and acts as the community center. Like the farms, its buildings and their respective programs surround a large yard. This provides a connective space to facilitate cross-programming, accessibility and opportunities for spontaneous interaction between inhabitants. It could also be compared to plazas located centrally in historic medieval communities. Like Houten, this space is free of divisive vehicle traffic as roads and parking are kept to the exterior perimeter of the group of buildings. Programmatic elements in this cluster include:

- A semi-public building with a **market** supplied by local farms, **commercial** and **professional** spaces and a rooftop **greenhouse** whose produce is also sold in the market below.

- A public building that houses a **library**, a **gymnasium** for year round events and gatherings and an agricultural **research center** and **greenhouse** with space for community education programs.

- A tourism-focused building, including a **winery**

showcasing local varieties, a **restaurant** supplied by local produce and a **hotel** for visitors looking to experience the culture during extended stays.

- Six mixed-use **residential** buildings that house a variety of one to four bedroom units, **commercial** spaces, a **gallery**, a community **gym**, a **squash court** and a **daycare** for young children.

The second type of cluster is repeated seven times within the development. As populations grow, more of these could be added. They are groups of row-homes within short walking distance to the town center. The row-house fronts surround small, communal pedestrian yards in the center of each cluster, terraced with the landscape and made accessible by ramps and pathways. Private yards emit radially from the back of each home, extending to a snaking residential roadway that slows vehicle traffic and keeps it away from the communal outdoor spaces. Private parking exists along this road at the end of each yard.

The interstitial spaces between the clusters are reserved for public garden programming and connecting pathways. This extends from the community center to the base of the site, providing direct access to food and gardening along the main pedestrian route. This accessible feature is a nod to the Acadians as well as Blue Zones and is supported by the agricultural research and education facilities in the community center. Pedestals protruding from this network offer residents opportunities to sit and enjoy favourable weather within the gardens, with tables and fire pits for informal gatherings.

Chapter 5: Design
Referencing Monuments and Place

> Whatever we build significantly affects neigh-
> boring structures (and history) and the overall
> sense of place. We must attend as much to this
> reshaping of the existent environment as we do
> to the shaping of our own building. (Moore et al.
> 2001, 97)

The architectural design of the settlement identifies built monuments as inspiration for development of a place-based architectural language that differs from the monotony of globalized suburban design. The groups of large farm buildings that dot the Annapolis Valley landscape provide a recognizable form that reference both culture and history. As these clusters are organized centrally to facilitate efficient processing of agricultural products, new communities can do the same by filling novel arrangements of similar forms with program for people that fosters both planned and impromptu interactions. The overlapping nature of programmatic connections and relationships allow for a more efficient face-to-face transfer of local knowledge as desired within an architecture that references place. *Accessibility* is provided by the pedestrian focused environment which simultaneously offers people the ability to overlap and group daily tasks in close proximity to one another such as exercise and buying groceries for an evening meal.

Situating

The public community center portion of the design is placed at the top of the site. This places it close to the main access road, keeping visiting traffic in pedestrian areas to a minimum. It also provides the public access
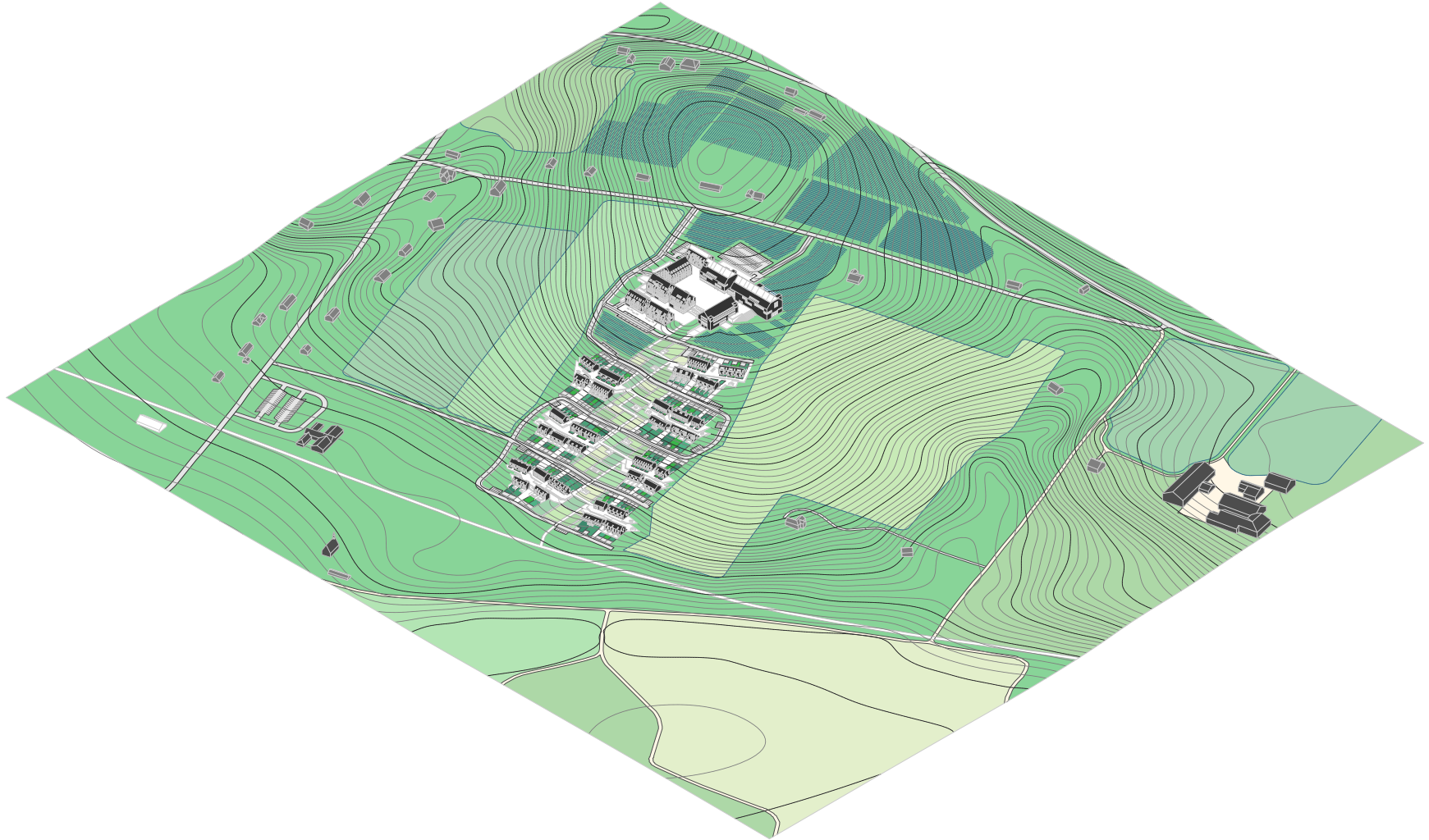
Axonometric view of community.

to the most expansive views, a nod to the public nature of the current look-off that exists at the site today. It also increases visibility, allowing it to stand out in the region as a method of wayfinding.

On approach from Old Post Road at the south end of the site, the community center buildings become more visible as people climb the hill. When turning off of this road to enter the community, visitors are oriented perpendicular to the main building, flanked by new vineyards supplying grapes for the winery and concealing parking lots that would alter the serene feeling of the existing agricultural fabric.

A second entrance to the east of the public entry and a third at the north end of the site connected to Grand Pré Road provide residents with separate vehicle access to the neighbourhood clusters placed along natural contours farther down the hill. These clusters have added privacy supplied by the larger buildings above and enjoy unblocked panoramic views of the surrounding farmlands, the Minas Basin and Cape Blomidon. At the base of the hill on the northern end of the site, the pedestrian path network through the community gardens meets with the Annapolis Valley Trail, a former railroad that has become a pedestrian and cycling route connecting Grand Pré to Hantsport, Wolfville and other communities beyond.

Modification of Landscape

Much like the Acadians modified the landscape to suit their needs, this development must modify the landscape to ensure accessibility for inhabitants. A network of terraces and plinths supports the buildings

as they are placed down the hill. In the town center, these modifications allow access to specific views by hugging some buildings and extending out from others. Steps and ramps allow for circulation patterns that enable access to - and separate when necessary - programmatic elements at different floors and grades. In some places they become potential resting points or amphitheatres for public performances and gatherings.

At the neighbourhood cluster scale, terracing again acts as support for buildings and also provides public spaces for outdoor gatherings. in the community gardens, plinths provide resting places along pedestrian paths where inhabitants can gather and enjoy the surrounding views. Fire pits are scattered throughout the plinths and neighbourhoods to enjoy company and the sounds of night over a beer or wine.

Design Language

To allow for increased pedestrian circulation, the length of the forms have been split strategically for permeability. This differs from many of the surrounding farm buildings that require long continuous structures for maximum efficiency. In the public buildings, different sets of windows extend horizontally and vertically, wrap around corners or protrude as glazed boxes to provide expansive panoramic landscape views from the interior. These features also help to differentiate these forms from agricultural cluster as public centers at near and far distances.

In the mixed-use residential buildings, balconies and windows provide residents with intentional views of the community plaza and events while others look

outward over vineyards and landscape features. This offers inhabitants unique backdrops connecting their residence to indicators of place, contrary to the typical suburban views of manicured lawns and treed or fenced veils protecting private possessions from distant neighbours. Individuality in these forms are expressed through differing window punctuation patterns and by materiality. Cladding includes variations of wood and metal profiles, similar to the material differences in many groups of farm buildings nearby.

These design features are continued at a smaller scale in the neighbourhood clusters. Shifts and slight rotations of row-houses open views over the landscape to residents. Materials vary as well, offering opportunity to address individual preference and choice.

Structure

The buildings in the community center are constructed using glue-laminated mass timber columns and beams. Although hardwoods existed in the region before and could potentially be regrown over time as mentioned previously, the scale of the main buildings and associated bays requires particularly large structural members. These can be built up with smaller-growth trees and could address demand issues in the forestry sector as a result of the recent closure of a major Nova Scotia pulp mill (Gorman 2020).

Lateral stability is provided by concrete egress cores and diagonal steel cross bracing in tension. In the large spans required for the gymnasium, vertical loads are directed to heavy beams supported by king posts which transfer loads from the roof and floors above

through thick cable towards large columns on the perimeter. SIPs panels with window inserts attached to the exterior of the perimeter beams and columns allow for complete visibility of the structural systems within the buildings. This natural aesthetic celebrates the craftsmanship involved during construction and could inspire the formation of local companies that specialize in this form of construction.

In the neighbourhood clusters of row-houses, stick frame building methods are used. This form of construction is familiar to the region and offers design flexibility in smaller-scale structures. ***Basement reductions and less concrete
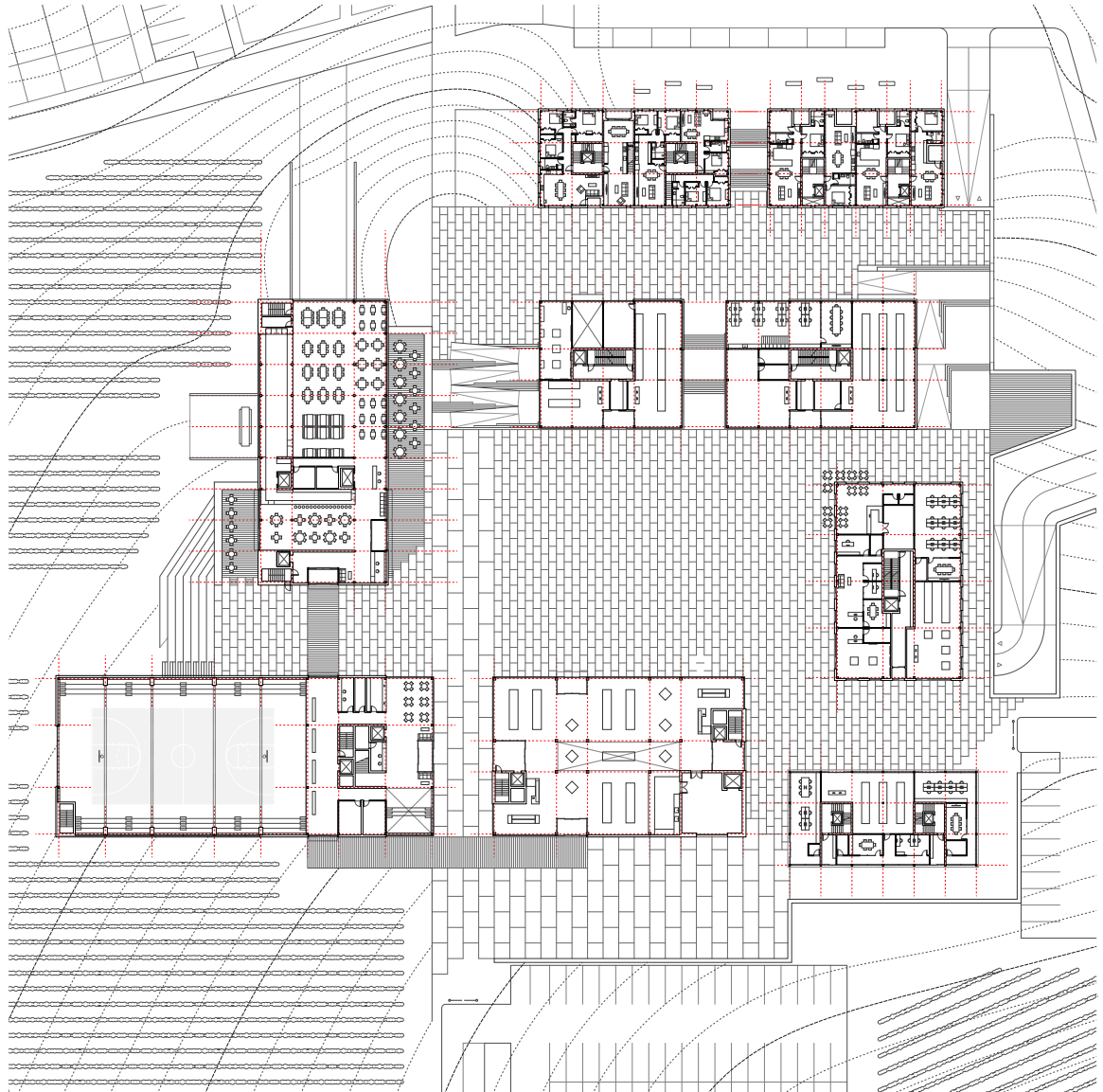
Ground floor plan of town centre plaza and surrounding buildings.
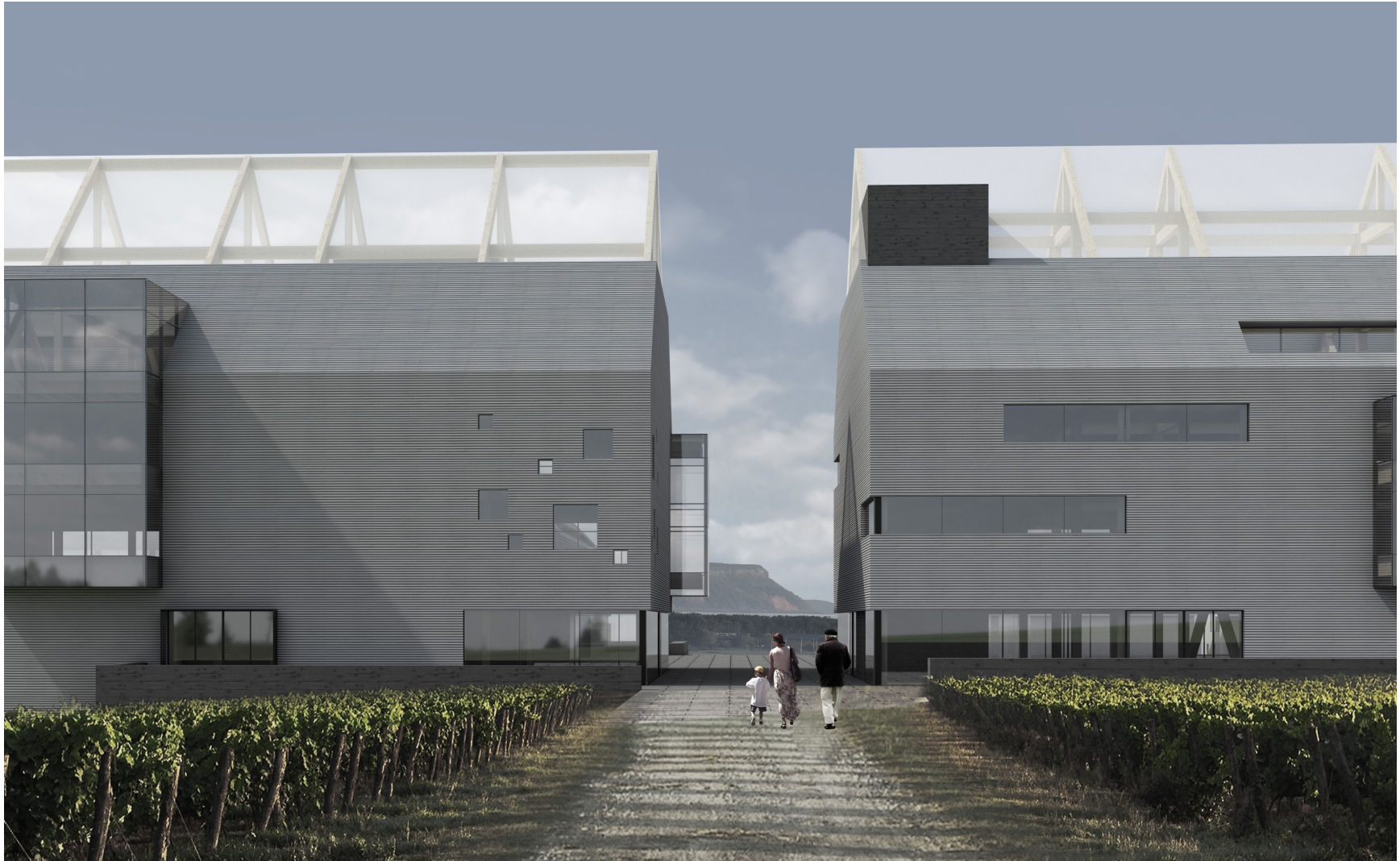
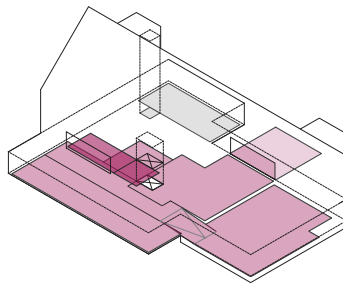Approach to town center from South looking toward Blomidon.
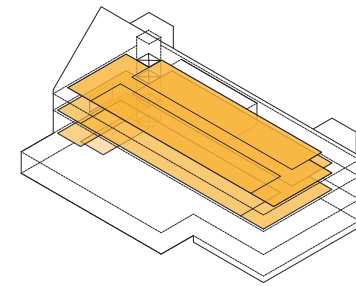
Plaza hosting a market during summer months.
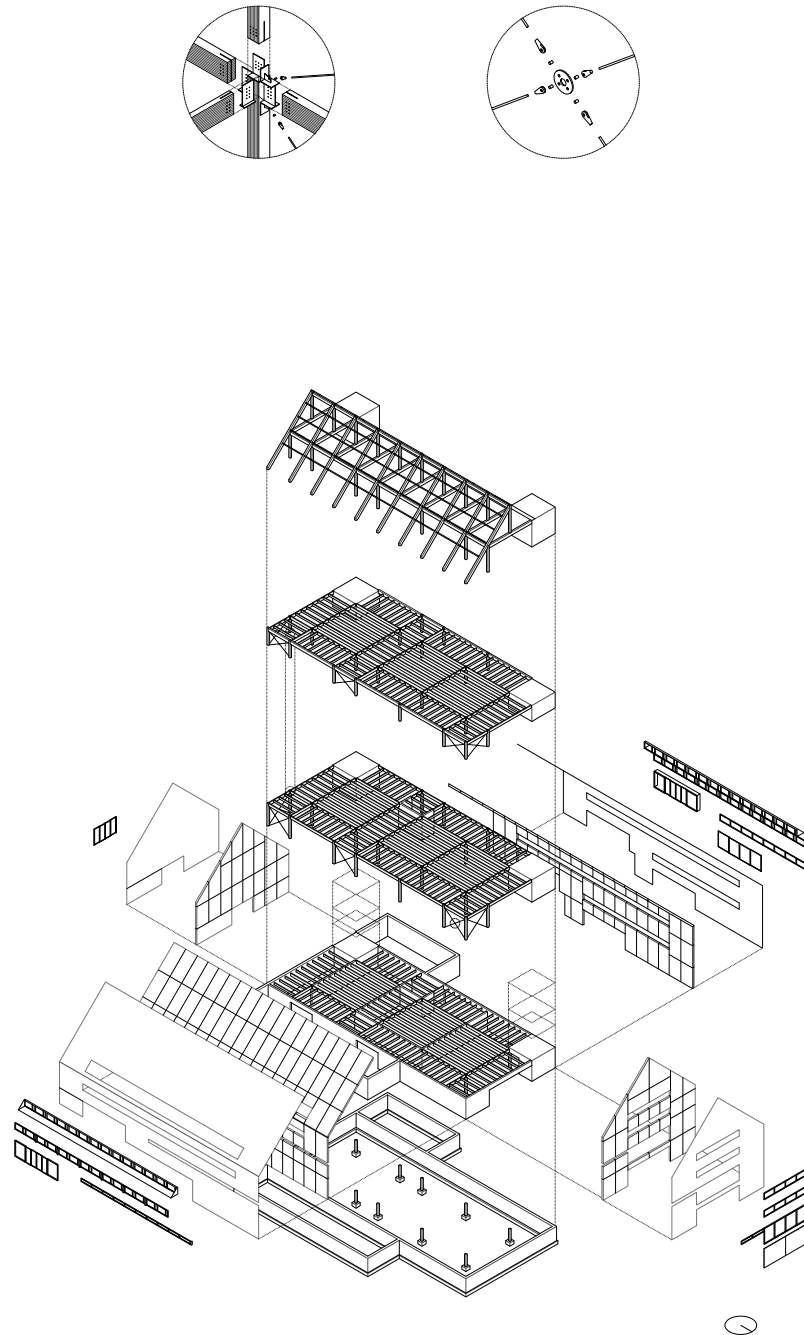
Structural exploded axonometric of restaurant, hotel and winery building highlighting building structure.
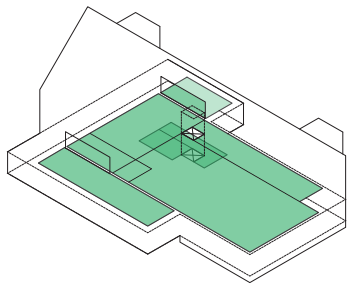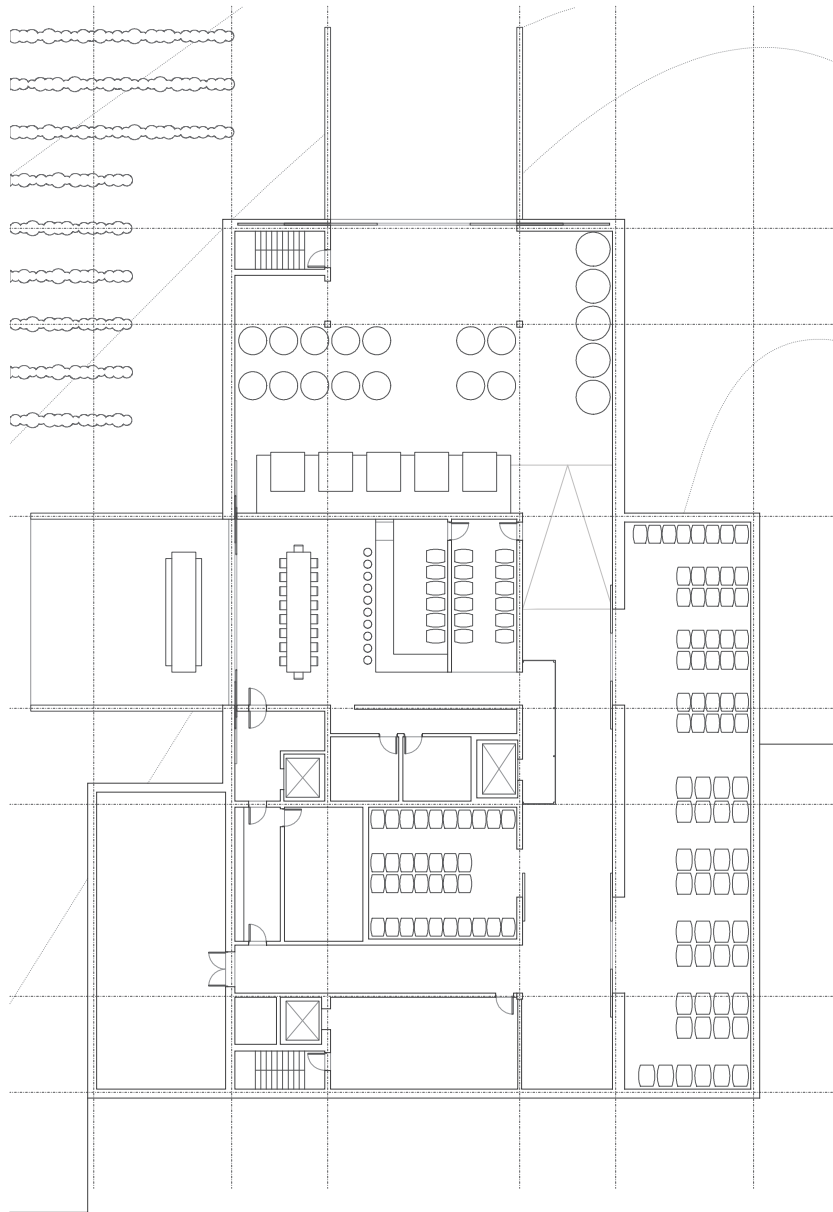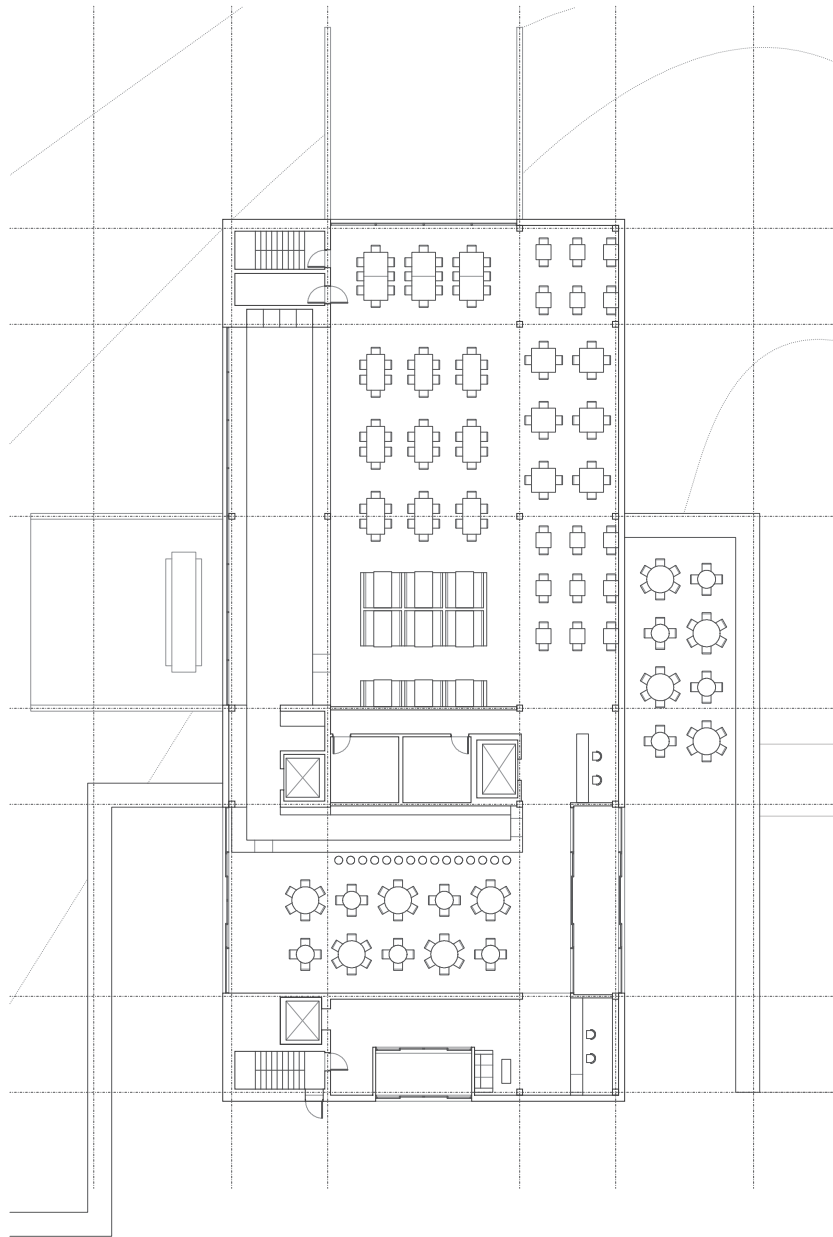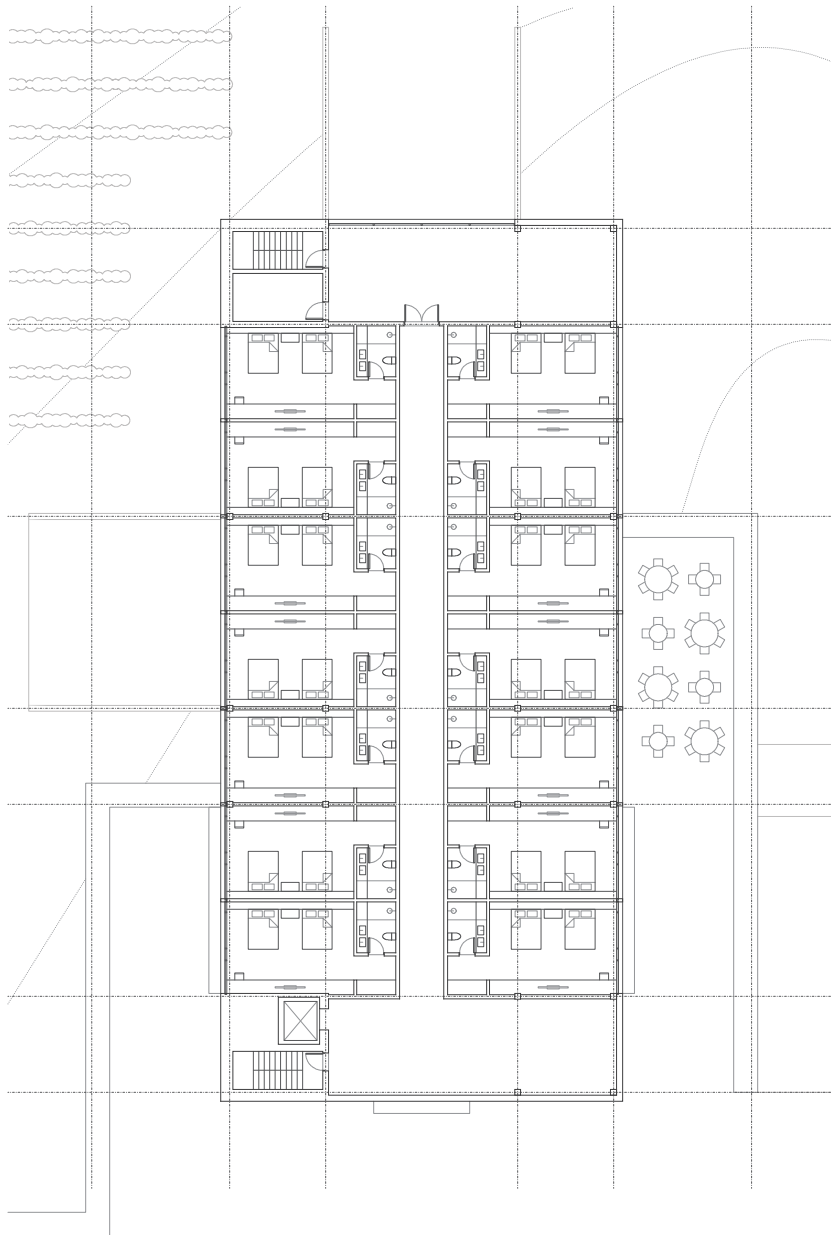
Restaurant

Winery

Hotel

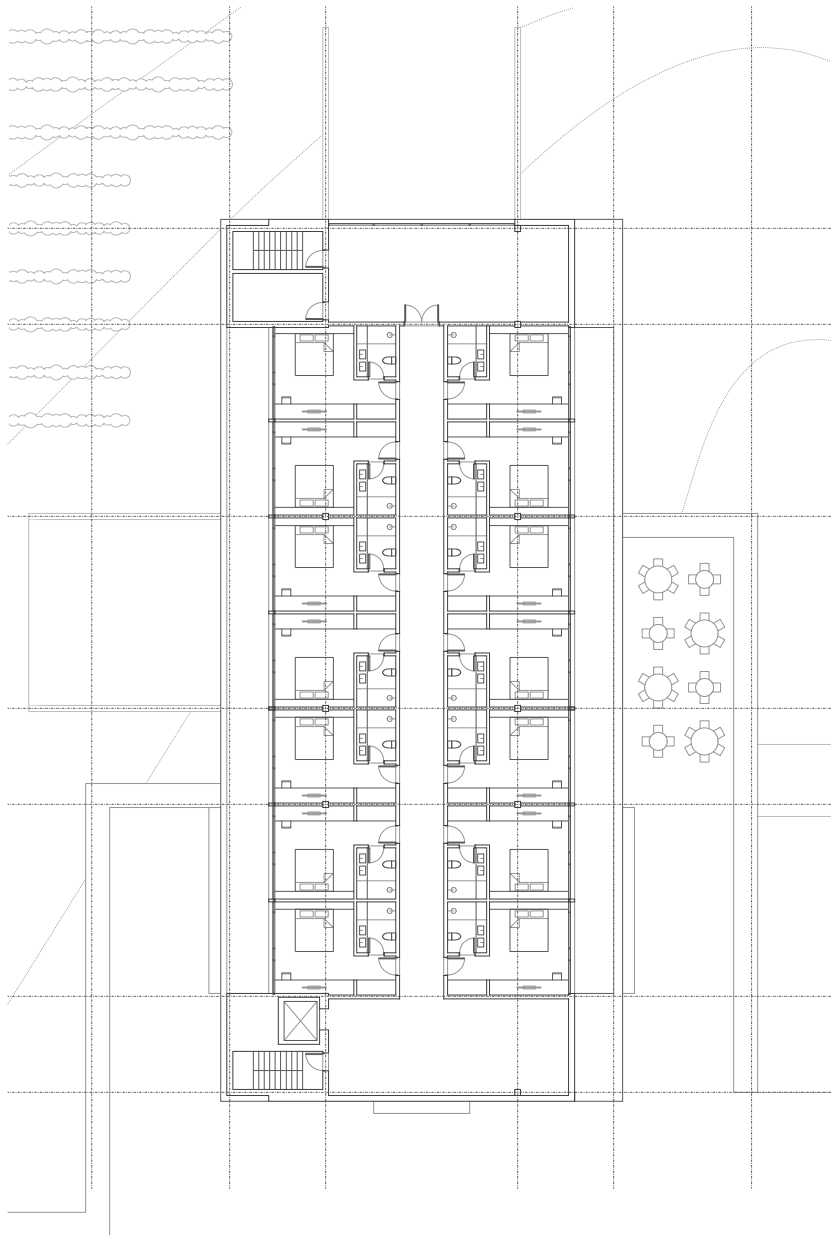Program diagram for restaurant, hotel and winery building.

Winery plan, below ground floor.

Ground floor plan of Restaurant. Hotel entry at South end.
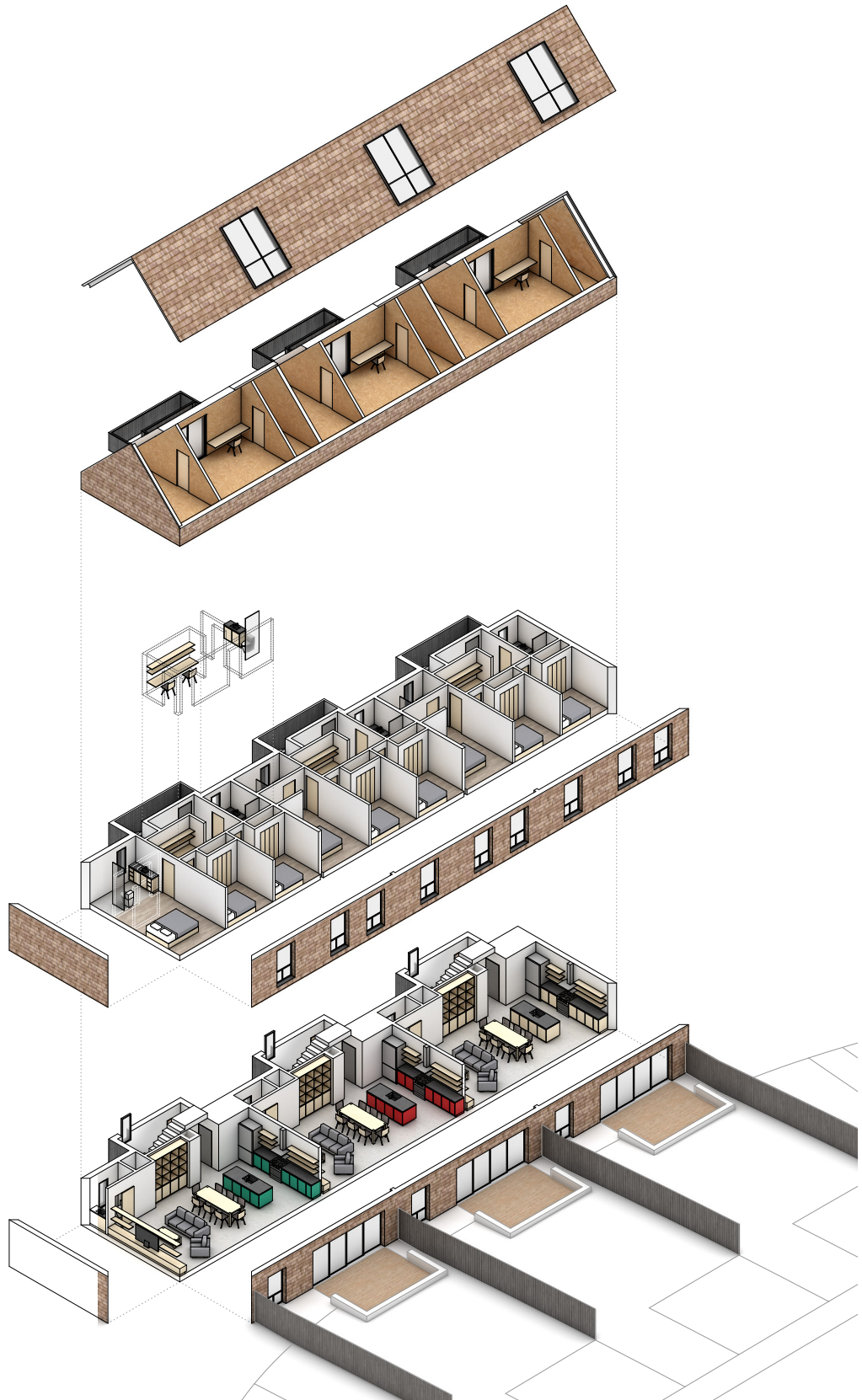
Second floor plan.

Third floor plan.

Ground floor plan of a neighbourhood cluster.

Neighbourhood cluster axonometric drawing highlighting relationship between private yards, public growing spaces and pedestrian network.

Exploded axo of a row-home within the neighbourhood cluster illustrated on the previous page.

Looking West down the Annapolis valley from public space between rowhomes.

Chapter 6: Conclusion

This thesis has shown a unique community design which shifts priority of automobile access typical in suburban environments to pedestrian access. It also takes into consideration the surrounding agricultural and natural environments and stresses that future communities should consider their importance as they are established or expand.

It should be stated that the design is based on the interpretations of the author. The design language could change after consultation with other residents or if the community concept were to materialize in a different location. The aesthetic decisions are not intended to be global as that would replicate some issues of sameness associated with current suburban design. What this thesis does show is that it is possible to extract architecture from unique environments and compliment it with pedestrian design. Functionalist goals (in terms of pedestrianization) can be achieved without having to look identical on the surface.

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