BRIDGING LANDSCAPES:
CONNECTING THE CITY
THROUGH PRODUCTIVE GREENSCAPES

by

Vanessa Pankhurst

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CONTENTS

ABSTRACT

This thesis explores ideas of social and ecological sustainability that emphasize ethically-based design processes that enhance life without depleting resources. A strong inter-relationship between society and the environment can be created with sustainable building and infrastructure systems that take shape through the form of urban agriculture.

Proposing an interactive horticultural centre dedicated to hands on learning and research will embed ideologies of health and wellness with productive greenspaces to create a more ecologically resilient and health conscious community. The facility is strategically placed on the site to create a transitional experience that shifts between built, cultivated and natural environments resulting in increased levels of physical activity as the user moves through the undulating landscape.

The proposed facility is located in Lethbridge, Alberta and incorporates elements of urban agriculture, health and wellness, education and research, and community integration.

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CHAPTER 1: INTRODUCTION

Can architecture act as the catalyst to cultivate a more sustainable and health conscious community through the development of edible landscapes and interactive learning spaces within an urban environment?

Urbanization is a concept that cities have been confronted with since the industrial revolution. Urbanization physically and psychologically detaches society from the ecological systems that support them. As the suburbs continue to sprawl, small-scale farms, public gardens and markets begin to dissolve. The tendency to renounce rural life and move to the city accelerated after World Was II and has resulted in nearly three-quarters of the population inhabiting the urban environment.[1] There is a growing need to change the environmentally detrimental agricultural practices and to establish a local alternative to food production to create healthier communities throughout North America. The standard method of agriculture in North America depends on fossil fuels for the majority of the phases involved in food production such as, the machinery used for planting and harvesting, the manufacturing of fertilizers and pesticides, and the fuel required to transport produce to grocery stores around the world.[2] As the supply of oil decreases so will the population's food supply. Relying on a food system that requires fossil fuels for production and transportation is simply not sustainable. Food that travels for thousands of miles before arriving at our local grocery stores has significantly less nutritional value than food produced locally.

Instead of relying solely on agribusinesses to supply food to the global market, cities around the world are turning to alternative methods to produce their own food. Implementing agricultural strategies into the urban environment can be very successful if proper education programs are established to reintroduce people with their food, to help them identify which plants are edible, and to teach them how to plant, grow and harvest their own food.[3] North Americans are at a critical point where knowledge about food and agriculture needs to be relearnt, and the cities in which we reside are the perfect setting for us to launch this new way of thinking and doing.

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1 Luc J. A, Mougeot, *Growing Better Cities Urban Agriculture for Sustainable Development* (Ottawa: International Development Research Centre, 2006), 3.

2 Darrin Nordahl, *Public Produce the New Urban Agriculture* (Washington, DC: Island Press, 2009), 18.

3 Ibid., 11.

Urban Agriculture

Urban agriculture can simply be defined as growing food within the confines of a city. “Urban agriculture can be described as the growing, processing, and distribution of food and nonfood, plant and tree crops, and the raising of livestock, directly for the urban market, both within and on the fringe of an urban area.”[4] The multifaceted practice of urban agriculture can emerge through horizontal and vertical growing techniques, it can occur at ground level or on rooftop gardens, and can be practiced year round through the use of greenhouses or hydroponics. Urban agriculture allows citizens the opportunity to grow intensively within tight spaces that exist within the urban fabric. Urban farmers can grow food for individual purposes, for local residents, social organizations or for a larger population by selling food at a local farmers market.

There is a common notion that has been deeply rooted into societies psyche that has led people to believe that there should be a distinct divide between the programmatic activities that occur in urban and rural environments. This separation of landscapes creates a unique opportunity for urban agriculture to blur and merge urban and rural programs. By implementing rural activities (growing and harvesting food) into an urban setting, urban agriculture has the potential to change the dichotomy of urban and rural landscapes. By integrating more productive greenspaces into Canadian cities, vast acres of farmland will no longer be the only appropriate setting for growing food.

Urban agriculture has great potential to produce more than just food for an urban population. It is uncommon for people to farm solitarily. More often than not farming requires many hands to help with the practice. Thus, involving many people in urban agriculture creates a community and sense of connectedness. Urban agriculture is based upon principles of collaborating with people who share the common goal of improving the quality and availability of fresh food for their communities. By integrating agricultural practices into the urban environment there becomes a unique potential to create a social movement that could have the ability to improve the overall quality of our world.

> While we may have broken ties with rural living, we haven’t broken our ties with our need to eat. For the longest time, we’ve planned our cities, and sanitation needs, all the while hoping that the rural lands around us would continue to produce food

4 Mougeot, *Growing Better Cities,* 4.

> and that the cheap fuels would continue to flow to transport it from farther and farther away. Energy conservation will drive us to shorten that global food chain. It all leads us back to the city. We are just starting to rethink our cities deliberately with our food needs in mind. Cities have resources like land, water, labour, and a ready-market for food production. It makes sense to shorten our food chain by growing food right in the cities where we co-producers live.[5]

Implementing urban agriculture into cities can be done in various ways and at different scales. There are numerous options for all members of society to be involved in the local food movement for example, restaurateurs can grow their own produce to decrease overhead costs, school yards can plant edible gardens to teach students about healthy food options and where they come from, neighbourhood groups can establish community gardens, citizens can purchase their groceries from a local farmers market, homeowners can donate a portion of their yard to an urban farming organization, or individuals can join the guerrilla garden movements and transform vacant derelict land into beautiful productive gardens.[6] By creating opportunities for people to become more aware of what is involved in the process of growing and harvesting food we will begin to see societies emerge that are reconnecting to the land and are taking charge of where their food comes from.

Furthermore, if municipalities promote urban and peri-urban agriculture, they will have the potential to create a sustainable local food system for their citizens. In order for cities to transition to a sustainable local food system municipal governments and city planners need to collaborate with food policy councils to incorporate food security plans as a component of the cities social and economic plan.[7]

History

For thousands of years agricultural practices have been used as environmental, social and economical forms of infrastructure around the world. Archaeologists and historians have argued that agricultural roots were established and have evolved autonomously throughout different parts of the world. Most agricultural societies incorporate five building

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5 Jennifer King, *Food and the City: Urban Agriculture and the New Food Revolution* (Amherst, N.Y.: Prometheus Books, 2012),79.

6 Nordahl, *Public Produce,* 11.

7 Mustafa Koç, *For Hunger-Proof Cities: Sustainable Urban Food Systems* (Ottawa: International Development Research Centre, 1999), 6.

blocks into their farming practice.[8] The five essential building blocks of agriculture include:

1. Plant and Animal Selection

There are over 250, 000 species of plants in the world and approximately 50,000 are edible however, humans use less than 250 of them. Plant types range from roots, tubers, fruits, vegetables, herbs, cereals, nuts and spices. Animals currently provide 25% of societies protein consumption.[9] To date there are fifteen major crops which produce 90% of peoples calories and 60% of those calories come from three dominant crops: wheat, rice and maize.[10] Therefore, it is evident that civilizations have been constructed upon minimal crops, which can provide maximum energy.

2. Water Management

Water is an important element in agricultural production because all living things require water to grow. Developing a successful planting strategy will coincide with seasonal rainfall. When rainfall is not a dependable option effective farming can be achieved through water management systems such as, wells, dykes, aquifers and canals for irrigation.[11]

3. Fertility Renewal

Plants obtain the nutrients required for proper growth from the soil they are planted in. Nutrients such as, potassium, phosphate, and nitrogen are taken up by the plants as they grow thus, these nutrients need to be continuously renewed to ensure that every season new plants are able to obtain the appropriate nutrients.[12] Fertility renewal does not have to be achieved through chemical fertilizers. The soils nutrient levels can be replaced by animal excrement, which is natural and high in nutrients.

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8 Paul McMahon, *Feeding Frenzy: The New Politics of Food* (London: Profile Books, 2013), 8.

9 Ibid., 8.

10 Ibid., 9.

11 Ibid.

12 Ibid.

4. Pest Protection

Pest and weed protection has not always been achieved by environmentally damaging pesticides and herbicides. For hundreds of year's pest and invasive plant species were controlled through the use of hoes and rakes, which helped break up stubborn weeds.[13]

5. Mechanical Power

Farming requires tremendous amounts of work and is physically exhausting. Technological advances have lessened the physical burden of farm labor through the implementation of power operated machinery which can be used to till the soil, plant crops, spray pesticides, harvest crops, process and deliver food.[14] However, if farming begins to take place in the city at a much smaller scale and with large amounts of community involvement, there will not be a need to depend on gas guzzling machinery.

Over the years, agriculture has developed at different rates around the world; societies may have similar farming practices or distinct differences. Ancient Origins of farming are commonly built amongst geographical areas with fertile river valleys. The rivers provided a constant source of water and the annual floods deposited nutrients back into the soil, which ensured that the soils nutrient levels were consistently replenished. Around 3500 BCE dykes and canals managed the floodwaters along the Tigris, Euphrates, the Nile, and Indus rivers.[15] Pairing this form of infrastructure with farming practices produced a rich a reliable food source. Geographic areas that did not have annual floodwaters to replenish the soils nutrients utilized different methods of farming.

Exploring alternative methods of agriculture has brought my attention to the terraced fields at Machu Picchu, Peru, a site that demonstrates some of the earliest forms of urban agriculture. Inca culture had been rooted in Andean South America from approximately A.D. 1200 until 1532 when Spanish conquest occurred.[16] The Inca Empire covered a vast amount of land that extended from "Chile to Ecuador, from the river Maule in the south

13 Ibid.

14 Ibid.

15 Ibid.

16 Jean-Pierre Protzen, "Inca Quarrying and Stonecutting," *Journal of the Society of Architectural Historians* 44 (1985): 161.

to the river Angasmayo in the north, from the Pacific Coast in the west to the highlands of the Andes and the fringes of the Amazon basin in the east."[17] The geographic size of the Inca Empire is both enormous and impressive, however, it may be argued that their means of construction to establish such an empire is even more remarkable.

Perhaps the most impressive form of infrastructure that the Incas incorporated into their empire was the agricultural terrace. The terraces covered thousands of miles of land and were used to cultivate crops throughout the empire. The agricultural terraces were essential in preventing erosion that would have occurred from the heavy summer rainfall. The terraced crops were irrigated by an elaborate and precise system of water canals. By evaluating the agricultural infrastructure of the Inca Empire it becomes clear that the architecture of Inca society was indeed remarkable and extensive. Inca architects and builders were responsible for the infrastructure that supported the empire. There are valuable lessons that can be learnt from ancient traditions and some of the practices may have the potential to be incorporated into North American landscapes where the necessities of our land and people need to be better supported, conserved, and enhanced.

View of agricultural terraces at Machu Picchu from the southwest, March 7, 2011; from Herrmann, Dieter B.

17 Ibid., 161.

Victory Gardens

Turning our attention to the urban agriculture movement in Canada the earliest examples of community gardens were being organized as a type of food bank. However, during the war urban gardens transitioned from a method of relief to a war effort known as the Victory Garden movement. During the WWI and WWII many farmers had to leave their farms to fight in the war, as a result food production drastically decreased. The government developed a strategy to transform civilians into an army of gardeners, which boosted morale on the home front and simultaneously diminished food shortages and costs.[18] The gardens could be found essentially in any available space in the city (vacant lots, residential yards, school yards, railway corridors, playing fields, church grounds, etc).

> By the end of the 1943 growing season, there were approximately 52,000 Victory Gardens in the greater Vancouver area, which together produced 31,000 tons of fruits and vegetables valued at $4 million. According to the Canadian Department of Agriculture, 115 million pounds of vegetables were grown in 209,200 urban gardens in that same year.[19]

The Victory Gardens provide strong evidence that a large amount of produce can be grown within city limits and can be very successful in Canada. As a society we have the opportunity to learn from our past achievements and work together to adapt previously successful programs to meet our populations current needs.

Canadian 'Farmerettes', Hamilton, Ontario, April 21, 1942; from *The Hamilton Spectator*

18 King, *Food and the City*, 35.

19 Ibid.

Allotments, Community Gardens and Urban Farms

In 17th century England allotments were small plots tended by labourers to counteract the land that had once been available for common agricultural practices, which had transitioned into private enclosures for wealthy landlords. Throughout the industrial revolution allotments became a common means to produce food for the rural poor who had migrated to the city. After the Second World War the use of allotments began to decrease and did not regain popularity until the 1970s.[20] Throughout Europe and North America urban farms and community garden movements have started to become popular due to a growing interest in environmental ethics and alternative lifestyles. Urban farms and community gardens are different than allotments because they each require community initiative in order to function.[21] It is common for urban farms and community gardens to place greater emphasis on education and community cohesion rather than endorsing food production as the primary objective. Implementing urban agriculture into cities has great potential to revitalize neighbourhoods, experiment with alternative growing techniques and promote a positive way to engage in healthy living within a metropolitan environment.

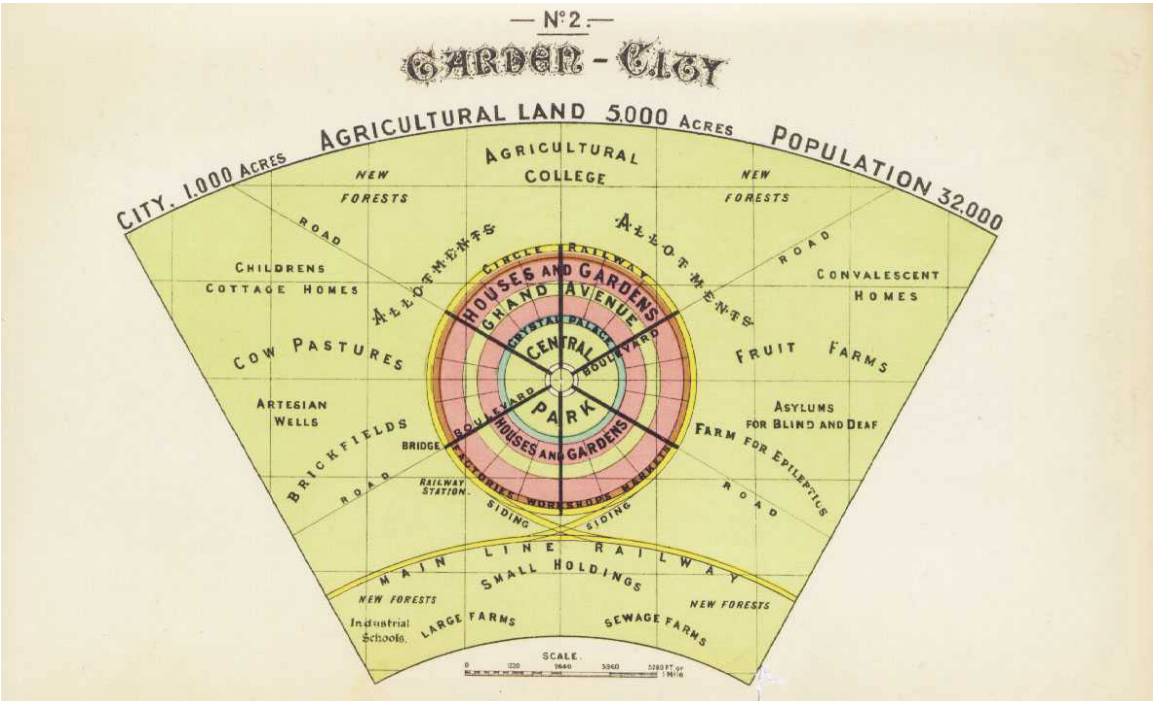
View of Richmond Village Allotment Garden, Northhampton, August 2011; from City Farmer

20 Gil Doron, "Urban Agriculture: Small, Medium, Large," *Architectural Design* 75 (2005): 57.

21 Ibid.

20th Century Architecture

Ebenezer Howard's Garden Cities of Tomorrow first published in 1902 incorporates ideas of urban agriculture and allotments. A city would be divided in order to set aside five-sixths of the land for agricultural production purposes, which included a ring of allotments around the extremity of the urban settlement. Residential plots were 20 feet by 130 feet, which provided ample space for a family of five or more to reside.[22]



Ebenezer Howard, Plan of Garden City, 1902; from *Garden Cities Of To-Morrow*

Le Corbusier also explored ideas of urban agriculture on a large scale in his 'Contemporary City' proposal which was further developed and explained in The City of Tomorrow and its Planning in 1924.[23] Le Corbusier's 'Contemporary City' plans encompassed three different zones for urban agriculture practices; one with indirect proximity to the city, the protected zone, and the urban center. The Protected zones encompassed large swatches of land for farming and detached residential houses. The agricultural intentions for the urban zone was much more detailed and included a cellular style neighbourhood and

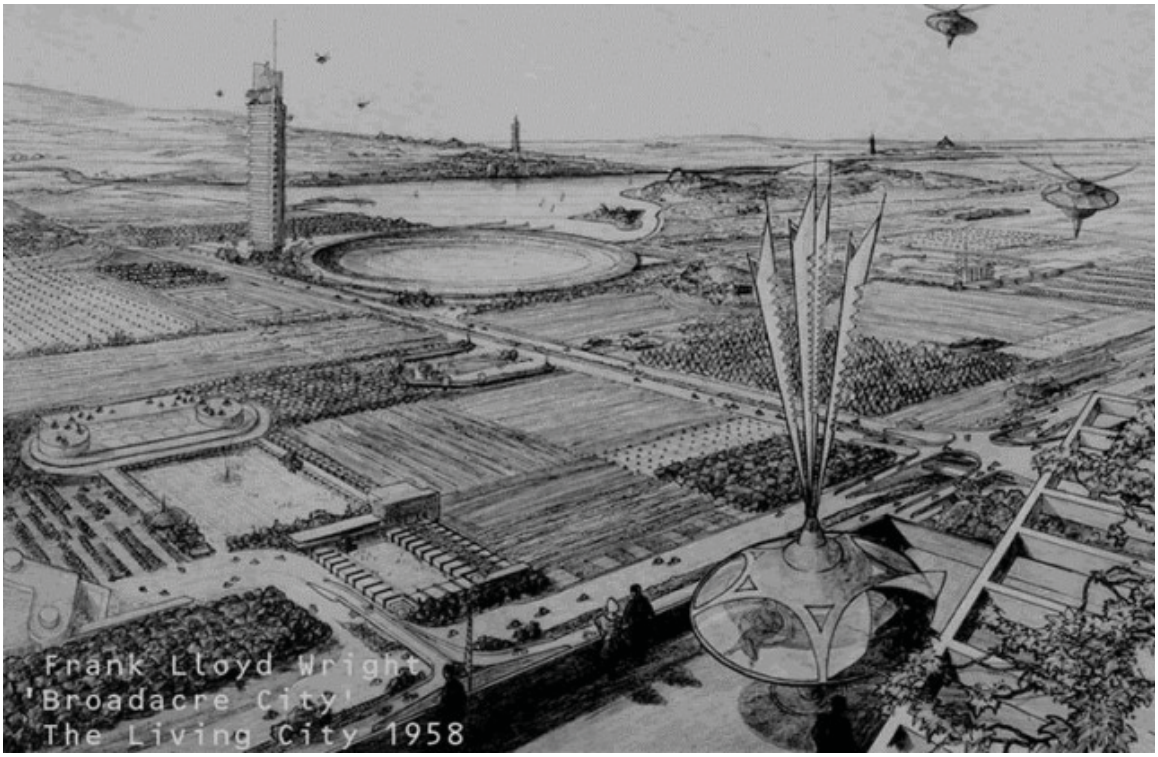
22 Ibid., 54

23 Ibid.

allotment fields that were approximately 10 acres.[24] Le Corbusier's describes specifically how urban agricultural practices would take place within the urban environment by stating that:

> There would be a farmer in charge of every 100 such plots and intensive cultivation would be employed. The farmer undertakes all the heavy work. The inhabitant comes back from his factory or office, and with the renewed strength given him by his games, starts to work on his garden. His plot, cultivated in a standardized and scientific way, feeds him for the greater part of the year. There are storehouses on the borders of each group of plots in which he can store his produce for winter.[25]

The last example of 20th century large-scale urban agriculture was Franks Lloyd Wrights Broadacre City. Broadacre city was a utopian city plan that incorporated agriculture into single detached suburban settlements. His ideas of bringing agricultural practices into an urban environment blurred the ideas between urban and suburban landscapes. Wrights plan for Broadacre City was rooted in ecological principles and created a unique potential for food production and the constructed urban environment to coexist and be equally balanced.[26]



Frank Lloyd Wright, *Broadacre City*,1958; from B. Pfeiffer, *Frank Lloyd Wright 1943–1959*

24 Ibid.

25 Ibid.

26 Ibid.

Current Trends

There are a variety of places where urban agriculture can take place which range from "backyards, crop and animal production on rooftops, in window boxes, on roadsides, beneath high tension lines, in vacant lots, on steep slopes and banks of rivers, and on the grounds of schools, hospitals, prisons, and other institutions. There is aquaculture in tanks, ponds, and pens in rivers."[27] Listed below are seven current urban agriculture trends that are common in North America today.

1. Private Gardens

The number of private front and back yard gardens may have decreased in past generations however; they are beginning to spring back up across Canada. Citizens are finding innovative and exciting new ways to grow fruit and vegetables in their own yards. People are growing their own food to reap the health benefits of consuming organic produce and the positive mental and physical activity that come along with the practice. Websites and blogs are easily accessible and are full of inspiring ideas of how residents are able to grow food in increasingly smaller spaces making private gardens a viable option for residents who live in high and low density neighbourhoods.

View of private urban garden, Bremerton, 2010; photograph by Becky Warner, from R Warner Wordpress

27 Mougeot, *Growing Better Cities*, 4.

2. Community Projects

There are hundreds of community garden examples that exist across Canada. Community gardens bring people together to grow healthy food and help create prosperous communities. More often than not the members who pay a small fee to rent an annual garden plot run the gardens. These sites become great informal learning environments where members are able to share their knowledge and experience of gardening.

The Stop is a community food center located in Toronto, Ontario. The food stop relies on community support in their efforts to combat poverty and hunger with healthy local food. The Stop strives to provide healthy food for all community members through food banks, farmers markets, urban agriculture, and community advocacy.[28]

View of The Stop Community Food Centre, Toronto, 2014; from The Stop Community Food Centre

28 "The Stop Philosophy," The Stop Community Food Centre, accessed April 26, 2014, http://www.thestop.org

3. Institutional Initiatives

Universities, schools, hospitals, churches and other businesses are implementing productive greenspaces into their properties to promote local food and healthy living.

In 2007 McGill University created a productive growing scheme that involved 1000 square feet of container gardens to promote edible landscapes in public spaces. The Edible Campus project is an example of how the urban environment and productive growing can work simultaneously to create new means of food production and improve underused spaces without decreasing the ability of an urban space to function.[29]

View of McGill University urban gardens, Montreal, 2014; from Mcgill University

29 "Making the Edible Campus," McGill University, accessed April 26, 2014, http://www.mcgill.ca/mchg/projects/ediblecampus

4. Small Commercial Enterprises

In order for urban farming to become a plausible job option some urban farmers are taking on a new strategy for commercial growing known as SPIN (small plot intensive farming). This term emerged out of Saskatoon, Saskatchewan but is being adopted by other cities across Canada. SPIN farming is based on the principle that urban farmers will lease a front or back yard from local residents and within these small spaces they will grow high value, fast growing crops.[30] The produce is then marketed through "food box" programs, or farmers markets.

Fresh City Farms located in Toronto, Ontario cultivates fresh fruit and vegetables on six acres of land throughout the greater Toronto area and also utilizes a 3,000 square foot greenhouse for year round production. Fresh City Farms runs workshops for farm members and the general public and they also offer a vegetable box program. The box program offers different vegetables from week to week depending on which fruits and vegetables are in season. Vegetable boxes offer a great variety of healthy choices with at least seven to twelve different vegetables.[31]

View of Fresh City Farms Downsview Park Greenhouse, Toronto, 2014; from Fresh City Farms

30 "Urban Agriculture," Urban Farmer, accessed April 26, 2014, www.theurbanfarmer.ca

31 "City Farming," Fresh City Farms, accessed April 26, 2014, http://www.freshcityfarms.com

5. Peri-urban Agriculture

Peri-urban refers to the land at the cities edge. This edge is commonly difficult to farm on not because of geological issues but because the land is prime real estate for developers to build on as a city continues to grow. The difficulty to maintain farmland at the edge of a city has prompted cities like Detroit to re-zone land within the city limits as “agricultural” which results in commercial and non-commercial agriculture to occur on vacant or underutilized areas.[32]

The Broxburn Vegetable Farm was established in 1994 five kilometers east of the city center of Lethbridge, Alberta. The farm has eighty acres of peri-urban farmland and operates a three-acre greenhouse. All crops are grown organically and pests are controlled by the introduction of other predatory species. The Broxburn Vegetable Farm caters to the community of Lethbridge and also plays a role in the agri-tourism industry with its produce store and U-pick crops.[33]

View of Broxburn Hydropnic Greenhouse, Lethbridge, 2013; from Broxburn Vegetables

32 “Urban Agriculture,” Urban Farmer, accessed April 26, 2014, www.theurbanfarmer.ca

33 “Farm,” Broxburn Vegetables and Cafe, accessed April 26, 2014, http://www.broxburn-vegetables.com

6. Roof-top and Vertical Innovations

Incorporating vertical gardens or greenhouses is an excellent strategy for cities with limited physical space or a shorter growing season. Some cities are taking vertical growing one step further by introducing vertical farms built as skyscrapers.

Brooklyn Grange specializes in urban rooftop agriculture and beekeeping in New York City. An important aspect of their programs is composting. The Brooklyn Grange rooftop gardens are used to supply local produce to food markets, and restaurants throughout the state. [34]

View of Brooklyn Grange rooftop gardens, New York, 2014; from Brooklyn Grange Farm

34 "Farms," Brooklyn Grange, accessed April 26, 2014, http://brooklyngrangefarm.com

7. Urban Chickens and Bees

Throughout Europe residents have been keeping small livestock in their backyards for years. However, in Canada keeping farm animals in the city continues to be a controversial subject. This issue brings us back to the question of what are appropriate programmatic activities for urban and rural environments and should these activities remain separate? By confronting municipal by-laws and the government officials who prohibit citizens and organizations from keeping small livestock in the city, the boundaries between existing rural and urban landscapes begin to breakdown and dissolve.

Toronto Beekeepers Cooperative focuses their efforts on beekeeping, honey production, and education. Their goal is to educate inexperienced individuals on how to produce honey and to bring awareness to the significance of bees in our environment.[35]

View of Toronto Beekeepers at Downsview Park, Toronto, 2011; from Toronto Bees

35 "Principals of the Toronto Beekeepers," Toronto Beekeepers Co-operative, accessed April 26, 2014, http://torontobees.ca

Agriculture and the Urban Environment

Our current food system is essentially unsustainable, industrial farming methods will exacerbate the pollution in our oceans, destroy land, and harm animals and people through the use of toxic fertilizers and pesticides. “In 1940, 1 calorie of fossil fuel energy produced 2.3 calories of food energy. But with today’s industrial system of agriculture, the ratio has flipped to an inefficient, unsustainable equation, as it takes 10 calories of fossil-fuel energy to produce just 1 calorie of modern supermarket food.”[36] Therefore, one of the most evident environmental benefits, which results from growing food within an urban setting, is a diminished dependency on fossil fuels because the gap between consumer and producer becomes drastically shorter.

In today’s day and age most urban consumers are not engaged with the origins of their food source. There is a physical and psychological disconnect between humans and their biological food source. By severing the connection between production, distribution and consumption the quality of our natural ecosystems and the health of people living in modern society will continue to decrease at alarming rates. Within the urban environment ideas about production and consumption are missing and misconceived on both temporal and spatial levels. Since most urban consumers do not directly rely upon their local environment for their food source there is no longer a line of communication between humans and the ecosystems that support us. Warning signs that our surrounding ecosystems are failing often go unnoticed or are completely disregarded.[37] Urban food systems such as community gardens or farmers market are settings where information about food production can move directly between the farmer and the consumer.

> Creating a direct link between producer and consumer [can] improve knowledge about food production and supporting ecosystems among consumers and become a driving force towards more sustainable consumption patterns and production practices.[38]

By introducing local urban food systems into our cities the general public will have the opportunity to gain ecological knowledge about the species of fruits and vegetables that can be grown in the region depending on the season, as well as how the climate and local

36 Nordahl, *Public Produce,* 16.

37 Åsa Svenfelt and Annika Carlsson-Kanyama, “Farmers’ markets – linking food consumption and the ecology of food production?,” *Local Environment* 15 (2010): 454.

38 Ibid.

ecosystems play a strong role in the production of our food supply.[39]

Architectural suggestions and designs have the opportunity to make urban agriculture benefit all cities by proposing better landscapes to maintain healthy environmental designs to sustain society and our earth. A more recent approach to urban agriculture has been developed in the book Continuous Productive Urban Landscapes: Designing Urban Agriculture for Sustainable Cites. CPULs are designed greenspaces that are both environmentally and economically productive. “For example, a CPUL provides food from urban agriculture, pollution absorption, the cooling effect of trees, and increased biodiversity from wildlife corridors.”[40] CPULs promote productive greenspaces to occur throughout the urban environment, thus decreasing the distance between production and consumption. CPULs have the potential to be integrated into a variety of urban spaces to help revitalize vacant lots, lawns, roofs, parks and schoolyards. CPULs can also operate at a larger scale on the peri-urban fringe of metropolitan cities thus, creating an opportunity for agricultural practices to transform desolate parking lots, wastelands, and brownfield sites.[41]

Existing ecosystems can be better monitored once countries begin to produce their food locally and seasonally. Local urban food systems are sustainable solutions for the environment and the local economy. Local food systems can help close the gap that exists between urban consumers and the productive activities that take place in our surrounding ecosystems. As the gap between production and consumption begins to close carbon dioxide emissions from transportation and processing will be reduced, energy costs will be cut drastically, our dependence on fossil fuels will decrease, soil depletion, and global warming will no longer continue to spiral out of control. Local food environments can also “reduce the vulnerability of food-supply systems to the impacts of weather and market-related supply problems of distant producers, offer greater choice through regional variations in biodiversity, provide fresher and more nutritious products in season, allow for more effective regional control of quality and chemical inputs, and create the potential for local development and employment opportunities.”[42]

39 Ibid.

40 Doron, “Urban Agriculture,” 59.

41 Ibid.

42 Koc, *For Hunger-Proof Cities*, 6.

Urban Greenspace and Health

Canadians residing in metropolitan centers across Canada continue to suffer from developing health risks due to declining environmental conditions. Environmental conditions are twofold; there are physical geographies, which encompass the built environment and social geographies, which are our public support systems.[43] In order to understand the complex relationship between people and place the theory of environmental aesthetics can be used.

> Environmental aesthetics refers to the study of affective responses to the environment, how they evolve as people interact with the social and physical environment, and how they mediate peoples environmental experiences.[44]

The aesthetic qualities of urban greenspace embody the sensory and experiential qualities, which play a fundamental role in the therapeutic, and health benefits that can be achieved through interaction with productive and non-productive greenspace.[45] Landscape designs that embody ideas of health and wellness must show sensitivity to different scales of environments and create a sustainable balance between ecology and aesthetics in order to connect individuals to places that encourage healthy lifestyles.[46] As people begin to engage with urban greenspaces they awaken an opportunity for ecological learning to take place. Interacting with urban greenspaces is an "ecological experience, where human selves become aware that their actions and existence are not separate from those of the non-humans with whom they engage and interact."[47]

Creating productive urban greenspaces can provide long-lasting solutions to the overall wellbeing of metropolitan residents and resolve rural and urban environmental concerns. Urban garden participants gain holistic awareness about the health benefits that result from engaging with the biophysical world that surrounds them. Growing food in an urban environment draws the community together and helps revitalize the city. Productive urban

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43 Jeffrey R. Masuda et al., "Out of our Inner City Backyards: Re-scaling Urban Environmental Health Inequity Assessment." *Social Science & Medicine* 75 (2012): 1244.

44 James Hale et al., "Connecting Food Environments And Health Through The Relational Nature Of Aesthetics: Gaining Insight Through The Community Gardening Experience," *Social Science & Medicine* 72 (2011): 1854.

45 Ibid.

46 Ibid.

47 Ibid.

greenspaces bring program and purpose to a specific place. Productive urban greenspace attract people for a number of different reasons; to obtain healthy, low cost, local food, to learn about urban gardening, to enjoy the health benefits of interacting with nature, and to socialize with people who have common interests. All in all, when people begin to engage with productive greenspaces they are directly enhancing their lives and their community.

Greenspace and recreational space can improve the quality of a city as well as the quality of life of its residents. "92% of Lethbridge residents said that recreation and park facilities and services are important components to improve their quality of life."[48] The community of Lethbridge currently has an abundance of parks and recreational spaces equally distributed throughout the city. However, the city is significantly lacking productive greenspaces.

> It is time to think about how our public spaces could improve public health by providing places for exercise and access to healthy food. The CDC states that one effective measure for combating obesity is to seek opportunities for physical activity within the community, such as hiking and biking along trails in parks and sidewalks along city streets. Not only could these public spaces provide opportunities for physical activity, however with the planting of fruits and vegetables, public space can increase access to the fresh produce that is necessary in (and largely missing from) American diets.[49]

Increasing opportunities for recreational and outdoor activities to take place within the city will increase the overall health and wellbeing of local citizens. Sustainable greenspace within an urban setting creates essential opportunities for citizen of all demographics to be physically and socially active. Providing children with positive exposure to outdoor parks builds environmental awareness and encourages beliefs towards conservation and preservation, as they grow old. Benefits are vast when considering recreation and culture within urban areas. Participating in recreational activities and maintaining a healthy lifestyle can reduce medical healthcare costs, decrease violence, and foster better childhood development and family lifestyles. A city rich with greenspace has the potential to attract more business opportunities and create employment while keeping current neighborhoods alive with interest where people are healthier, more productive, and prosperous.[50]

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48 The City of Lethbridge, *Recreation and Culture Master Plan*, The City of Lethbridge, 2013, http://www.lethbridge.ca/Things-To-Do/Documents/2013-01-28%20%20lethbridge%20MASTER%20PLAN-sm.pdf, 1.

49 Nordahl, *Public Produce*, 41.

50 The City of Lethbridge, *Recreation and Culture Master Plan*, The City of Lethbridge, 2013,

Urban Agriculture and Health

The World Health Organization defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmary".[51] This definition is careful to ensure that the term health encompasses both the physical and psychological welfare of a person. Research has found that there is a distinct relationship between urbanization, shortages of arable land, the loss of greenspace, and societies deteriorating health.[52] The industrialized food system and modern conveniences has created a culture dominated by food that is low cost and low in nutritional value. Our current food system has completely disconnected people from the environments that sustain them.[53] "Even when we are shopping, today's civilized replacement for hunting, the natural environment eludes us because food is vacuum-packed, odor-free and tastes neutral – remote from human senses."[54]

> We've all seen the emaciated bodies of starving people starving in countries crippled by food insecurity. It is incredibly oxymoronic that obesity is the result of food insecurity here in North America. It is not the inaccessibility of food calories in this country that is problematic. Rather, it is the abundance of cheap calories derived from processed and fast food vis-à-vis the inaccessibility of fresh, wholesome, nutrient-dense foods at an affordable price that is responsible for the poor health of citizens.[55]

Rising rates of obesity and health related illness are consequences of the food industries promotion of non-healthful food, lack of physical activity and a detachment from the biophysical landscapes that surround us.

Consuming food is one of our most basic human needs and we as humans deserve the right to have access to healthy, nutritional, chemical, preservative and hormone free

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http://www.lethbridge.ca/Things-To-Do/Documents/2013-01-28%20%20lethbridge%20MASTER%20PLAN-sm.pdf, 42.

51 Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.

52 Dimitri Devuyst, Luc Hens, and W. de. Lannoy. *How Green is the City? Sustainability Assessment and the Management of Urban Environments,* (New York: Columbia University Press, 2001) 2.

53 James Hale et al., "Connecting Food Environments And Health," 1853.

54 Philipp Meuser, and Daniela Pogade. *Wayfinding and Signage: Construction and Design Manual* (Berlin: DOM Publishers, 2010), 14.

55 Nordahl, *Public Produce,* 35.

food. However, if the industrial food industry insists on supplying the global food market with unhealthy food choices that have been proven to contribute to chronic health related illness cities are going to have to turn to alternative food systems if they are interested in the overall wellbeing of their citizens. In order for municipalities to provide food security and access to proper nutrition, future plans for the development of the city will need to integrate a successful food system which includes temporary and permanent productive greenspaces as well as sustainable practices for production, distribution, consumption and waste management.[56] "A sustainable food system should help to satisfy basic human needs, without compromising the ability of future generations to meet their needs. It must therefore maintain ecological integrity and integrate conservation and development "[57]

By improving the state of current food environments there is great opportunity to improve the over quality of public health and begin to combat the rising number or health related illnesses such as obesity, diabetes, hypertension and cardiovascular disease. The first steps to improving the quality of health throughout the nation is to change to the way food is grown, distributed, and consumed in order to re-establish a connection between people and local food environments.[58] Despite the fast paced urbanized lifestyles that consume our everyday lives there is still widespread belief that humans are innately connected to nature.[59] People's intrinsic connection to nature is founded in education and developed with first hand experiences in nature. Within the boundaries of the urban environment one of the simplest ways to connect with nature is through urban gardening. Urban gardening can involve both productive and non productive gardens. There is strong evidence that suggest that participating in urban gardening can have profound physiological and psychological health benefits. People who engage in 30 minutes of daily gardening are increasing the amount of moderate physical activity in their daily routine and are reaping the benefits of practicing a healthy lifestyle. Citizens, who engage in urban gardening increase their exposure to nature, increase their levels of physical activity, which decreases the possibility of developing cardiovascular disease

56 Koc, *For Hunger-Proof Cities,* 2.

57 Ibid.

58 James Hale et al., "Connecting Food Environments And Health," 1854.

59 Jonathan Kingsley et al., "Cultivating Health and Wellbeing: Members' Perceptions of the Health Benefits of a Port Melbourne Community Garden," *Leisure Studies* 28 (2009): 208.

and diminishes stress and anxiety levels.[60]

The article “Cultivating Health and Wellbeing” states that international studies have illustrated that the primary reasons why people chose to become involved in community gardening is to partake in sustainable and environmental activities, to learn and share ideas about planting and growing food naturally and locally, to increase levels of physical and social activity, develop relationships with neighbors, and positively contribute to the aesthetics and safety of their community.[61] Studies on urban agriculture participants have indicated that gardeners experienced personal benefits of health and wellbeing. Urban gardens are social sanctuaries of peace; they are places of refuge from the stress of everyday life. Participating in urban agriculture brings users closer to nature, it provides them with a sense of accomplishment, and it increases their physical well being, and also allows them to reap the benefits of producing and consuming organic food.[62]

Urban agriculture in the form of community gardens creates opportunities for residents to become engaged in the processes that are involved with growing food. Urban agriculture can be used as a mechanism to reintroduce safe and healthy food production into cities across North America. Incorporating urban agriculture into various urban settings will help promote education about health and nutrition through positive interactions with nature. Implementing urban gardens into cities is also a valuable means to provide nutritious food choices to neighborhoods that do not have proper access to healthful alternative food sources such as, farmers markets or food cooperatives.[63]

60 Ibid.

61 Ibid., 209.

62 Ibid., 216.

63 James Hale et al., “Connecting Food Environments And Health,” 1854.

CHAPTER 2: SITE

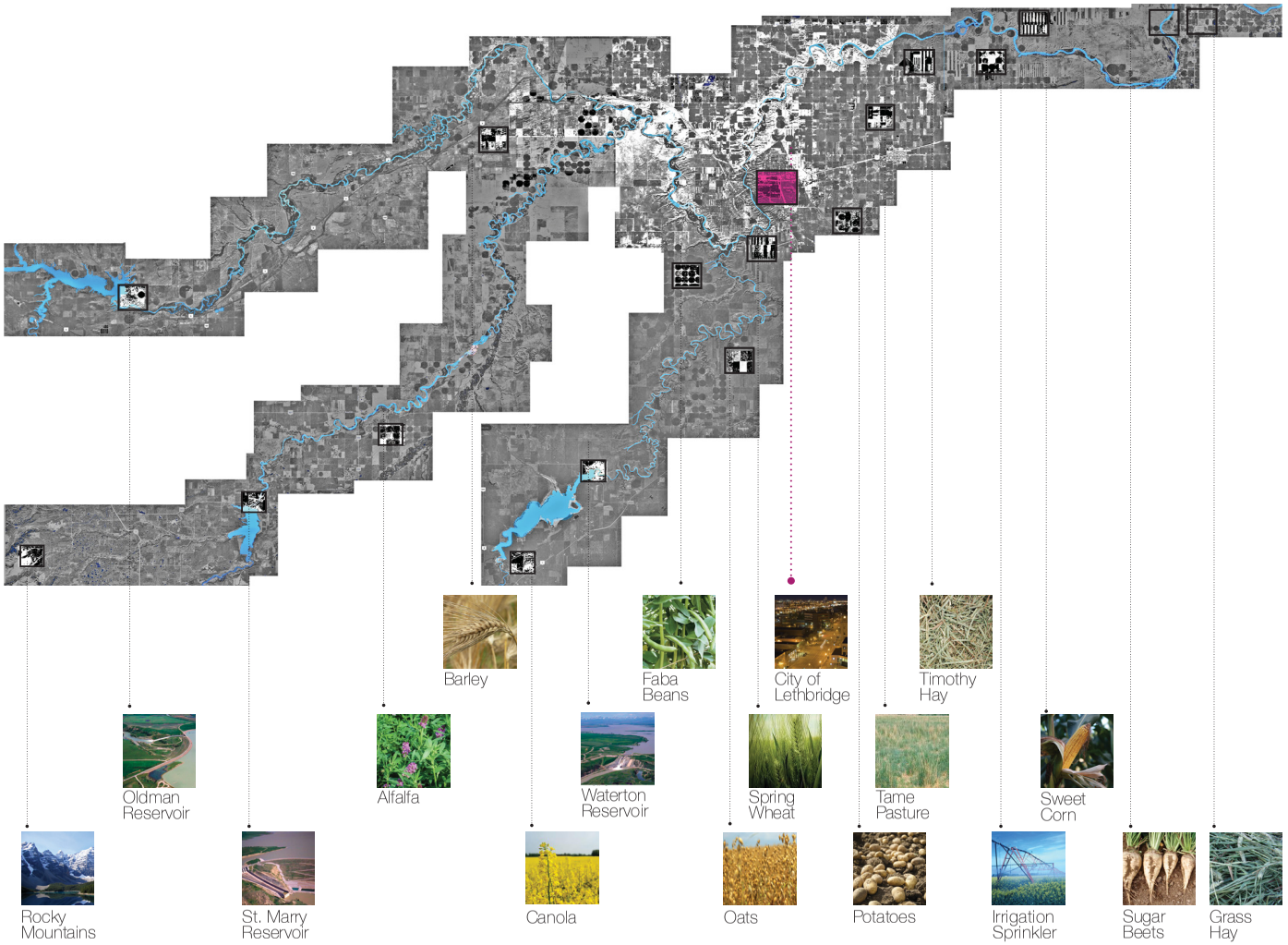
City of Lethbridge

The essence of this thesis is rooted in the City of Lethbridge. The city's distinct topographic landscape and agricultural history have shaped the city into what is today. The cultivated and natural landscapes of the city are driving characteristics and reference points for the development of this thesis.

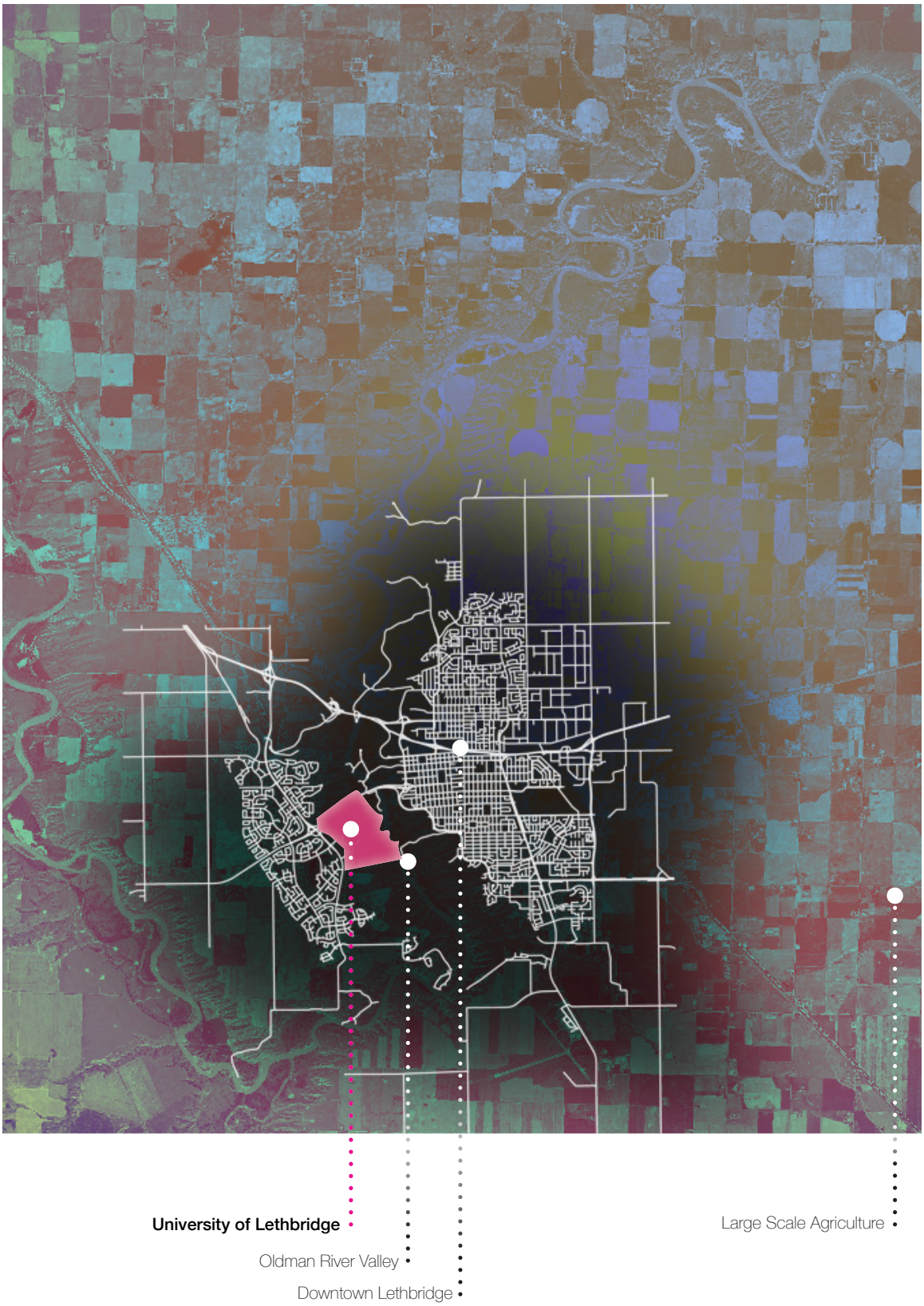

Lethbridge: Cultivated


Lethbridge: Natural


Lethbridge: Constructed



Southern Alberta Agriculture & Irrigation. This graphic illustrates the agricultural landscape, the three main irrigation reservoirs, and the primary crops that are produced in the farming districts that surround the City of Lethbridge; data from Alberta Agriculture and Rural Development



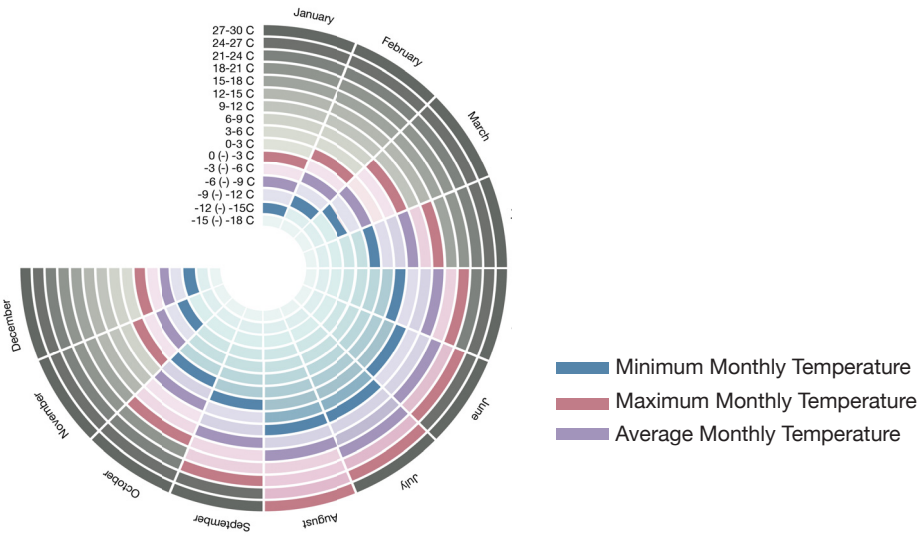
Siting the City of Lethbridge and the university campus within the cultivated geomertries that surround the city.

Climate

Lethbridge is known for being the sunny south and the warmest city in Canada. The mild temperatures allow for a variety of outdoor recreational activities to take place throughout the year. The frost-free period commences in May and last until the end of September which is equivalent to approximately 118 days, in turn the growing season typically lasts for abut 140 days out of the year.[64]

Temperature

The temperature during the winter fluctuates from very mild (15 degrees C) to extreme cold (-35 degrees C). The summer temperatures are hot and dry with maximum highs of 40 degrees C. The average temperature for summer is approximately 20 degrees C.[65]



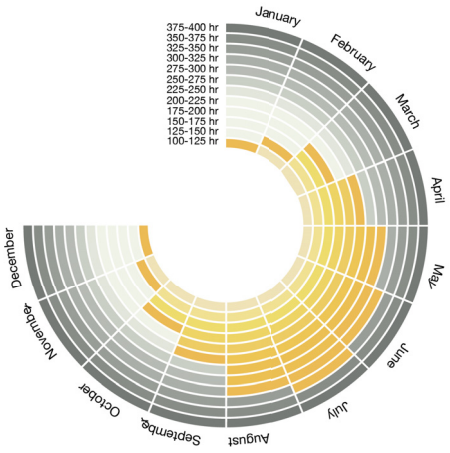
Temperature Diagram for Lethbridge; data from Environment Canada

64 Lombard North Group, *Urban Parks Master Plan: Urban Parks Project*, The City of Lethbridge, 1983, http://www.lethbridge.ca/living-here/My-Community/Documents/Urban%20Parks%20Master%20Plan.pdf 10.

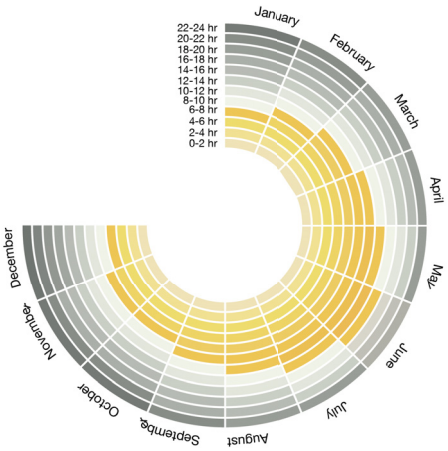
65 Ibid.

Daylight

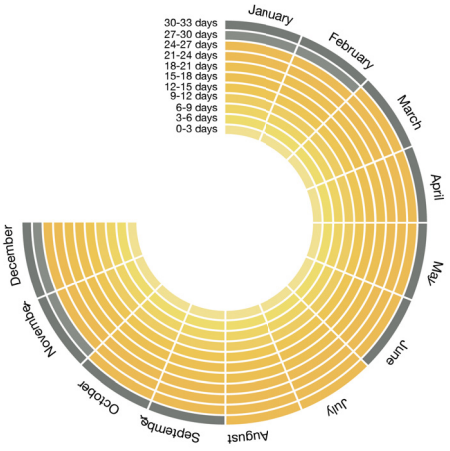
Lethbridge, Alberta is arguably one of the sunniest cites in Canada. The average number of days of monthly sunlight rarely falls below 27 days per month, which means its almost sunny 365 days out of the year. The summer months between June and August receive the longest amounts daylight resulting in over 300 hours of daylight per month.



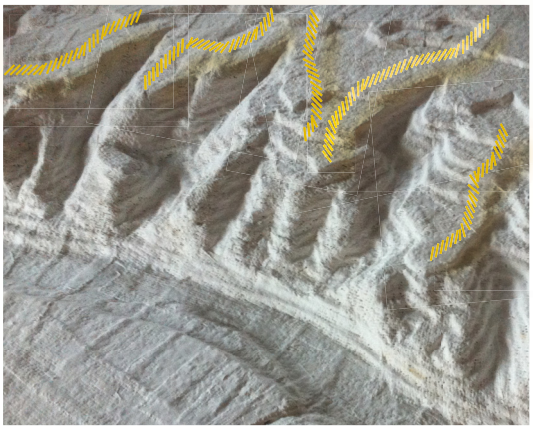
Maximum Hours of Monthly Daylight



Total Hours of Monthly Sunlight



Average Days of Monthly Sunlight

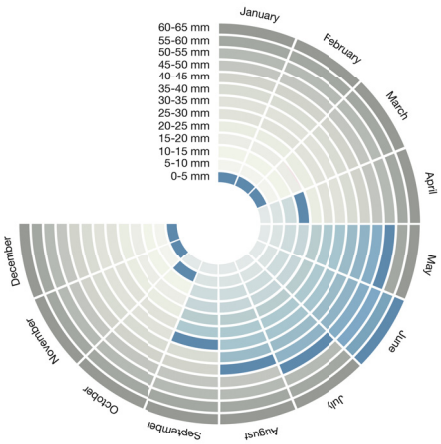


Solar effects and the coulees

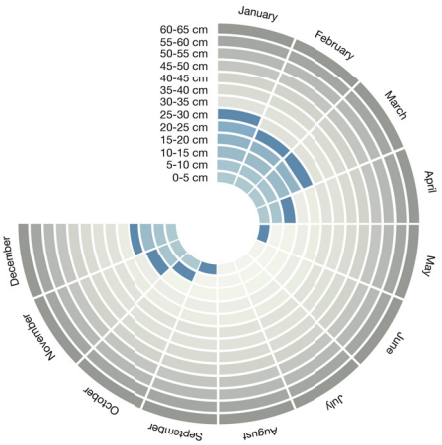
Solar Diagrams for Lethbridge; data from Environment Canada

Precipitation

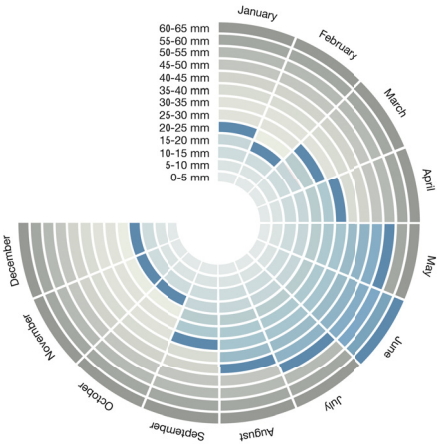
The highest levels of precipitation occur between May and June. The average annual precipitation is approximately 400mm with a combination of 130mm as snowfall and 270mm as rainfall. The coulee slopes are generally free of snow cover due to the warming effect of the Chinook winds. The experience of rapid melting snow, increased run off and substantial snowdrifts are all common occurrences due to the Chinook winds.[66]



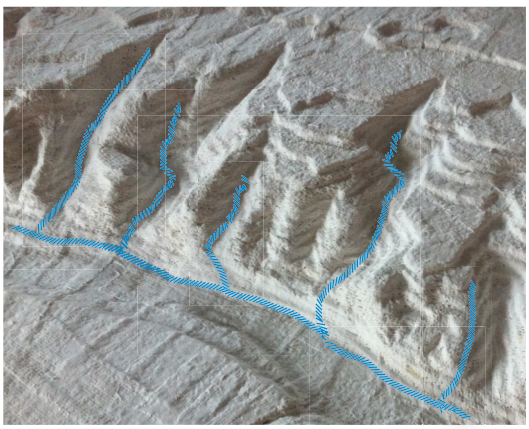
Average Monthly Rainfall (mm)



Average Monthly Snowfall (mm)



Average Monthly Precipitation (mm)



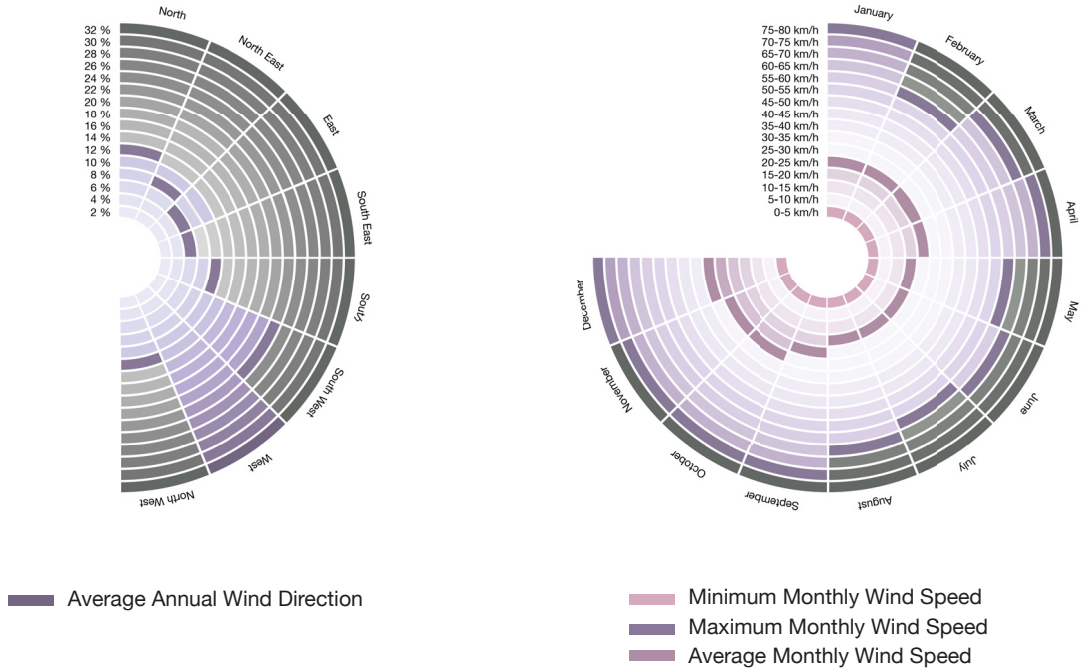
The effects of precipitation on the coulees

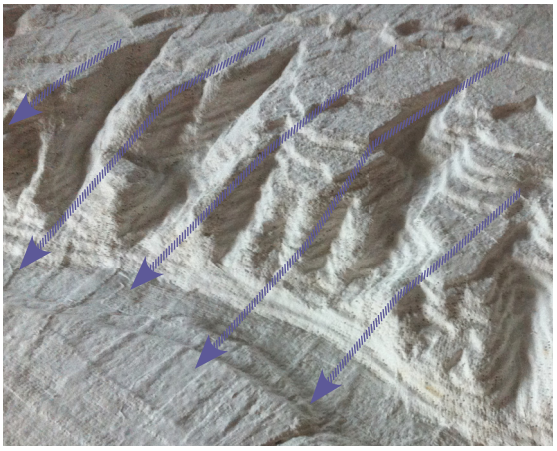
Precipitation Diagrams for Lethbridge; data from Environment Canada

66 Ibid.

Wind

Warm winds are predominantly from the west and southwest. The average annual wind speed is approximately 20km/h but has been reported to gust up to 100km/h on a monthly basis. The strong warm winter winds that form off the prairies coast are called Chinooks; they result in melting snow and drastic changes in temperature.[67]





The effects of wind on coulee formation

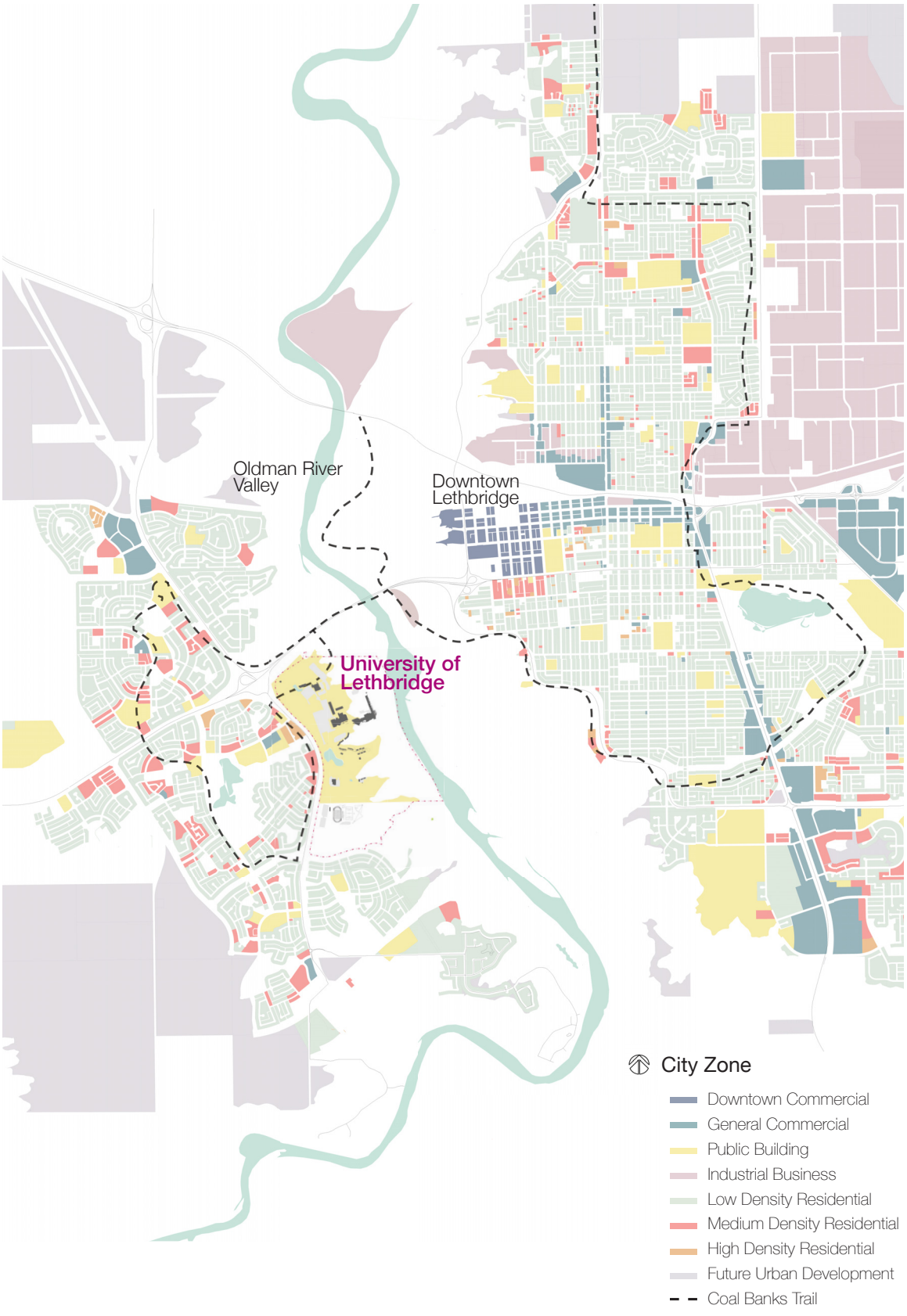
Wind Diagrams for Lethbridge; data from Environment Canada

67 Ibid.

Oldman River Valley

The City of Lethbridge has greatly contributed to the health of its residents by establishing many beautiful parks, open greenspaces as well as cultural and recreational facilities. The Oldman River Valley has strongly impacted the development of Lethbridge. The River Valley presents a unique topographic condition and a diverse range of natural environments, which provide tremendous opportunities for recreation, scenic and interpretive activities. The Valley symbolizes the heart of the city it is the link which unifies the east and west sides of Lethbridge.[68]

68 Ibid., 1.



The City: Map of city zones in relation to the university campus; data from The City of Lethbridge

The City: Map of topography and greenspaces in relation to the Coal Banks Trail network.

Vegetation

The primary types of vegetation that occur in the River Valley are as follows:

a) Cottonwood/Balsam Poplar & Willow

The Cottonwood/Balsam/Poplar Community symbolizes the initial stages of plant succession in the river valley. Willows are present along the shore zone and can easily become the dominant species.[69]

b) Open Grassland

June Grass, Blue Grama Grass and Spear Grass are common grassland species found throughout the valley. Prickly Pear Cactus and sage grow primarily on the south and west facing slopes as they tend to experience drier conditions then the north and east facing slopes, which are more likely to produce taller and more dense ground cover.[70]

c) Tall Shrub

Saskatoon, Chokecherry, Buffaloberry, Snowberry, Silverberry, Wildrose, and Red Osier Dogwood grow in clusters predominantly in coulee drainage zones as the soil in these areas have higher moisture content and better soil structure then the upper slopes. Wild Licorice, Milkweed, Aster and Goldenrod tend to grow in more open dry areas, which receive better sun exposure.[71]

d) Wetland

Precipitation, high groundwater, and surface runoff tend to collect in natural and constructed basins; it is amongst these areas of standing water that wetland vegetation flourishes. An established band of submerged aquatic plants such as Cattails, Bulrushes, Sedges and Reeds typically occur along the shoreline of the river.[72]

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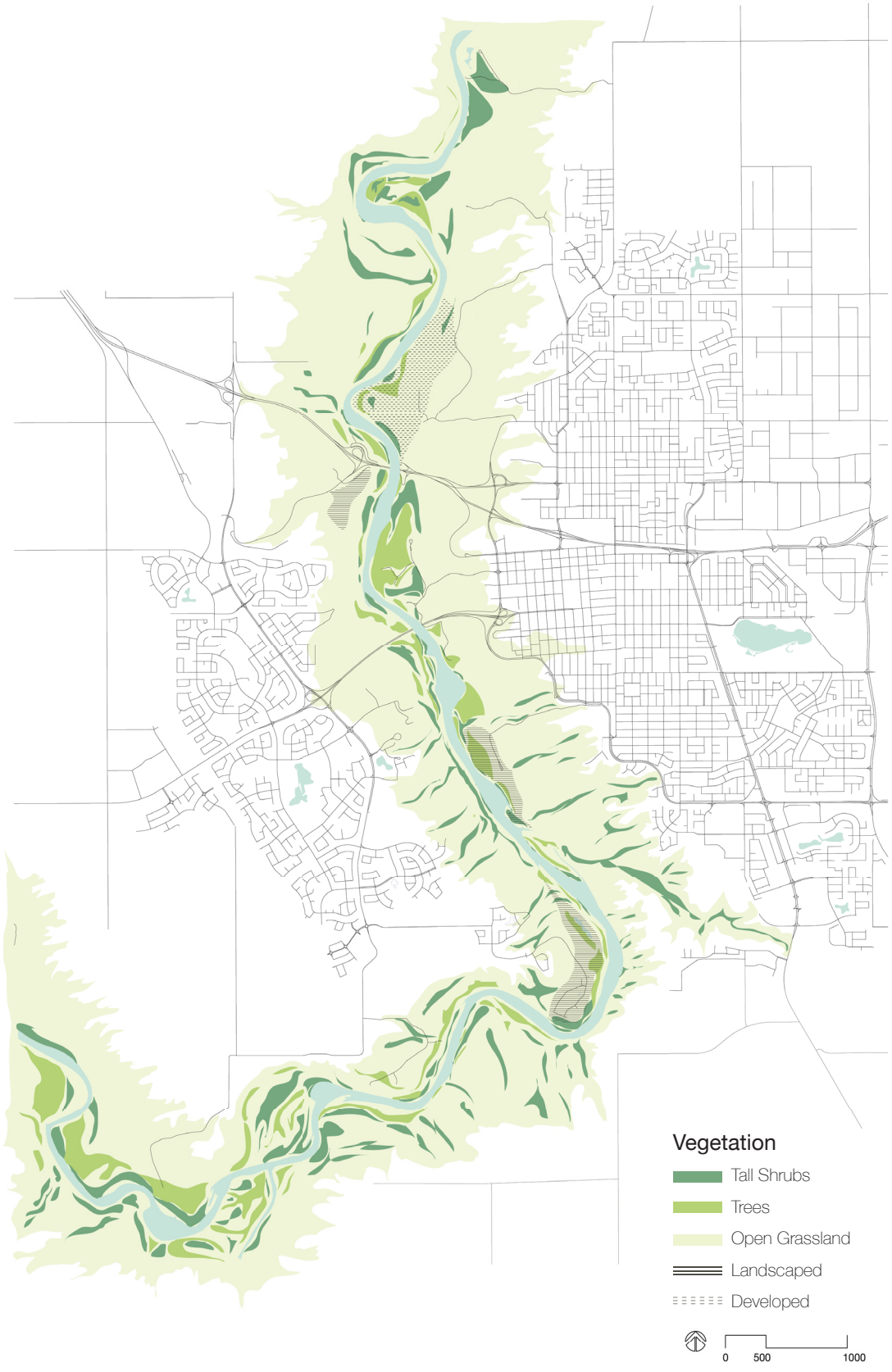
69 Lombard North Group, *River Valley Area Redevelopment Plan*, The City of Lethbridge, 2008, http://www.lethbridge.ca/Doing-Business/Planning-Development/Documents/River%20Valley%20ARP.pdf, 9.

70 Ibid., 30.

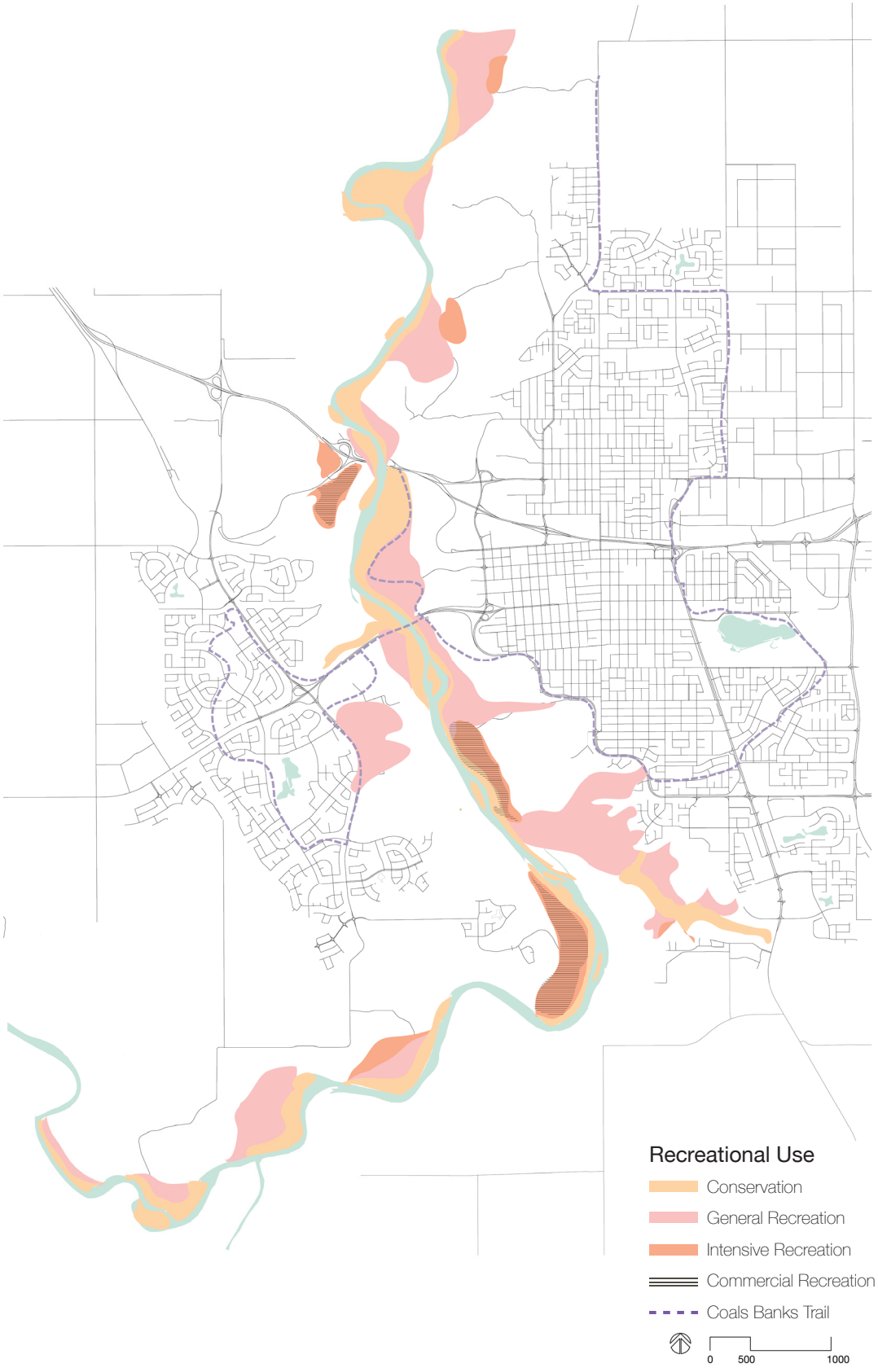
71 Ibid.

72 Ibid.

The Oldman River Valley contains three distinct vegetative zones. This image illustrates a variety of indigenous plant species that are commonly found within the three zones; data from Helen Schuler Nature Centre



Map of vegetation zones in the Oldman River Valley; data from The City of Lethbridge



Map of recreational zones in the Oldman River Valley; data from The City of Lethbridge

Wildlife

a) Ungulates

White-tailed and Mule Deer inhabit the Oldman River Corridor predominantly because of the variety of vegetation along the flood plain which, provides substantial open browse space in close proximity to protection from dense tree zones.[73]

b) Furbearers and Small Mammals

The Great Plains Muskrat and Canada Beaver are typically found along the riverbanks while other furbearing animals such as Prairie Coyote, Northern Plains Fox, Northern Plains Skunk, American Badger, and Long-tailed Weasel are found throughout the valley. The open grasslands are rich with dense ground cover affording great protection and food sources for a variety of small mammals such as: the White-tailed Prairie Hare, Richardson Ground Squirrel, Richardson Pocket Gopher, and Porcupine.[74]

c) Birds

The Cottonwood and Balsam Poplar trees along the flood plain accommodate the largest variety of birds in Lethbridge. Throughout the river bottom low shrub zones create excellent nesting sites for the Cedar Waxwing, Clay Colored Sparrow, Robin, and Easter Kingbird. The valley walls house numerous nesting sites for Cliff and Bank Swallows.[75]

d) Fisheries

The portion of the Oldman River that courses through the City of Lethbridge is a transitional zone for both warm and cold-water fish species. The three main species of warm water fish are: Walleye, Goldeye, and Northern Pike. The four most common cold water fish are: Cut-throat Trout, Rainbow Trout, Mountain Whitefish, and Dolly Varden.[76]

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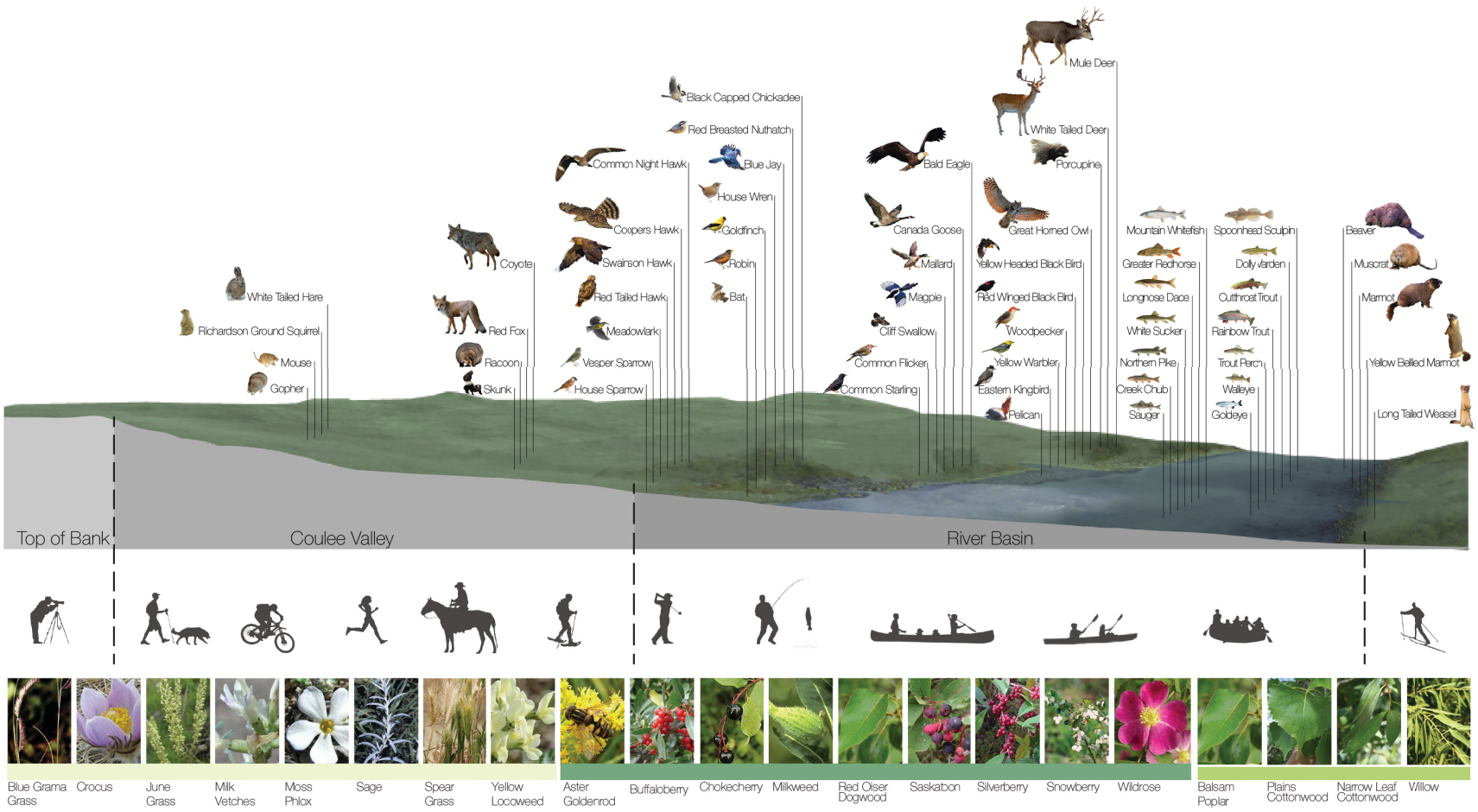
73 Ibid., 31.

74 Ibid.

75 Ibid., 32.

76 Ibid.



This graphic illustrates the three environmental zones of the Oldman River Valley, the prominent types of indigenous plant and animal species that inhabit the valley, as well as the variety of recreational activities that occur throughout the year; data from Helen Schuler Nature Centre

Topography

There are three topographic typologies found in the Oldman River Valley: the densely vegetated floodplains, the alluvial fans, and the coulees walls.[77] The floodplains are more or less flat with a slight elevation (5-8 meters), which extends from the edge of the river to the bottom of the valley walls.[78] The alluvial fans are typically found near the bottom of larger coulees, they are caused by deposition from coulee runoff. The alluvial fans continue to change over time as a result of erosion caused by flooding.[79] The coulees have a dramatic vertical height, which extends from 60-90 meters above the floodplain. Strong prevailing winds from the west and precipitation have greatly contributed to the unique shape of the undulating landscape. The north and south facing valley walls have recorded slopes between 20%-80%. The coulees are generally V-shaped and illustrate a particular parallel drainage pattern.[80]

Photograph of the Oldman River Valley's coulee landscape, Lethbridge, 2014

77 Ibid., 12.

78 Lombard North Group, *Urban Parks Master Plan: Urban Parks Project*, 12.

79 Lombard North Group, *River Valley Area Redevelopment Plan*, The City of Lethbridge, 2008, 12.

80 Ibid.

Geology

During the Pleistocene period the Oldman River Valley underwent various stages of glaciation. The thickness of the glaciers that once covered this region is an astonishing 2200 feet.[81] Before glaciation took place, the valleys that exist today were infilled with sand and gravel, and the region was overlaid with a network of rivers and streams.[82] The bedrock that exists throughout Lethbridge contains layers of Cretaceous sandstones, siltstones, clay, coal and shale.[83]

The coulees are susceptible to slumping and instability as the moisture content in the soil increases or dramatically changes. Factors that can contribute to slumping are accumulation of snow, heavy rainfall, even lawn watering in residential neighbourhoods.[84]

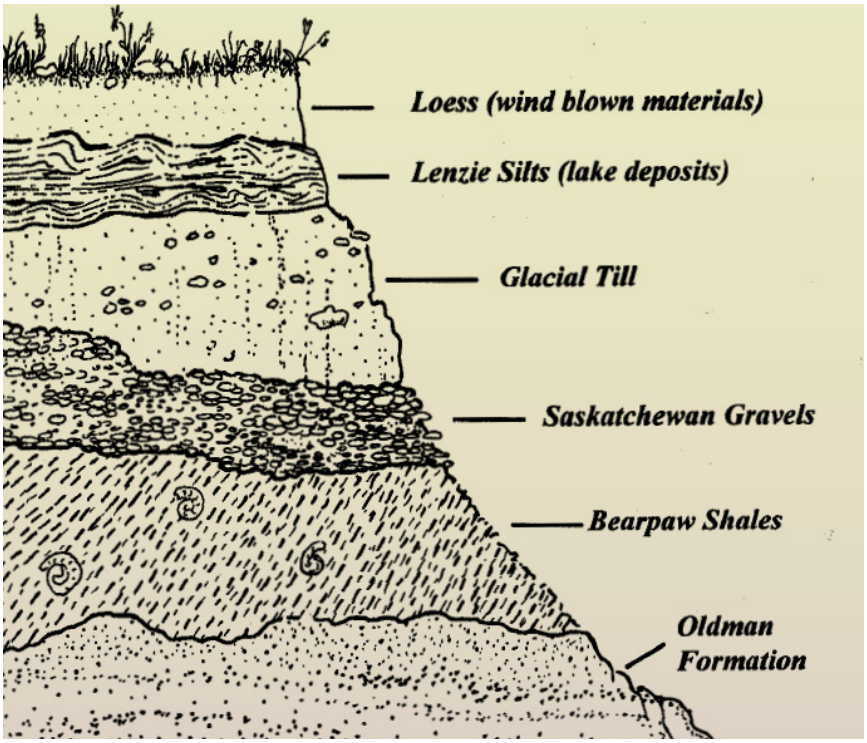


Illustration of the Oldman River Valley's geological layers; data from Helen Schuler

81 Erickson/ Massey Architects, *Development Plan: University of Lethbridge*, http://www.uleth.ca/masterplan/sites/ucmp/files/UofL-EM_Development_Plan_1969.pdf, B4.

82 Ibid., 12.

83 Ibid.

84 Helen Schuler Nature Centre, *Coulees & Cottonwoods: Nature Field Guide for Lethbridge,* City of Lethbridge,http://www.lethbridge.ca/Things-To-Do/Nature-Centre/Documents/HSNC%20Field%20Guide%20singlepages.pdf, 8.

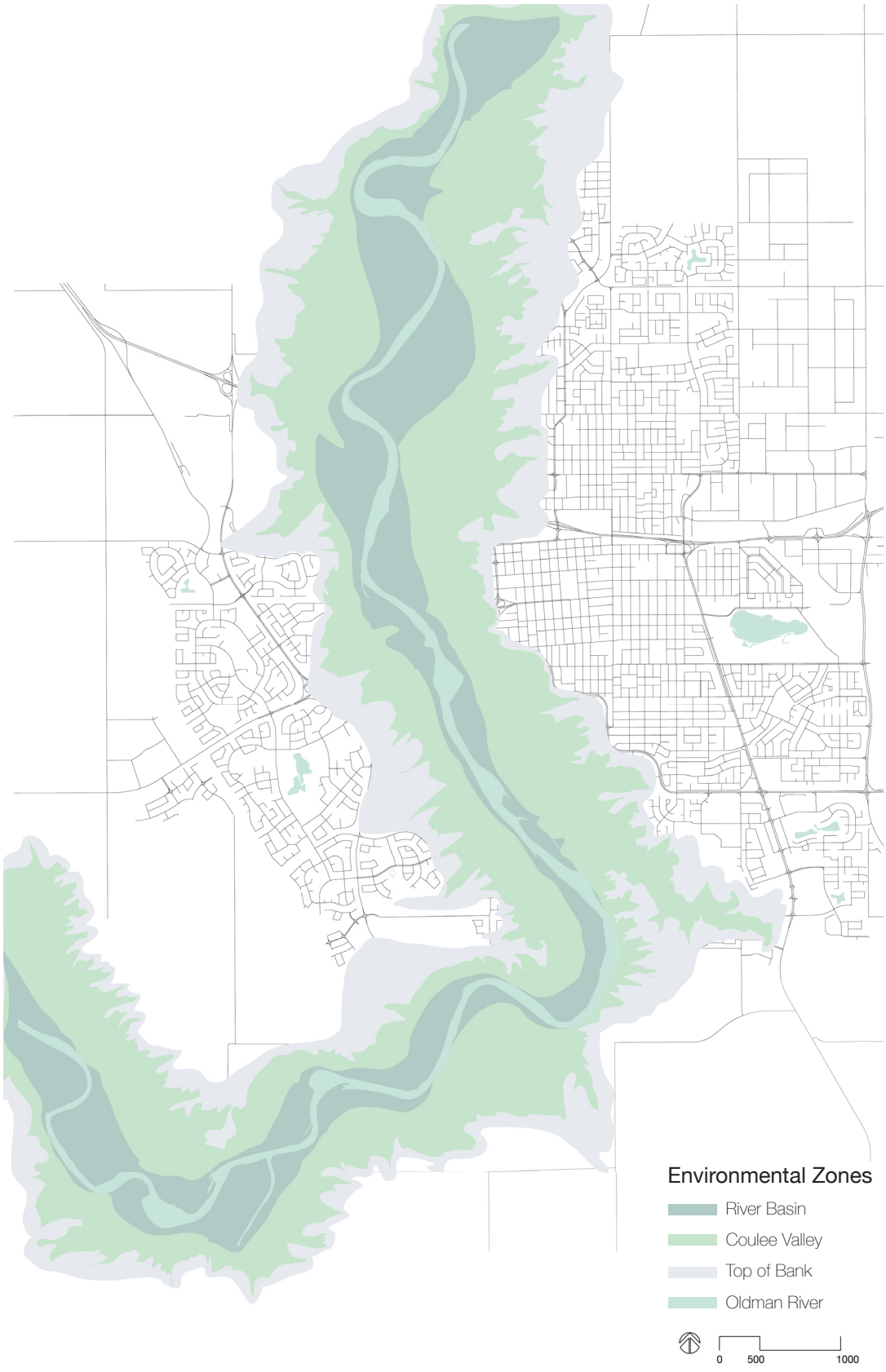
Photograph of the Oldman River Valley's slumping coulee conditions, Lethbridge, 2014

Hydrology

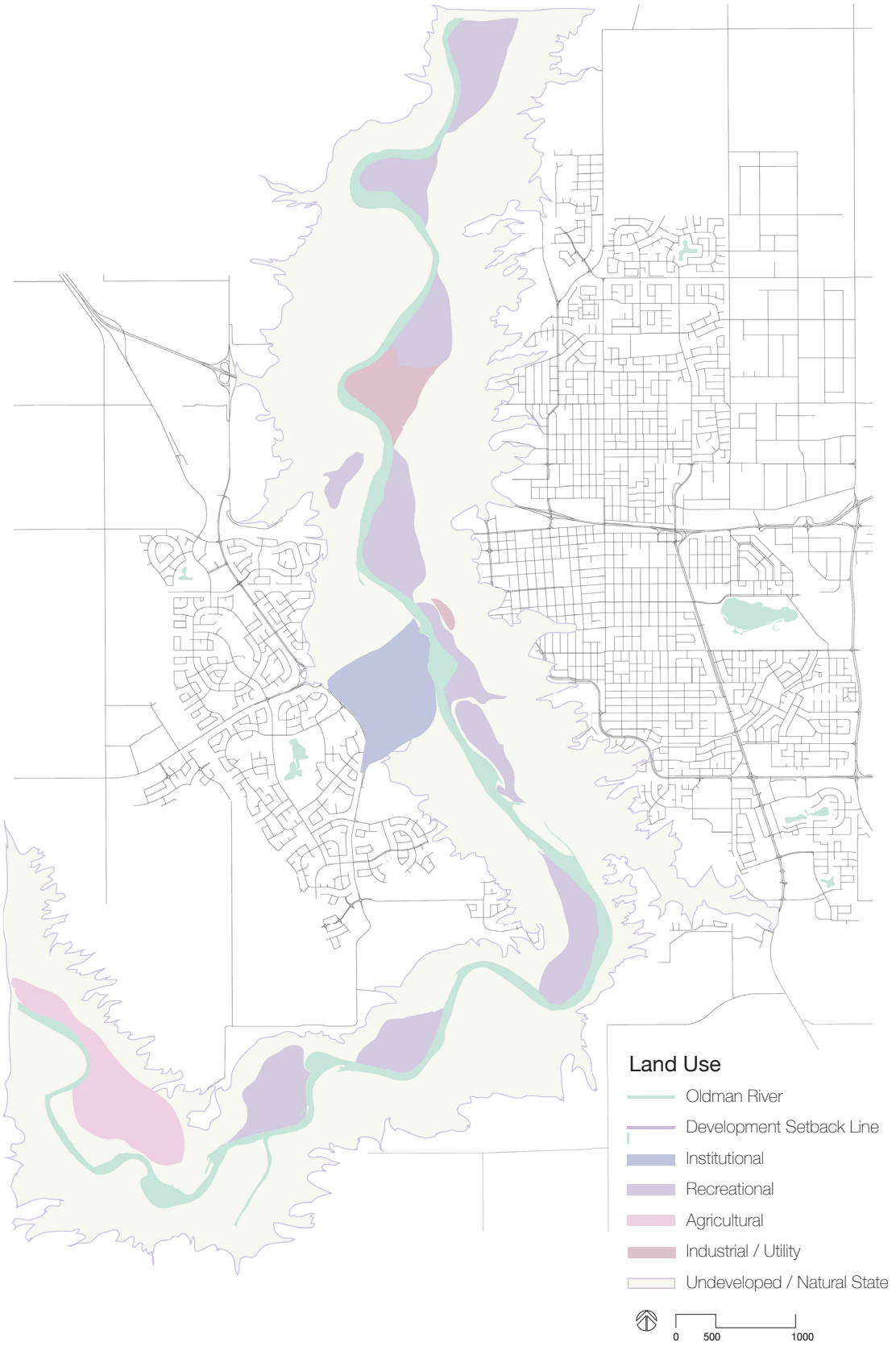
The Oldman River courses south and west through the City of Lethbridge however; it originates west of Lethbridge, in the Rocky Mountains at approximately 1800 meters above sea level. Throughout the month of June augmented levels of precipitation and snowmelt from higher elevations contribute to maximum annual discharges.[85]

Photograph of the Oldman River; data from University of Lethbridge University Campus Master Plan: A Vision of Our Core Academic Lands.

85 Lombard North Group, *Urban Parks Master Plan: Urban Parks Project*, 15.



Map of environmental zones in the Oldman River Valley; data from The City of Lethbridge



Map of land use zones in the Oldman River Valley; data from The City of Lethbridge

University of Lethbridge

The University of Lethbridge was founded in 1967 and spans over 231-hectares on the west bank of the Oldman River. Today the institution has an enrolment of over 7,500 students and is the second largest employer in the city.[86]

The Original Campus Master Plan

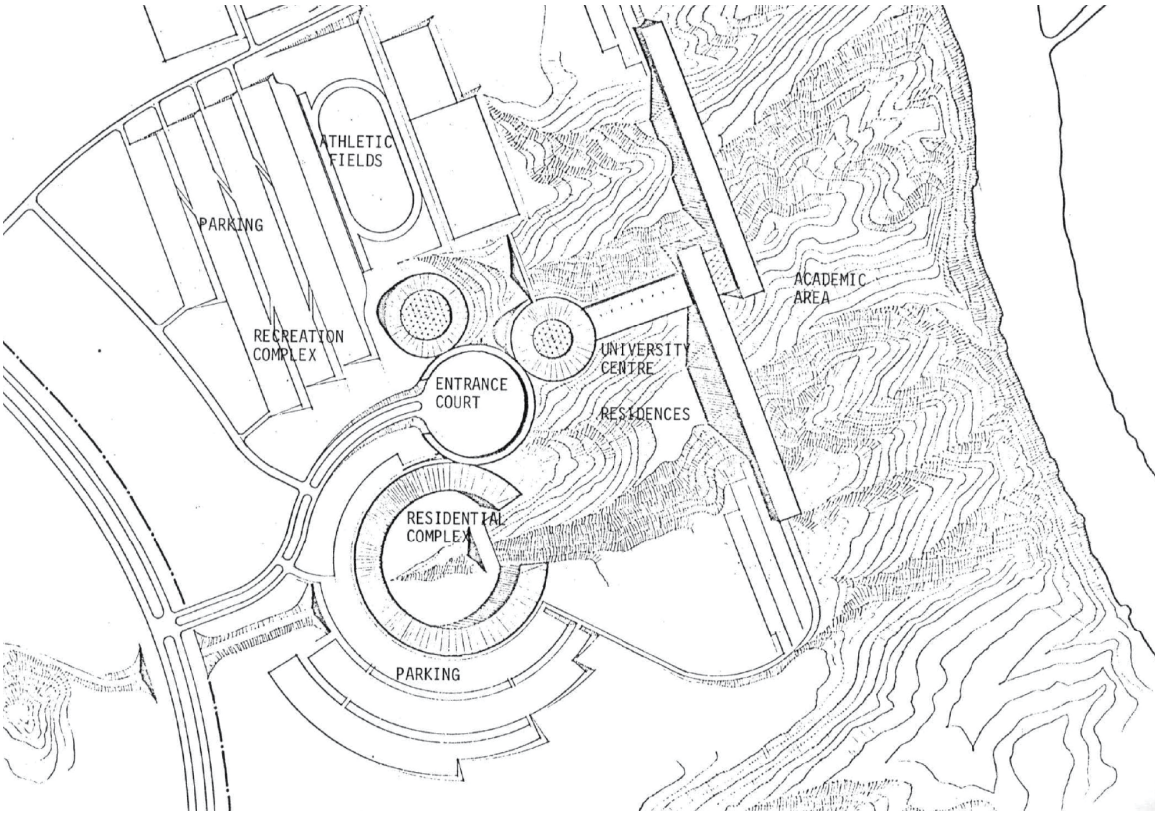
The initial Erickson-Massey master plan proposed that the campus function as a village where the academic, residential and commercial spaces function together.[87] "The first broad objective of the plan for the University of Lethbridge is, then, to extend the teaching-learning process beyond the narrow confines of the classroom so that it may embrace all aspects of university life."[88] The original plan incorporates the Social Sciences and Humanities into University Hall, while the proposed south building was meant to house Physical and Life Sciences. Student residence buildings are shown as crescent shaped structures located west of University Hall on the top of the coulee bank. University Hall responds to the prairie landscape and expansive sky as an essential form that hovers over the undulating coulees. The original master plan presented University Hall as an iconic centerpiece that is founded upon the liberal education model where students could live and learn simultaneously.[89]

86 The University of Lethbridge, *University Campus Master Plan: A Vision of Our Core Academic Lands, 2012, http://www.uleth.ca/masterplan/sites/ucmp/files/master-plan/University-Camp*us-Master-Plan-2012.pdf, 44.

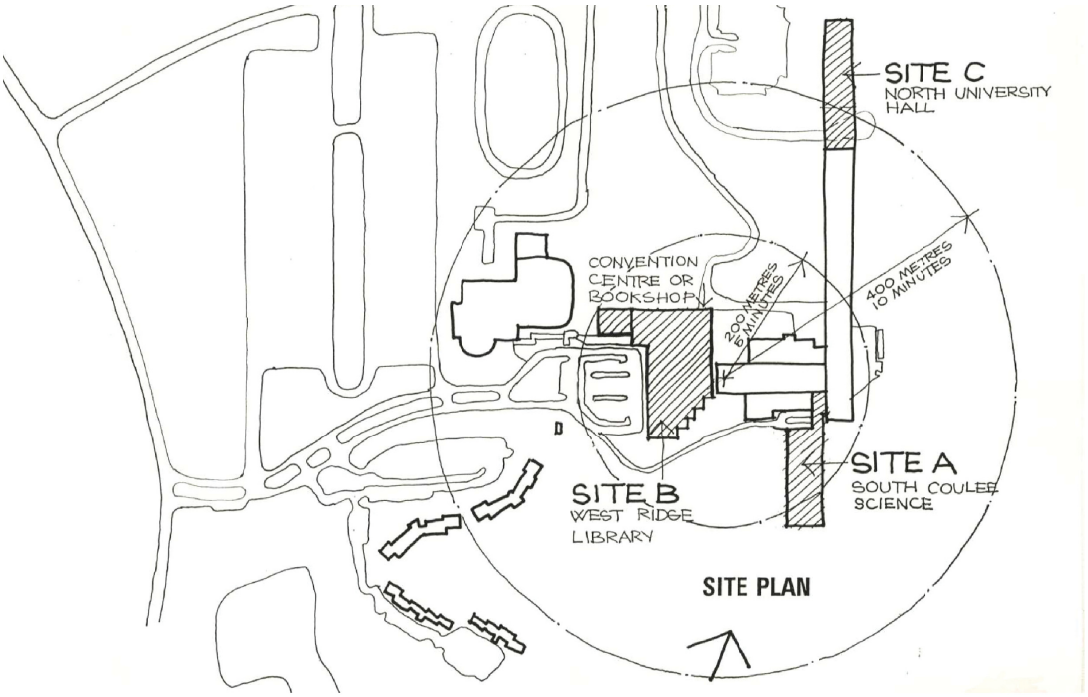
87 Erickson/ Massery Architects, *Development Plan: University of Lethbridge*, 7.

88 Ibid.

89 The University of Lethbridge, *University Campus Master Plan: A Vision of Our Core Academic Lands,* 41.



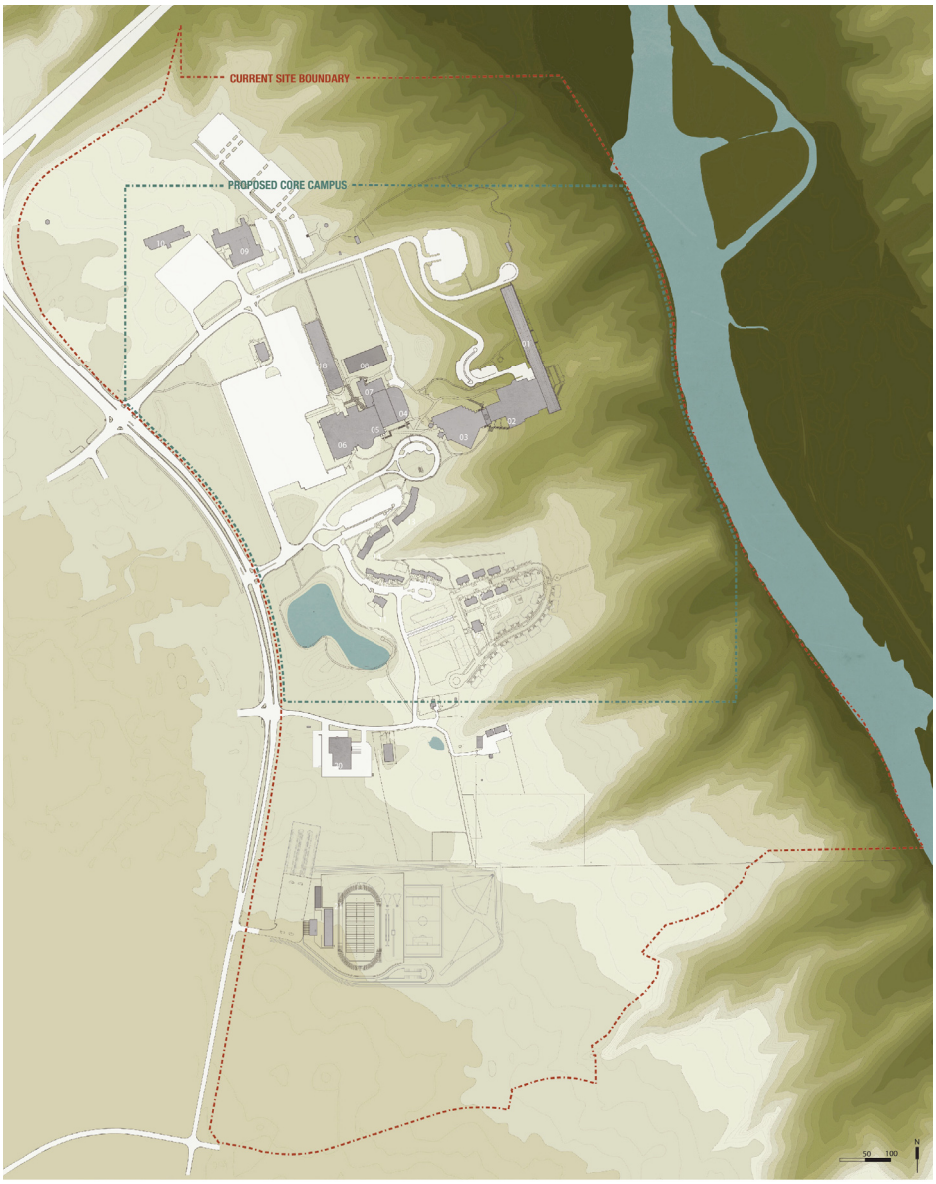
Erickson-Massey Development Plan (1969). From University of Lethbridge University Campus Master Plan: A Vision of Our Core Academic Lands.



Campus Development Plan (1993). From University of Lethbridge University Campus Master Plan: A Vision of Our Core Academic Lands.

The Campus Today

The University of Lethbridge campus has been greatly modified from the original village concept once envisioned by Erickson-Massey. The current academic buildings have been roughly laid out around the central origin of the Students' Union Building, with academic and research buildings situated to the north and residential and athletic facilities situated to the south.[90]



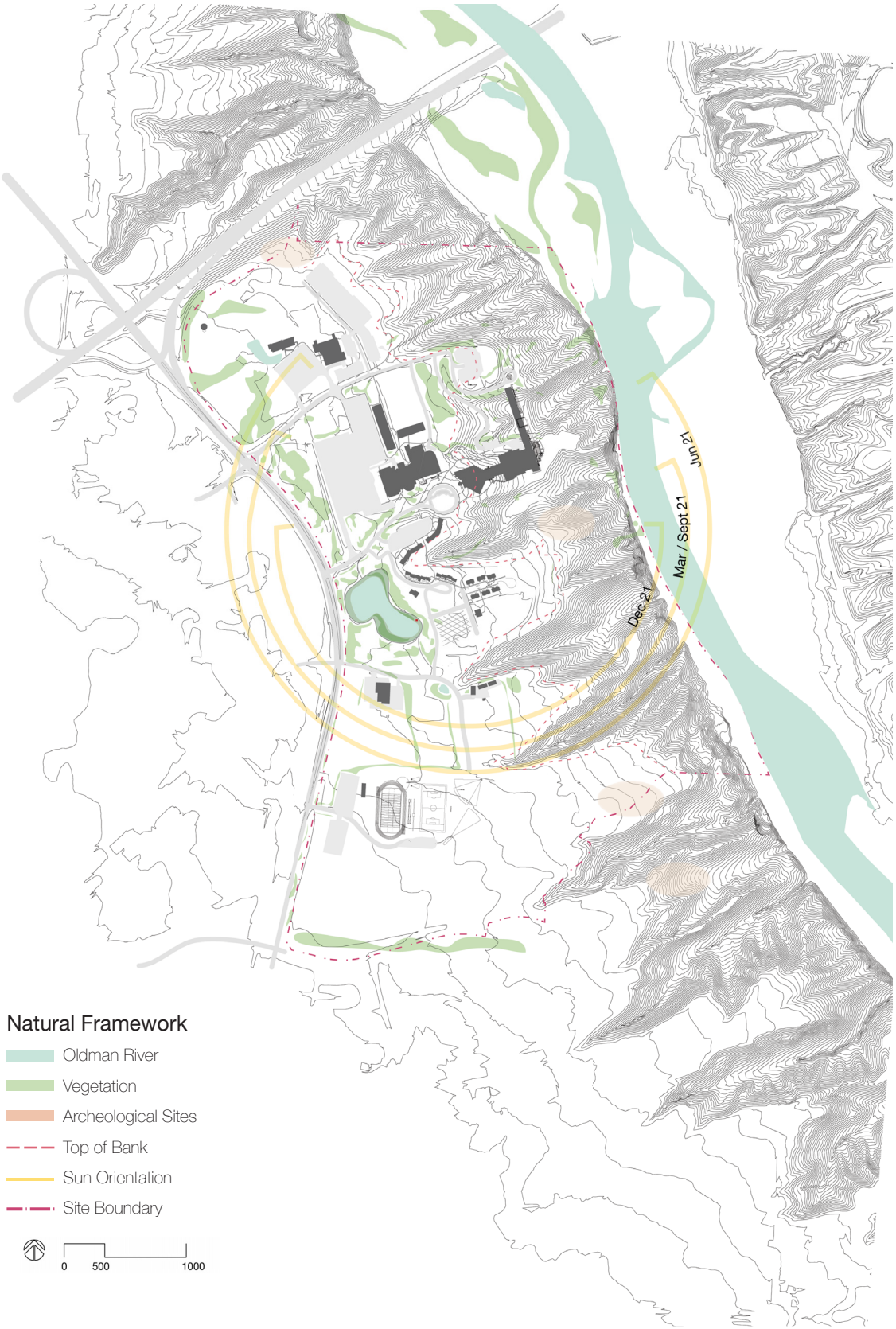
University of Lethbridge Site Plan. From University of Lethbridge University Campus Master Plan: A Vision of Our Core Academic Lands.

90 Ibid., 44..

Natural Framework

The physical environment that surrounds the University Campus has played a fundamental role in the way the campus was initially oriented and the way it has developed. The University is situated on a landscape of prairie grasslands and undulating coulees, which slope down to the Oldman River. “The coulee landscape has also provided the University an integral cultural component with several archeological sites located at the top of several promontories. These sites show that approximately 5,000 to 3,000 years ago people permanently settled in this region.”[91]

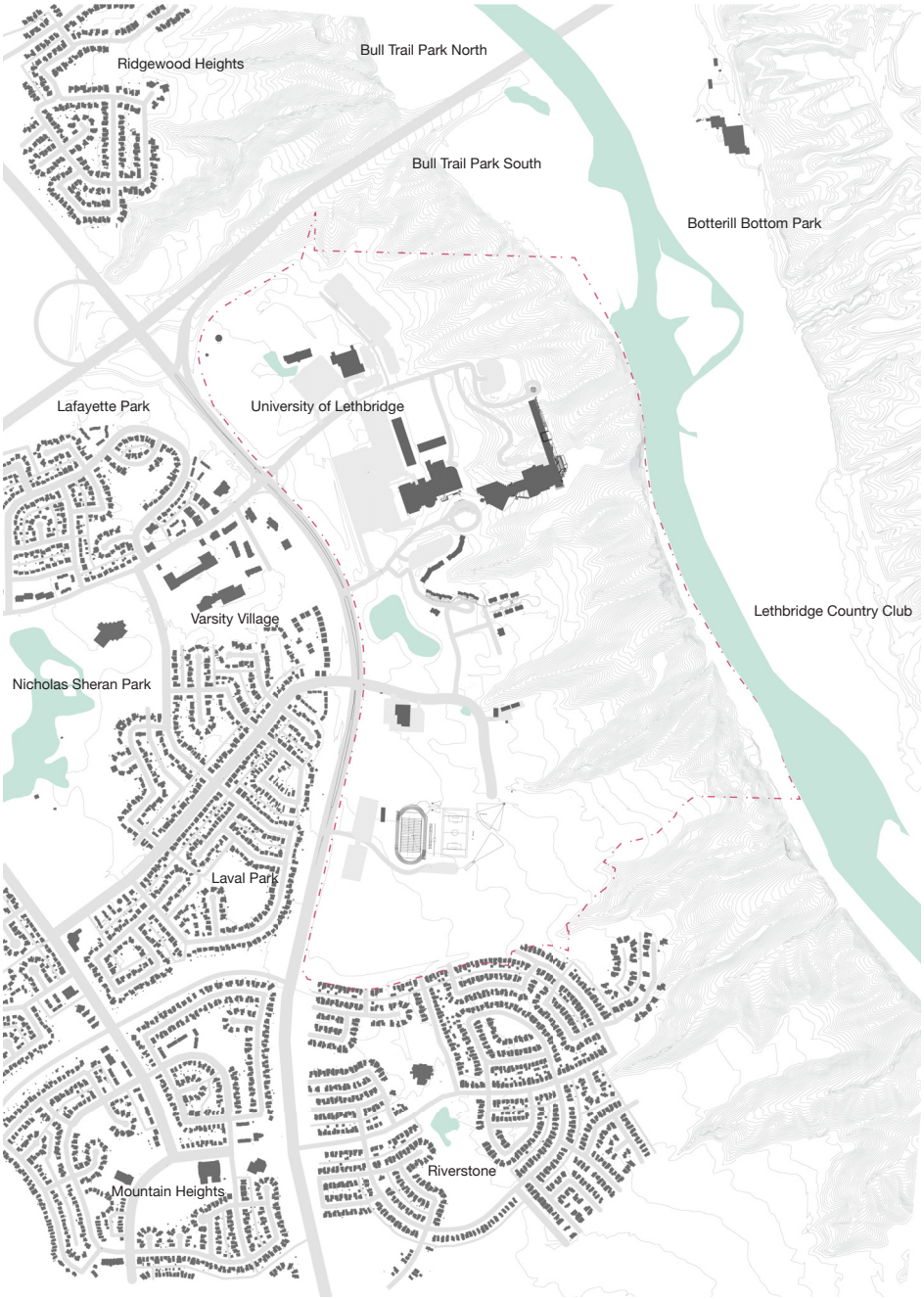
91 Ibid., 42.



Natural framework map illustrates the correlation between the physical environment and the orientation of the campus; data from The University of Lethbridge University Campus Master Plan

Broader Context

The University of Lethbridge is situated along the west side of the river valley. The surrounding neighborhoods are predominantly low-density residential, with a few apartment buildings and commercial nodes dispersed along University Drive.[92]



This map shows the highway and river basin that frame the campus on the east and west and the residential neighborhoods and parks that surround the campus.

92 Ibid., 47.

Buildings (size, uses, age)

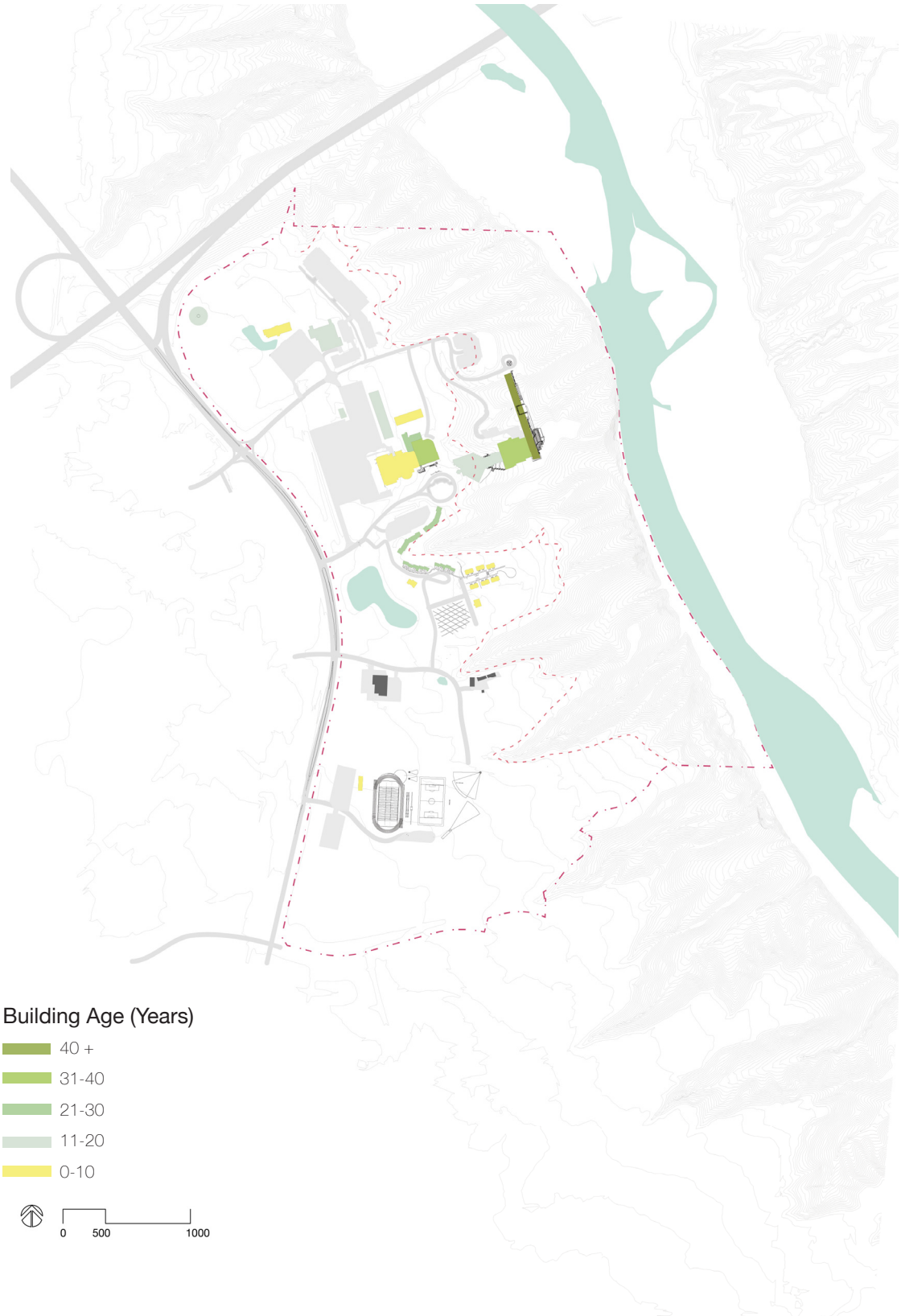
80% of the buildings on the campus are less than 20 years old resulting in the majority of the buildings being in good condition.

University Hall is the largest building on campus. As the campus began to evolve many of the buildings continued to reflect the architectural brutalism seen in the Erickson-Massey design; small punched windows, low horizontality, concrete and glass cladding, and expansive building footprints are common architectural characteristics that are visible in many of the campus buildings. Over the years the campus expanded further west away from the undulating coulees, which in turn resulted in a new architectural typology. Newer buildings encompass contemporary metal and composite cladding systems and smaller footprints rising three to four story's above the prairie landscape.[93]

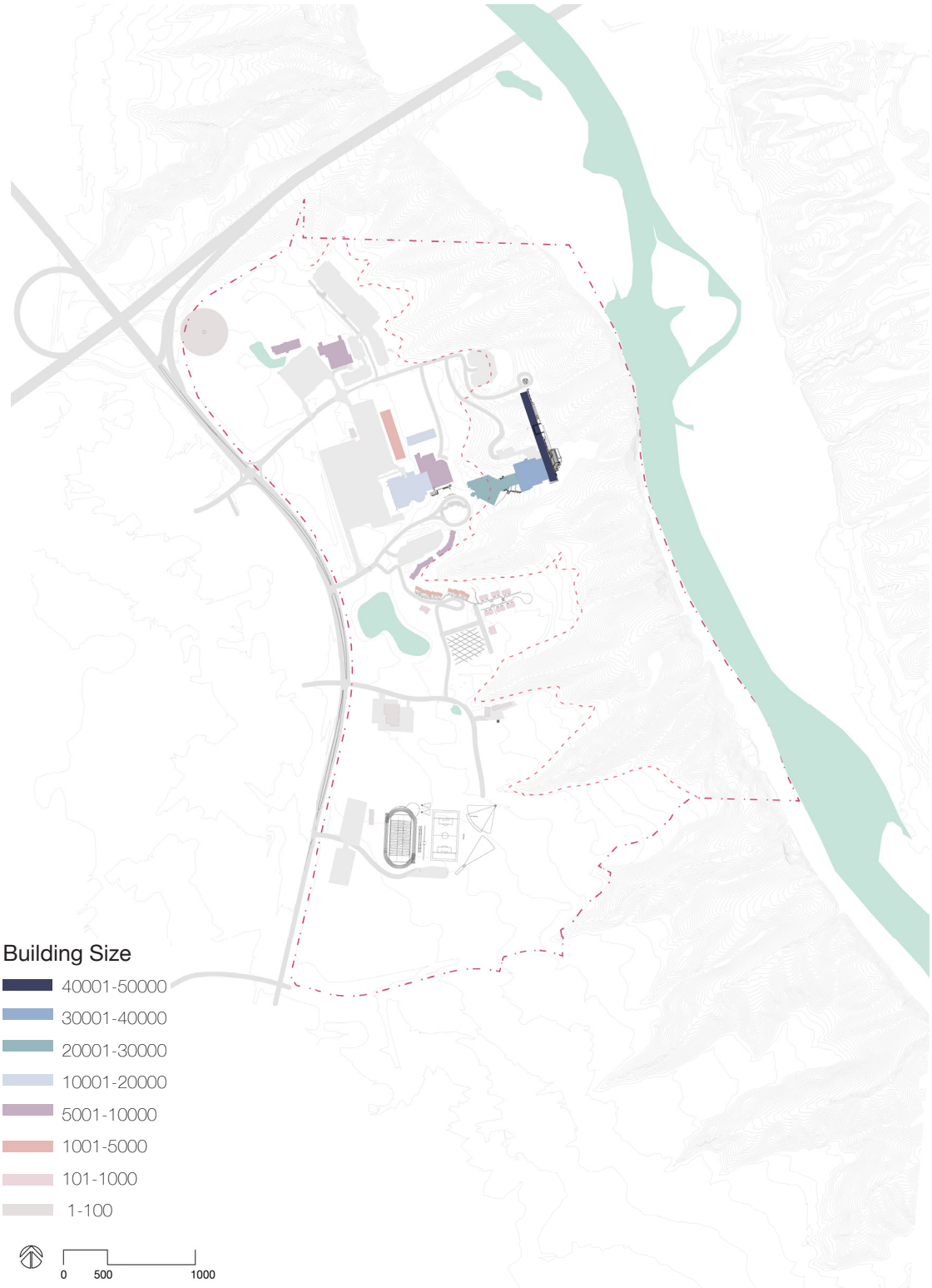
The campus has been organized into four distinct zones: research, academic, residential and athletic.[94]

93 Ibid., 44.

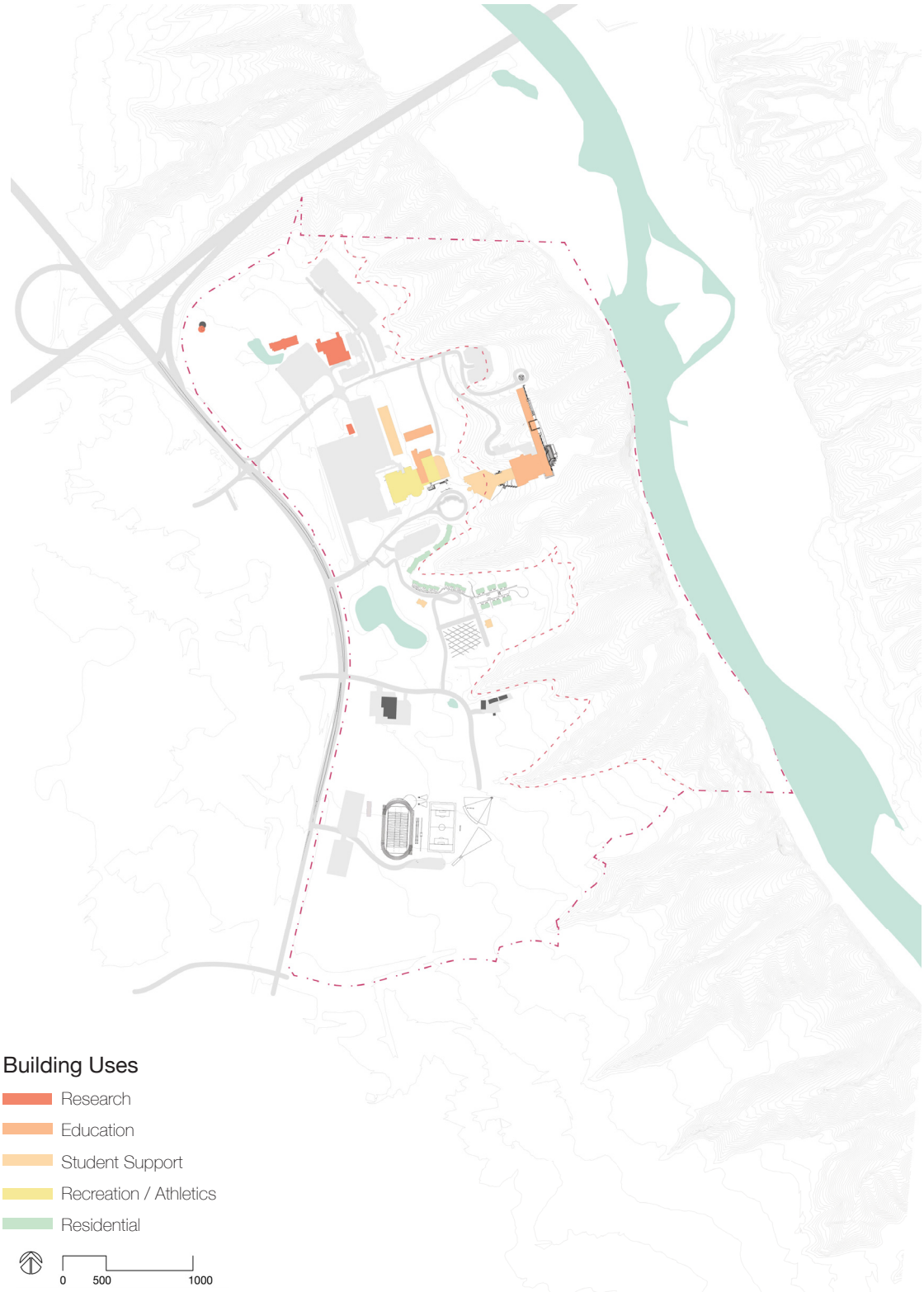
94 Ibid., 52.



This map indicates that most of the buiding on the campus have been built within the last 10-20 years, only a few of the buildings are more than 20 years old; data from The University of Lethbridge University Campus Master Plan



This map shows the relationship between the size of the buildings footprints and the landscape on which they are built. Buildings constructed along the east side of the campus have larger more spread-out footprints to respond to the dramatic changes in topography while, buildings with smaller footprints have been built along the west side of the campus where the land is more flat; data from The University of Lethbridge University Campus Master Plan



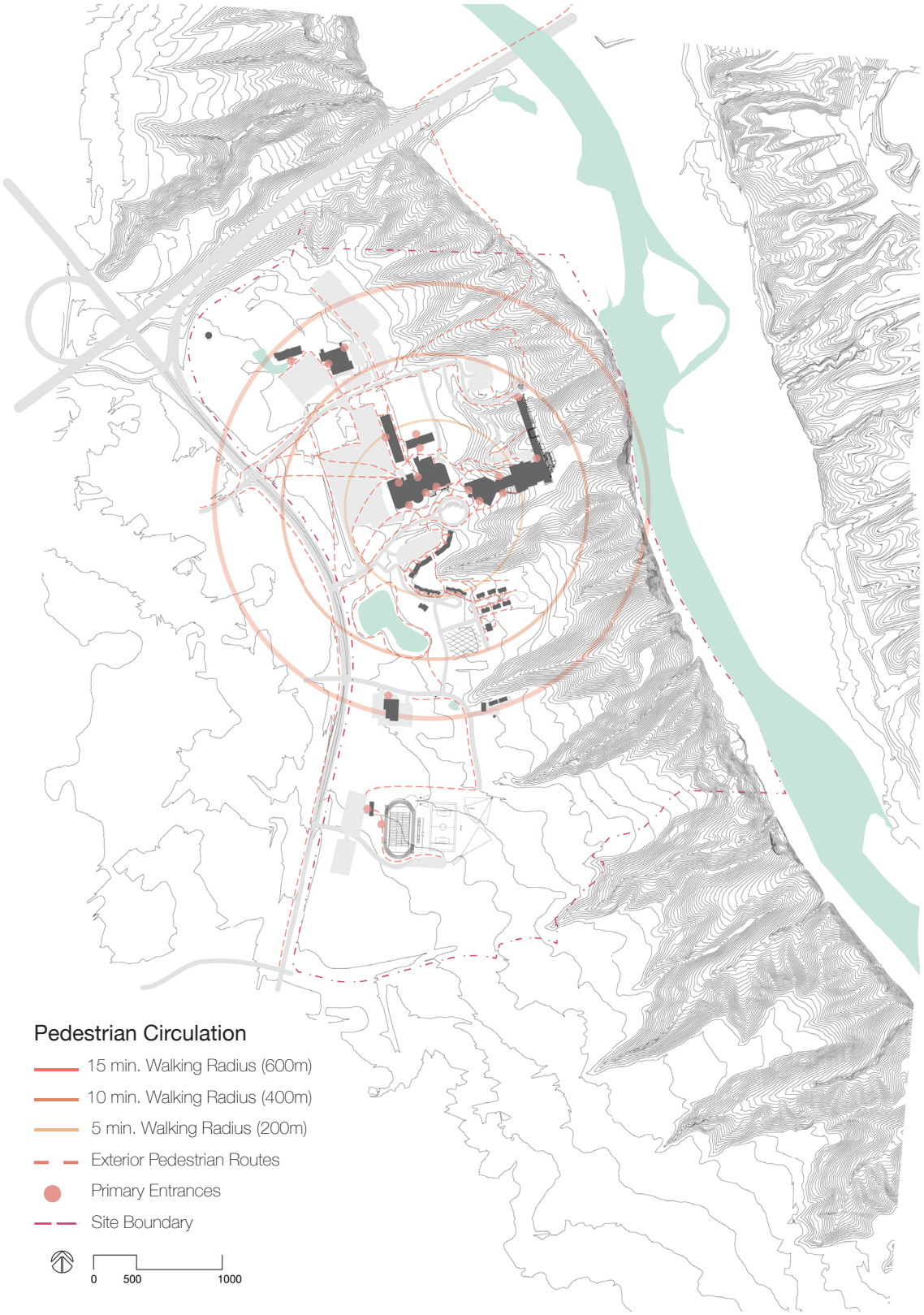
This map illustrates the four dominant sectors of the campus: research, academic, residential, and athletic. Student Services are located centrally within the campus; data from The University of Lethbridge University Campus Master Plan

Access and Circulation Systems (vehicular, pedestrian)

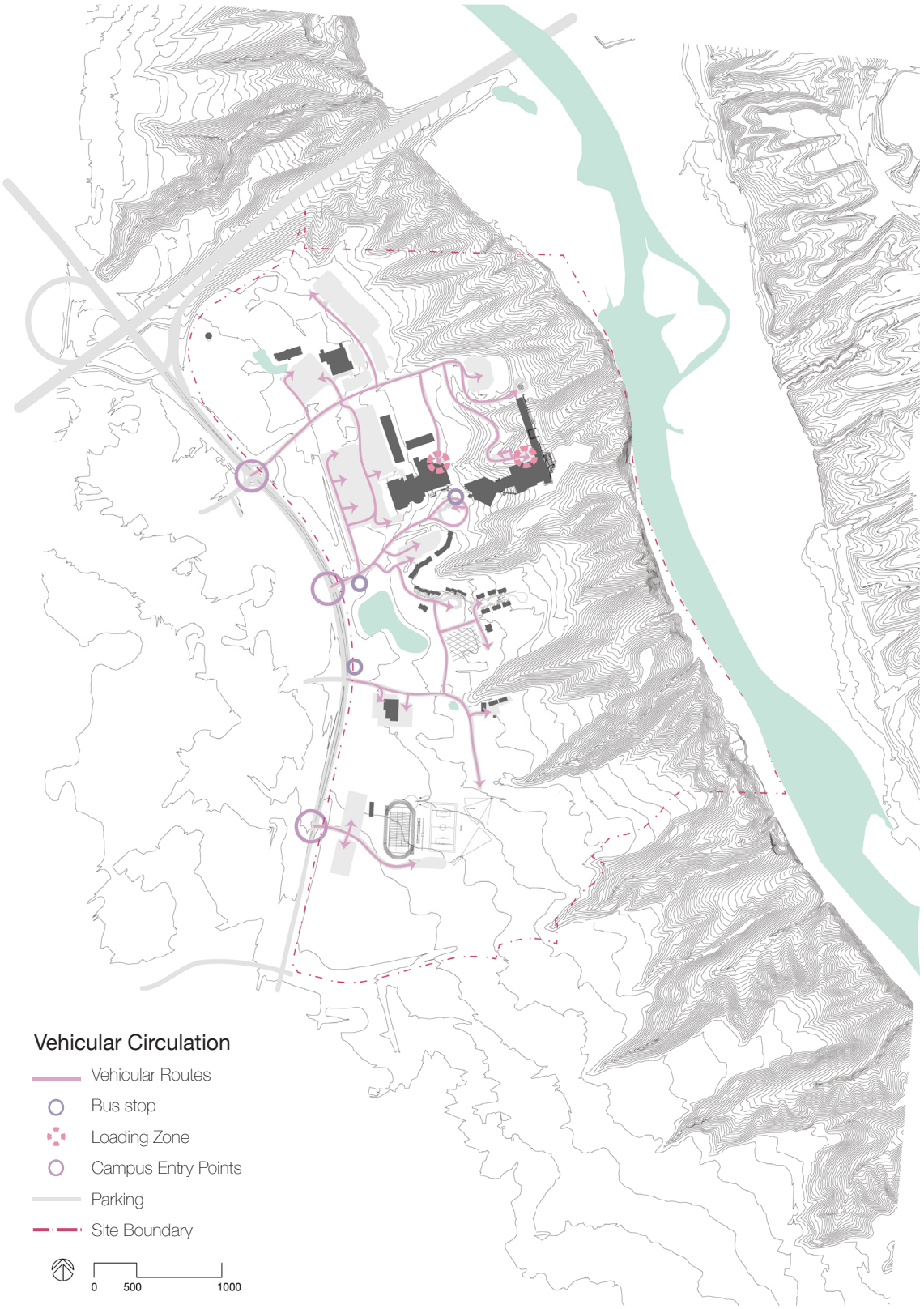
"Generally a campus plan should be organized so that a maximum walking time of 10-minutes is allowed for students to walk from destination points. The 10-minutes walking time relates to a 400-meter walking distance."[95] Currently there is an absence of connectedness between campus buildings due to an imperceptible pedestrian pathway system. It is critical that the campus become unified through a strong pedestrian path network. However, it is also important the campus is interconnected to the city, which can be achieved by linking the campus pathways to the recreations pathway system of the Oldman River Valley. The majority of vehicular traffic coming and going to the University is from Valley Drive West. Parking lots are primarily situated at the west end of the campus with the exception of a few small lots dispersed throughout the campus.[96]

95 Ibid., 44.

96 Ibid., 52.



This map illustrates the existing pedestrian circulation conditions, most of the academic buildings have been constructed within a 15 minute walking distance from one another; data from The University of Lethbridge University Campus Master Plan

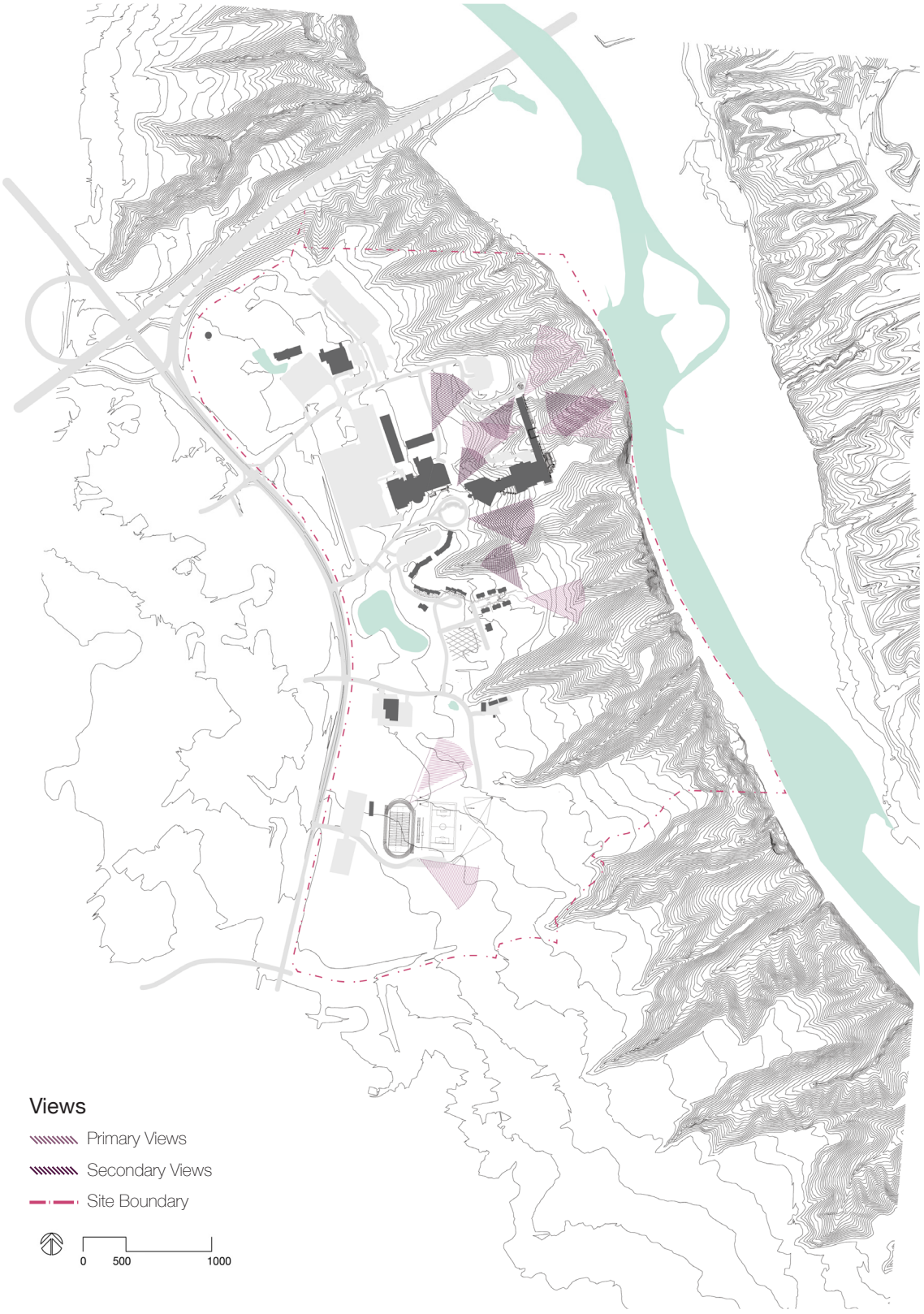


This map illustrates the existing vehicular circulation and parking lot conditions of the campus; data from The University of Lethbridge University Campus Master Plan

Views

The prairie landscape incorporates the vast majority of land around the university. It also unveils the dominant feature of the coulee edge, which is not visible until one approaches the river valley. From the edge of the coulees one has a remarkable vantage point of the entire river valley; the cottonwood and poplar trees line the shore line of the coursing Oldman River and in behind are glimpses of the extensive natural parkland. To the north of the campus are views of the Canadian Pacific Railway Bridge the longest and tallest trestle bridge of its kind, in the world. It spans across the Oldman River a flat track that draws your eye horizontally across the prairie. Directly east of the campus across the river valley are views of the cities downtown core and surrounding neighbourhoods.[97]

97 Erickson/ Massery Architects, *Development Plan: University of Lethbridge*, 16..



This map indicates the existing viewpoints from the campus to the city. Primary views should remain uninterrupted as they are a crucial means to connect the campus to the unique natural landscape; data from The University of Lethbridge University Campus Master Plan

CHAPTER 3: DESIGN

Program Integration

The centre for horticulture and education will use urban gardening programs to promote a more health conscious lifestyle in Lethbridge, Alberta. The centre will act as a landmark where people are able to find a balance between the natural and constructed environments that surround them. When visitors come to the centre they will be able to explore and discover how reliant we as humans are on the natural environment and find inspiration to adjust their lifestyle in order to give back and preserve natural landscapes. The gardens provide hands on learning opportunities about how to grow vegetables, fruits and herbs, and simultaneously bring consciousness to contemporary sustainability practices and modern local food movements in Alberta. This will be the first facility in Lethbridge to promote and educate citizens on the importance of sustainable, intensive agricultural practices. Overtime this example of urban gardening and education may be adapted and implemented into schools, post secondary institutions, and cities throughout Canada.

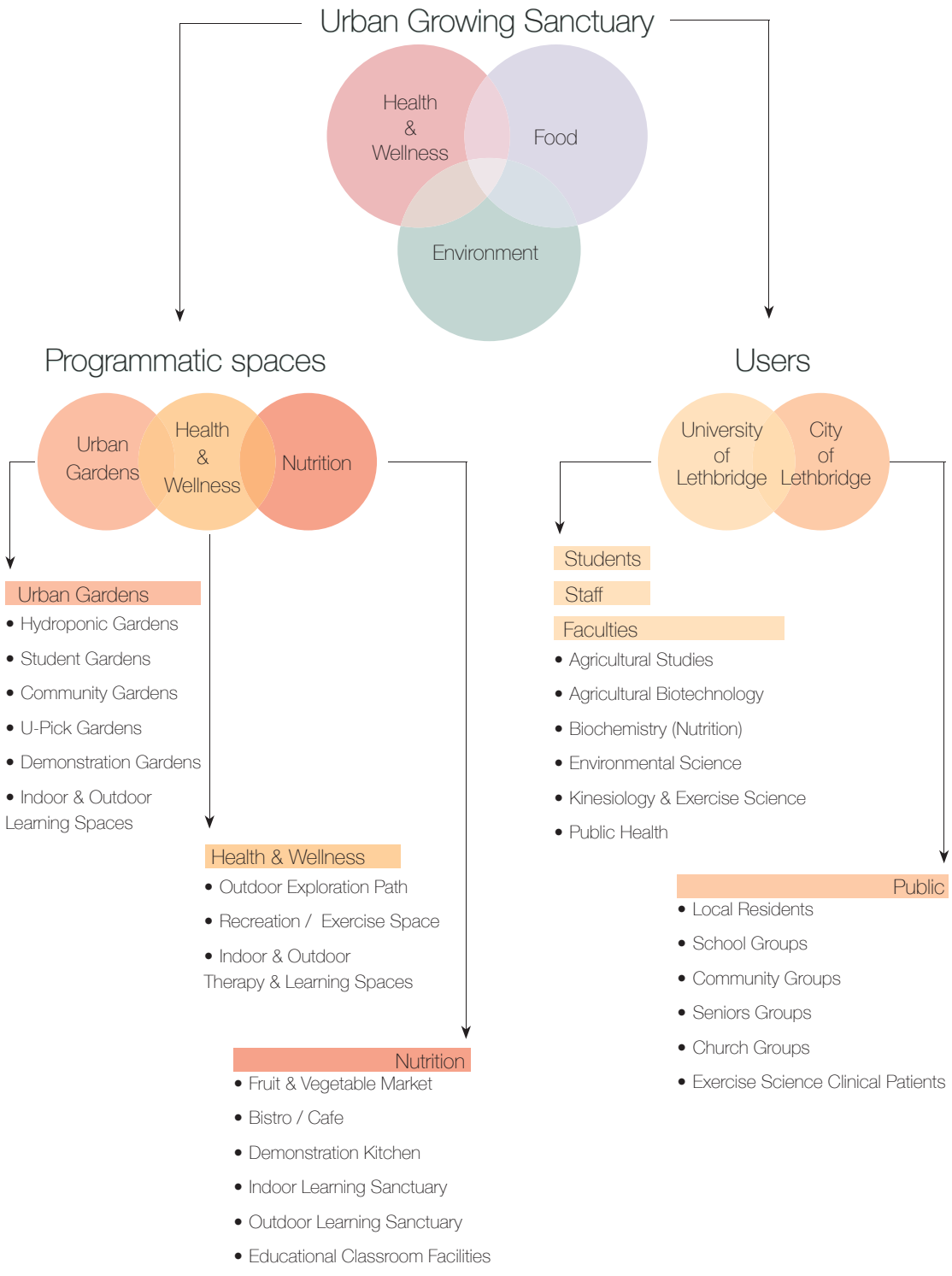
The proposed centre will create a new opportunity for the University of Lethbridge to begin invaluable research into plant production and conservation and examine the dynamic relationship between food and health. This facility will help strengthen the relationship between the University and the local community through the production and consumption of fresh local food. The facility is designed to host a variety of functions that will engage and educate citizens about food and health. The community user and school groups have the option to attend lectures and seminars, visit the interactive exhibits, participate in hands-on workshops in the terraced gardens or field plots or purchase their weekly produce from the hydroponic market. The hydroponic vegetable market, outdoor gardens and learning spaces permit cross pollination of knowledge to occur between, generations, cultures, and disciplines. Implementing a site within the city that advocates for environmental conservation, access to organic local food, and proper health, will improve the well being of users and in turn the overall community.

Users

There are primarily two user groups who will use the facility, the students and faculty of the university and the general public. Each of the user groups will be able to utilize the centre to learn about urban growing practices and reconnect with the land that produces their food. Through direct interaction with the various gardens users will be able to learn about the importance of interacting with the land. As an educational facility, the centre has the capability to use urban gardening as a means to empower and connect users with the public through projects that reach out into the greater community.

The centre will be accessible to all members of the community and will offer horticulture based programs that are designed for everyone from seniors, to families, to school groups, to gardening clubs etc. Specific programs will be set up to offer horticulture skills specializing in terraced planting and hydroponics. The opportunity to gain knowledge and vocational skills can positively impact people lives who have been less fortunate or who have been affected by disability, or those who are often socially excluded and need encouragement to move on with everyday life. The horticultural center is meant to be all-inclusive; it's not simply an academic facility that is restricted to university students and staff.

University students and local urban farmers maintain the gardens to be visually appealing and engaging to help create a memorable learning experience for students and visitors. The horticultural building is centrally located within the cities river valley and connects to various outdoors pathways. Therefore, the centre becomes an excellent location for walking, hiking, running or cycling groups to gather before or after their exercise session in the coulees to learn more about health and wellness by exploring aspects of the center, which focus on nutrition.



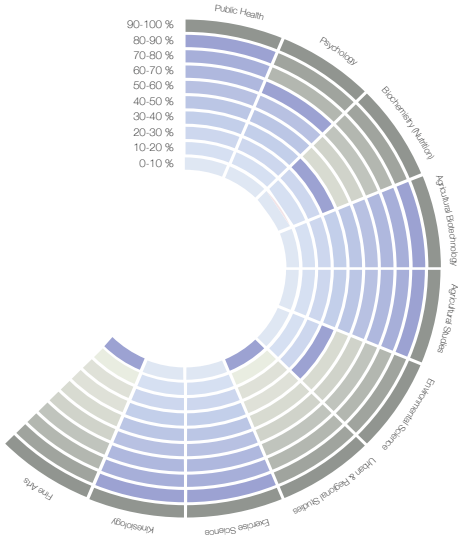
Initial Program diagram, evaluating different streams of disciplines, users, and required spaces.

Spaces

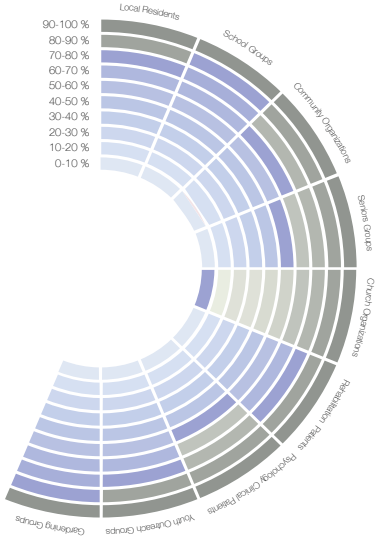
Students and professors will utilize indoor classrooms and laboratories to create and improve growing techniques specifically for Southern Alberta's climate. The open concept of the plan allows spaces to be multifunctional; they can be easily converted from exhibition spaces to spaces for workshops and special events. The open concept encourages users to meander at their own pace through the interactive exhibits that visually demonstrate the value of plants for food, medicine, and materials. The exhibition spaces are designed to engage and teach users about the various ways that plants are incorporated into a larger framework of ecosystems, which in turn provide humans with clean air, and unpolluted water.

The hydroponic market allows people to personally interact with their food and pick their own fruits and vegetables straight off the vine, or right from the soil that they are grown from. By creating an opportunity for people to engage with their food right at the source of production, I believe they will place a higher value upon the food they choose to consume. By changing the way people perceive, purchase, and consume food we will begin to see an overall change in the health of society. Cases of obesity, high blood pressure and cholesterol, diabetes, and other food related illnesses would drastically decrease once we change the way we think about food.

The stunning outdoor gardens are spaces where people can relax and take refuge from the hustle and bustle of urban living. These distinctive outdoor spaces can be used as outdoor classrooms for schools, after school programs, summer camps and the surrounding community to partake in hands-on learning. The cultivated and natural gardens exemplify how a healthy environment has the ability to improve people's lives. It is integral that we nurture the natural landscapes that surround us and rejuvenate our cities greenspaces to help combat land deprivation, pollution, diet related illness, and poor nutrition.

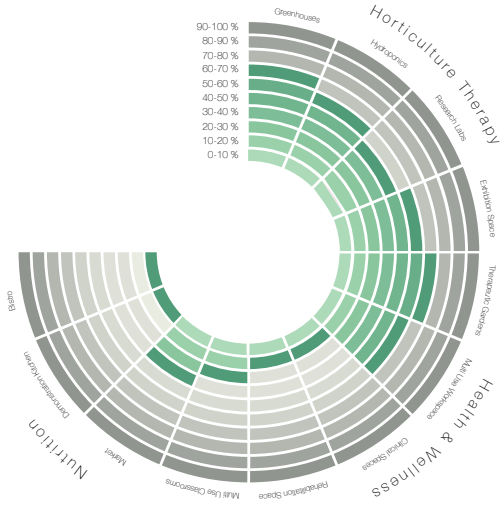


Faculty User Groups



Community User Groups

Outdoor Spaces



Indoor Spaces

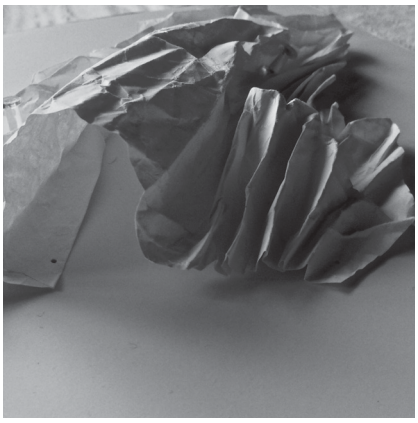
Initial Program diagrams depicting the estimated percentage of users and the appropriate programatic spcaes for each user group (community mememberes and university faculties).

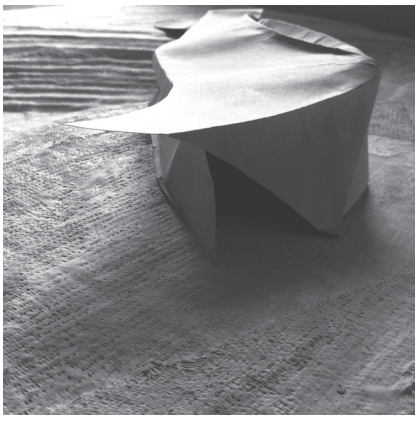
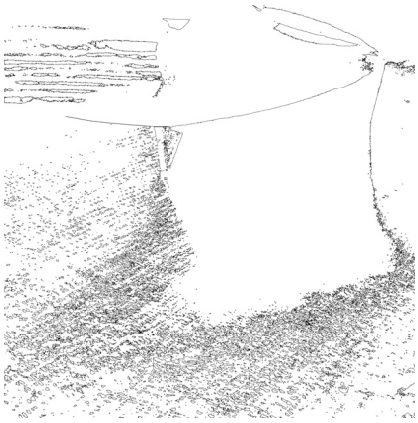
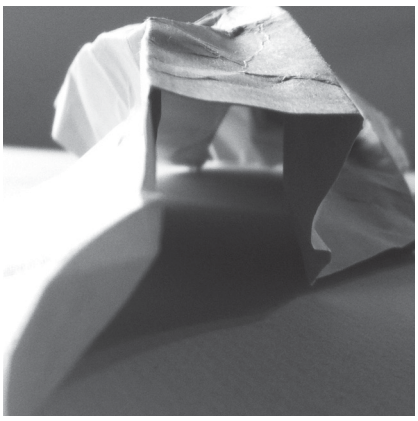
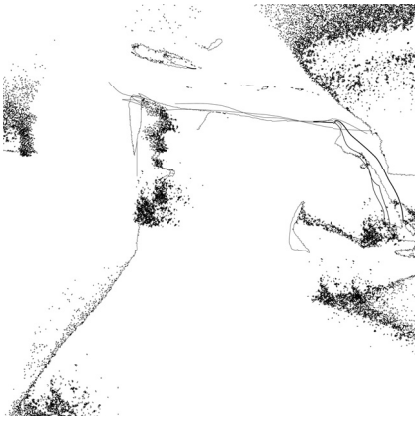
Formal Translation

In order to understand how the proposed architecture and surrounding landscape could become symbiotic and speak a similar language, I developed an exercise, which allowed me to determine where elements of synergy could be established between the two. Through experiments and manipulation of folded paper models I was able to mimic characteristics of the Oldman River Valley and then carefully examine distinct pieces of the models in order to draw conclusions in regards to how features of the landscape could influence architectural elements of the building. The River Valley that cuts through the city of Lethbridge is a vital component to this thesis and it is necessary that the architectural design not only reflect elements of the natural habitat in which it will reside but that is able to harmoniously connect to its natural surroundings. The landscape needs to be incorporated into the building just has as the building is be integrated into the site.

Inhabitable Space

By creating larger folds in the model, spaces were revealed as tunnels and openings, which represent sheltered area's for habitation.

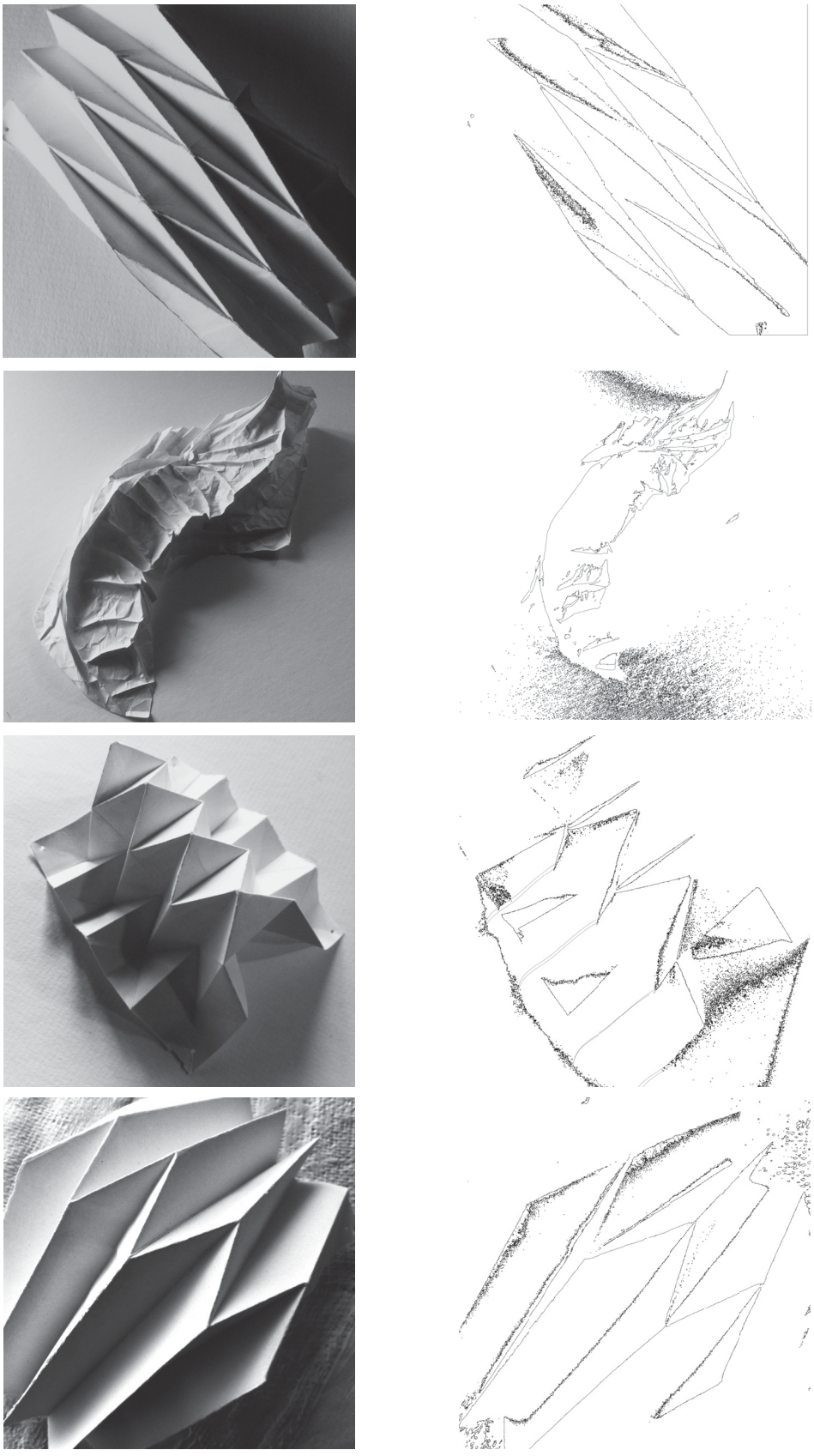


Inhabitable space series. Model photographs and drawing studies.

Water Collection and Drainage

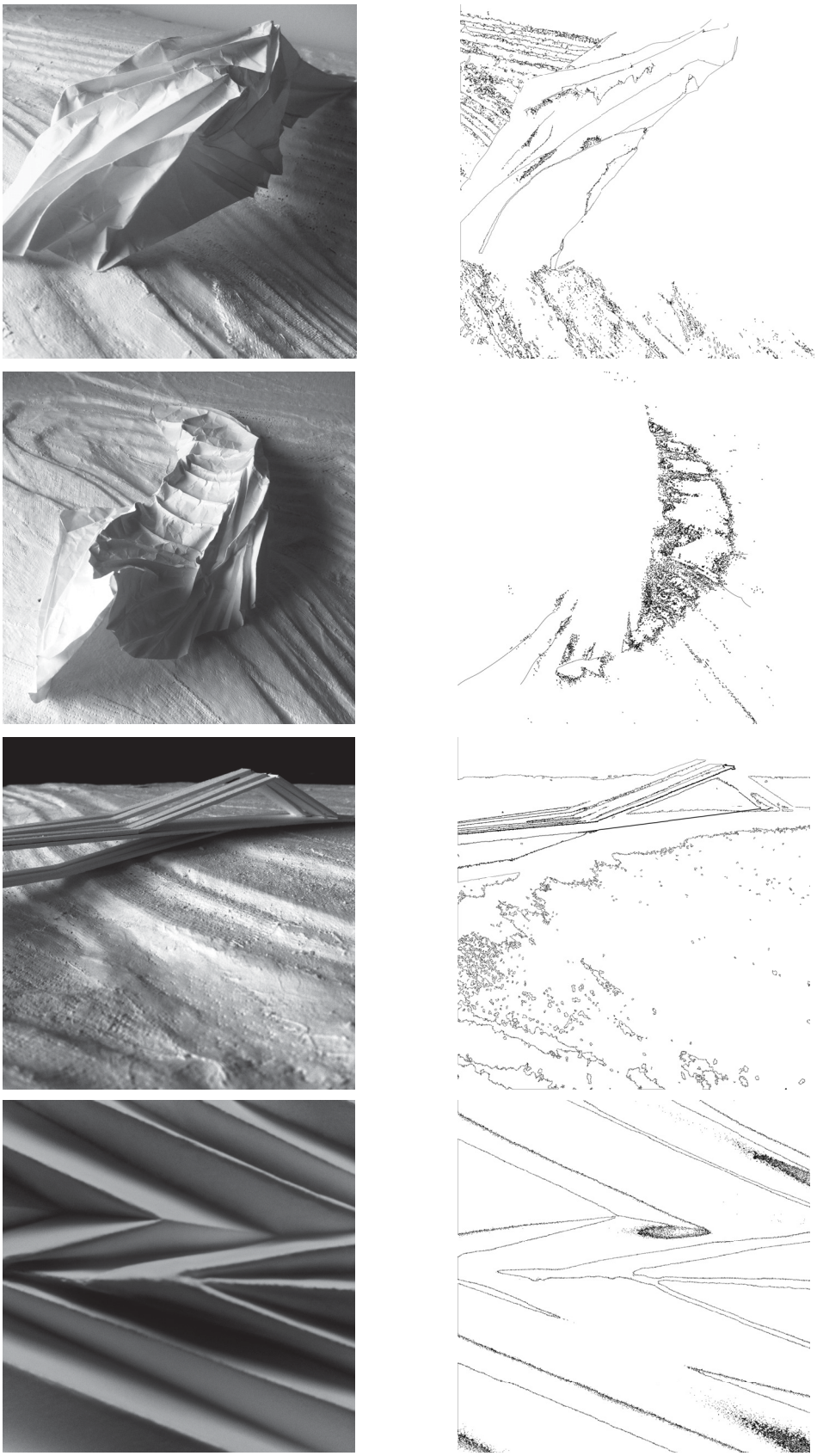
The folded models abstractly represent the peaks and valleys, of the Oldman River Valley. An instance where the land dips down to create a valley is where water tends to collect which results in small zones rich with vegetation. By examining the landscape through abstracted models it becomes evident as to how the architectural design must also properly collect and manage storm water and precipitation.



Water collection and drainage series. Model photographs and drawing studies.

Spanning a Distance and Uninterrupted Circulation

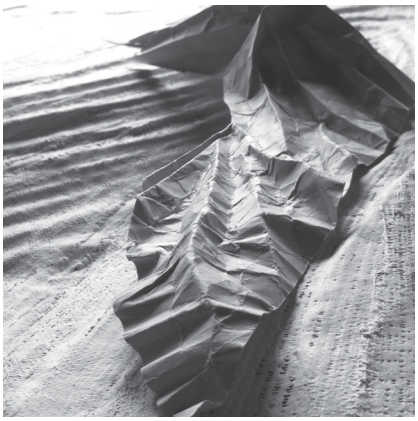
The ridges created by the folds in the paper demonstrate how the model is able to be self-supporting. The building also incorporates a spine like structure to allow the architecture to contract and expand when necessary and span between the peaks of two coulees. The structural vertebra helps create gentle curves, which translate nicely into the architecture of the building. The building is able to become a continuous extension of the landscape before it gracefully sweeps across a valley and plants its self back onto the ground. The idea of peeling away a layer of the land informed the design of the green roof, which allows users to move without interruption between the outdoor gardens and the building.

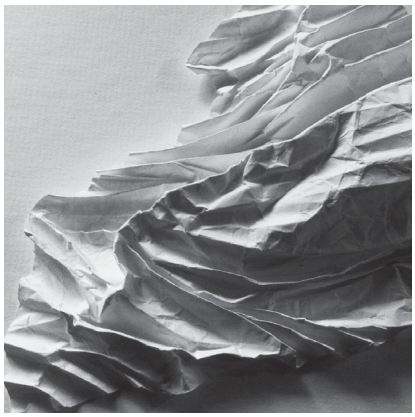
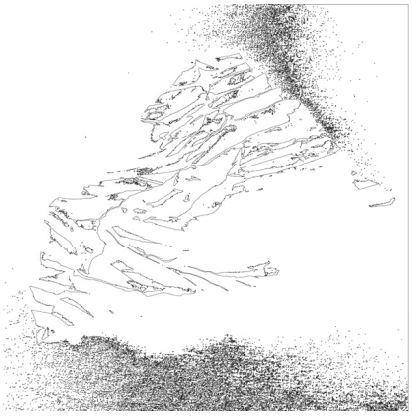


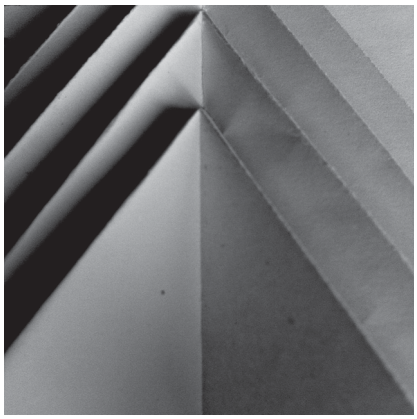
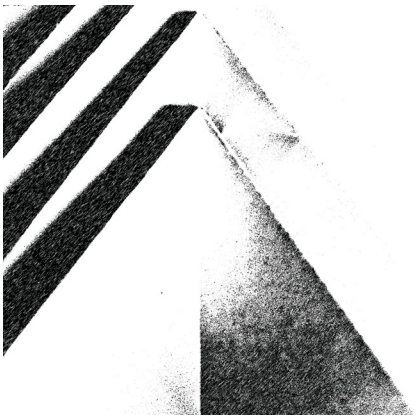
Spanning a distance and uninterrupted circulation series. Model photographs and drawing studies.

Conforming to the Landscape and Terracing a Slope

By abstracting the folded models through photographs and drawings, the high and low points in the models become clearly evident and help illustrate how drastically the topography of a landscape can change and how important it is to be sensitive to the changing elevation by creating a building that takes queues from the land by conforming to it, instead of taking a more drastic approach which would conform the land to the building and in turn destroy the existing environment and ecosystems.



Conforming to the landscape and terracing a slope series. Model photographs and drawing studies.

Landscape Design

Two key principles of the proposed design:

1. Encourage Health and Wellness

University students, staff and local residents will be able to benefit physically and psychologically from the productive urban gardens and educational workshops that have been established in the master plan. The campus garden will become a positive outlet where residents will be able to improve their overall health through recreation, nutritious food, and social interaction. The diversity of the universities productive urban growing strategy will appeal to people of all demographics and be made accessible to the general public. The educational horticultural center will become a sustainable piece of infrastructure that will optimize the wellbeing of Lethbridge residents. The center will provide access to healthy food and increase the community's participation in physical activity through the various interactive productive greenspaces.

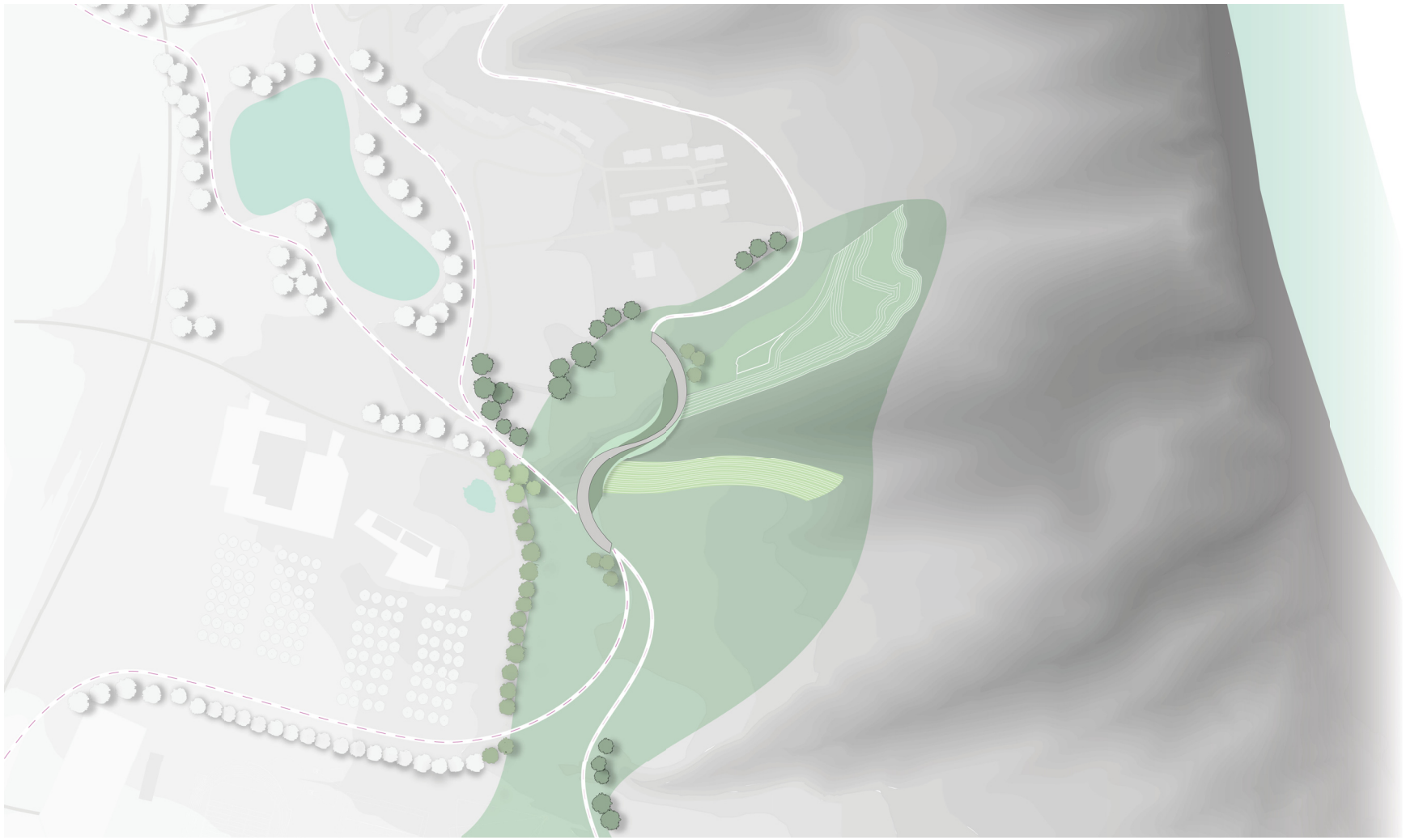
2. Enhance existing greenspace

Urban agriculture and recreation will become integral elements of the cities sustainable infrastructure system. The design will strategically interweave the existing environmental conditions with a new program that will promote productive greenspace within the city. The design has a minimal ecological footprint ensuring that there is no negative impact to the existing landscape and simultaneously conserves and protects the coulees natural habitat. The productive greenspaces will beautify the campus and help connect isolated and disengaged areas of the existing campus. The master plan will create a unique urban greenscape that merges the built environment with the natural environment, the recreational parkland, and the agricultural terrain.

This infrastructure strategy will maximize the amount of productive greenspace at the University of Lethbridge campus, and provide local and university residents with sufficient land to develop and practice small scale urban farming.

Planting Plan

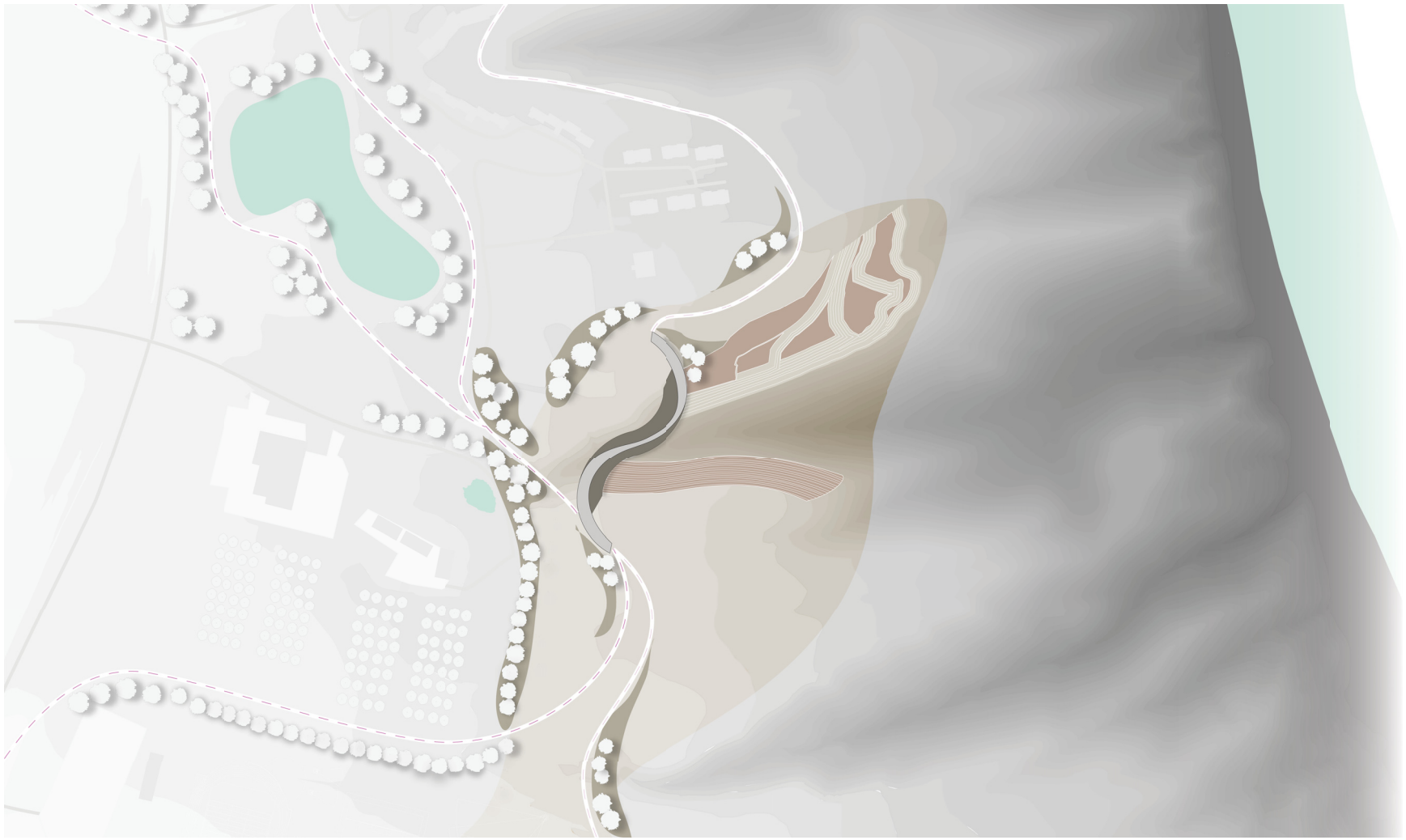
The design of the horticultural center will incorporate an exciting multifunction landscape design that will embrace the existing natural vegetation as well as the new productive and edible plants. The overall landscape design of the gardens will welcome visitors to explore and wonder through gardens that have been inspired by native plant species as well as productive gardens and terraces that are full of various edible plants and vegetables. The horticultural design demonstrates to users that native plant species combined with edible plant species have the potential to create a dynamic ecological system that is appropriate for the climate, multiple seasons, and unique topography of Lethbridge, Alberta. The flatland areas of the site incorporate native grasses and herbs, which exemplify the natural prairie landscape. Agricultural terraces are able to follow the existing contours of the coulees to harmoniously balance the natural and cultivated landscapes. The terraces will help mediate any future erosion or slumping of the coulees, they will help filter and control storm water, and they will provide stable ground for planting, growing, and harvesting fruit and vegetables.



Planting Plan

Soil Recuperation

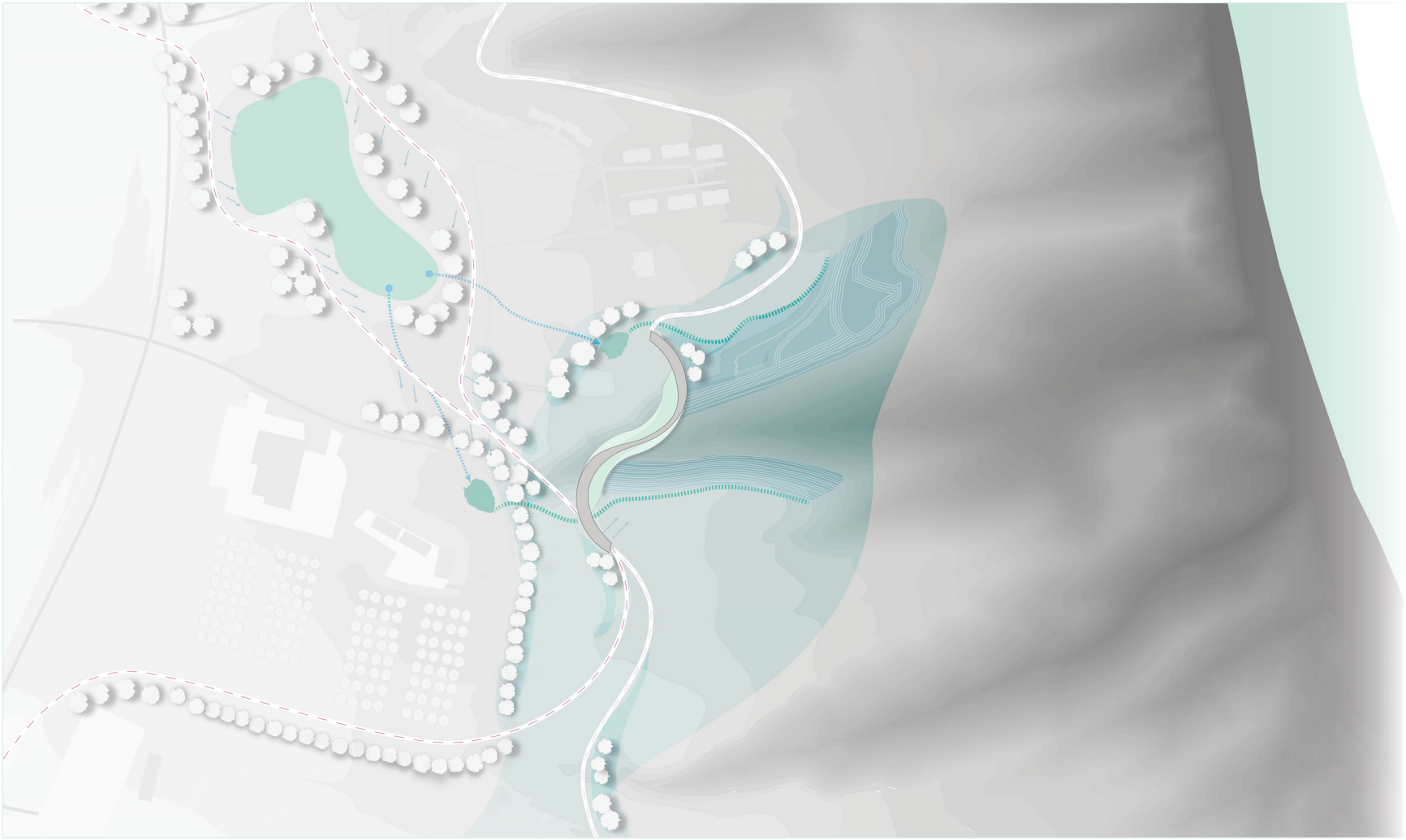
Specific soil typologies are strategically integrated into the design to support each unique garden. The bio-infiltration basins soils absorb and filter pollutants to provide uncontaminated water for the gardens and agricultural terraces. Structural soils are placed along the terraces to provide proper support while permitting root growth. Planting soil is incorporated into the gardens and agricultural terraces to provide adequate nutrient levels and the proper PH balance for edible and non-edible plant species.


Prairie Valley Soil
Vegetable Garden Soil
Structural Soil
Tree Soil
Extensive Growing Medium

Soils Plan

Water Management

Storm water management and water collection is integral to the overall success of the horticultural design. The green roof and planted elements are critical components of the site design. The extensive green roof collects and manages water as it's directed into the bio-infiltration basins where water is retained and later distributed throughout the gardens and terraces.



Water Management Plan

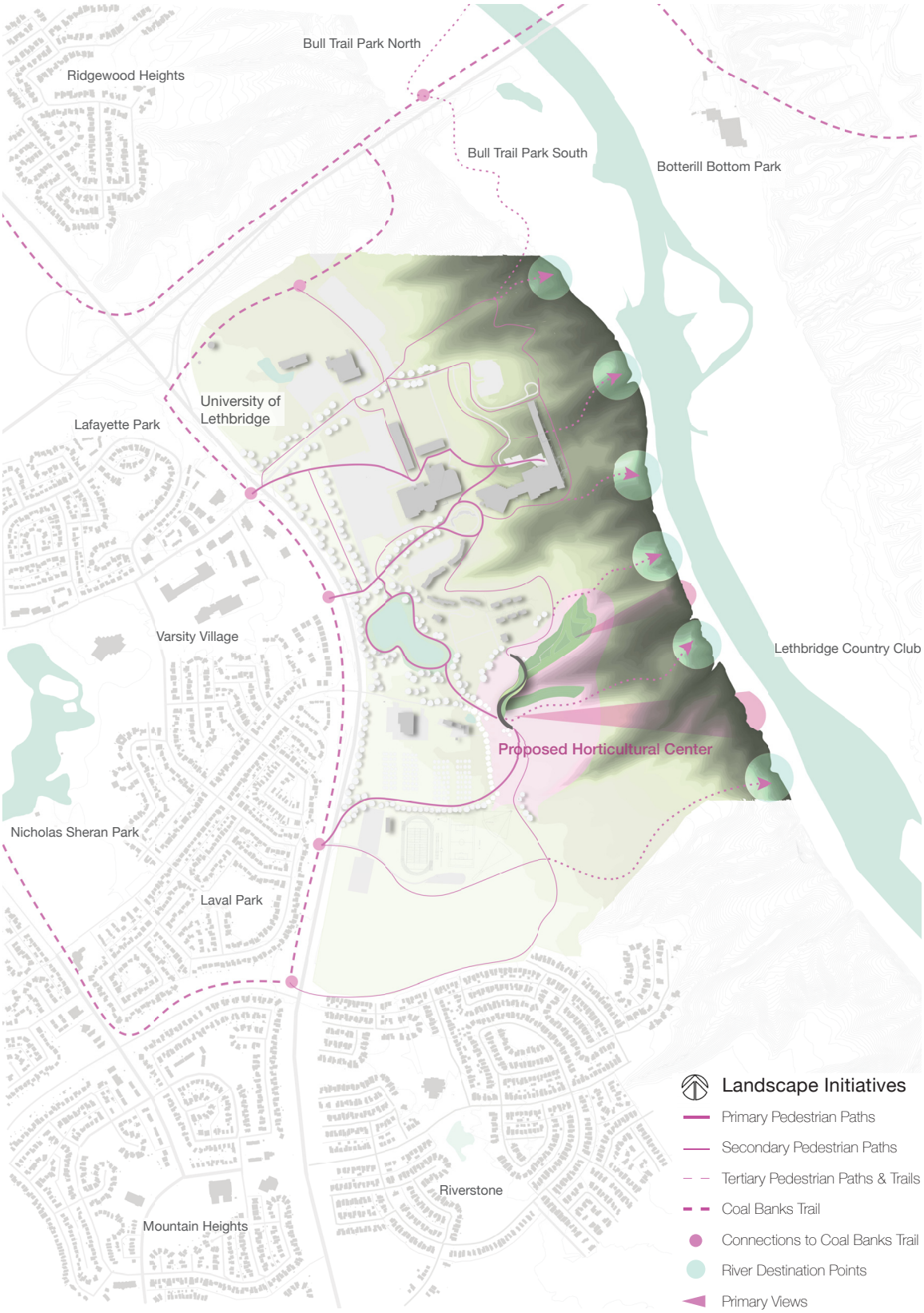
Connections to the City

The design will rehabilitate and revitalize the campus by making the greenspaces more accessible to active and passive users. The design will regenerate forgotten and underutilized areas of the campus and engage the edges of the coulees to draw in visitors from all sides of the city. The unique topography on which the campus is situated endorses personal exploration and opportunities for visitors to experience the landscape in their own way. It is important for the campus to have a primary and secondary path system. The primary path system is deliberately mapped out to provide clear and accessible circulation for all users, while the secondary path system only appears as a light trace through the landscape; it meanders up and down the coulees to allow users a more loose and adventurous means of experiencing the site. As more and more people begin to traverse the paths and trails the site will start to come to life with a combination of dynamic and animated movement.

An exclusive feature to the City of Lethbridge is the Coal Banks Trail, a 2.4m-wide district pathway that links cultural facilities and parks throughout Lethbridge. The Coal Banks Trail offers 30km of uninterrupted track connecting the west side, to the Oldman River Valley and to the south side Henderson Park and to the north side Pavan Park. The level of difficulty of the trail is rated as easy to moderate as portions leading in and out of the river valley contain steep hills and stairs. The trail is a great way to see the city and can be enjoyed by users of all types, including, walkers, runners, and cyclists.[98] By joining the campus path system to Coal Banks Trail and the extensive recreational trail-system, which runs throughout the Oldman River Valley users have a unique opportunity to explore and navigate back and forth between the constructed and the natural environments that surround them.

The network of pathways is important because they create strong connections across the campus. The path system is a crucial component to link the university to the river valley and the surrounding community. The University of Lethbridge is more than just an academic institution it is a year-round community facility, thus, it is essential that the campus have a clear connection to the rest of the city to welcome users of all demographics.

98 "Coal Banks Trail," City of Lethbridge, accessed April 26, 2014, http://www.lethbridge.ca/Things-To-Do/Pathways-Trails/Pages/Coalbanks-Trail.aspx



The master plan illustrates the connection points where the campus links back to the city and the surrounding river valley, thus unifying the campus with the community.

Connecting the campus to the city through a primary trail system.

Architectural Design

Incorporating principles of health and wellness and urban agriculture into the University of Lethbridge campus creates an opportunity to test how ecology and infrastructure can alter a community socially, physically, mentally and economically. The horticultural center and outdoor spaces are connected organically with the coulee valleys to bridge and blur the natural, built, and cultivated landscapes. Arthur Erickson had a particular outlook on building typology for the prairie landscape, in his design reports for the University of Lethbridge he made the following statement:

> To maintain harmony with the land, one must submit to its rules. One must use space generously or not at all. Buildings must grow out of the ground, clustered with other buildings or trees, but never sit blatantly on top of the ground. Forms must be simple and geometrically concise, as elaborate forms and fussy detail show as weakness… Just as the prairie landscape has been reduced to essentials, so must its buildings be as elemental.[99]

Taking inspiration from Arthur Ericson's University Hall; a building bridged between two coulees, the new horticultural center will emerge from the unique topography by bridging and terracing the undulating coulees. Glulam post-and-beam construction is used to create the simple organic shape of the building and concrete is used to ensure the foundation of the building is firmly rooted in the ground and is structurally sound.

Visitors to the center are invited to partake in the buildings 100-metre promenade that spans between two coulees along the Western side of the river valley. The curved walkway flows in harmony with the curvilinear contours of the coulees and sweeps across the valley to epitomize the dynamic movement of the surging river below. The center is situated within the zone identified in the River Valley Master Plan as "top of bank" and is primarily composed of dry prairie. By situating the building above the river bottom, minimal disturbance to the natural coulee habitat will occur. Situating the new horticultural center along the west coulee ridge will provide excellent views across the river valley as its looks east toward the city center. The proposed design will ensure maximum sunlight is available for the terraced gardens situated on the south facing slopes.

The gradually sloping green roof flows seamlessly and gracefully into the natural landscape leading visitors to the vegetated terraces and river valley below. The building

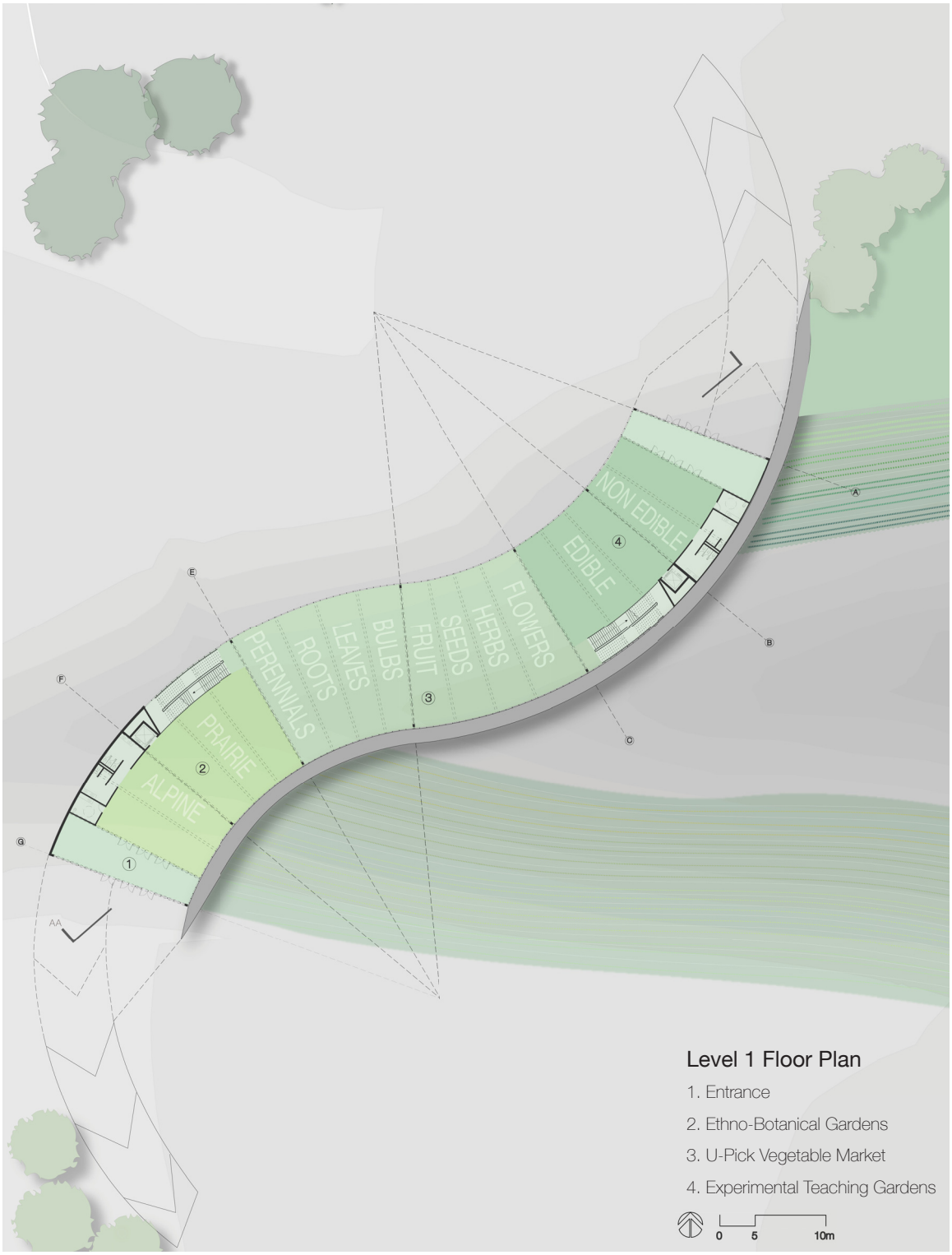
99 Erickson/ Massey Architects, *Development Plan: University of Lethbridge*, 15.

emerges from the distinct undulating topography of the Oldman River Valley and bridges the divide, which often occurs between landscape and architecture.

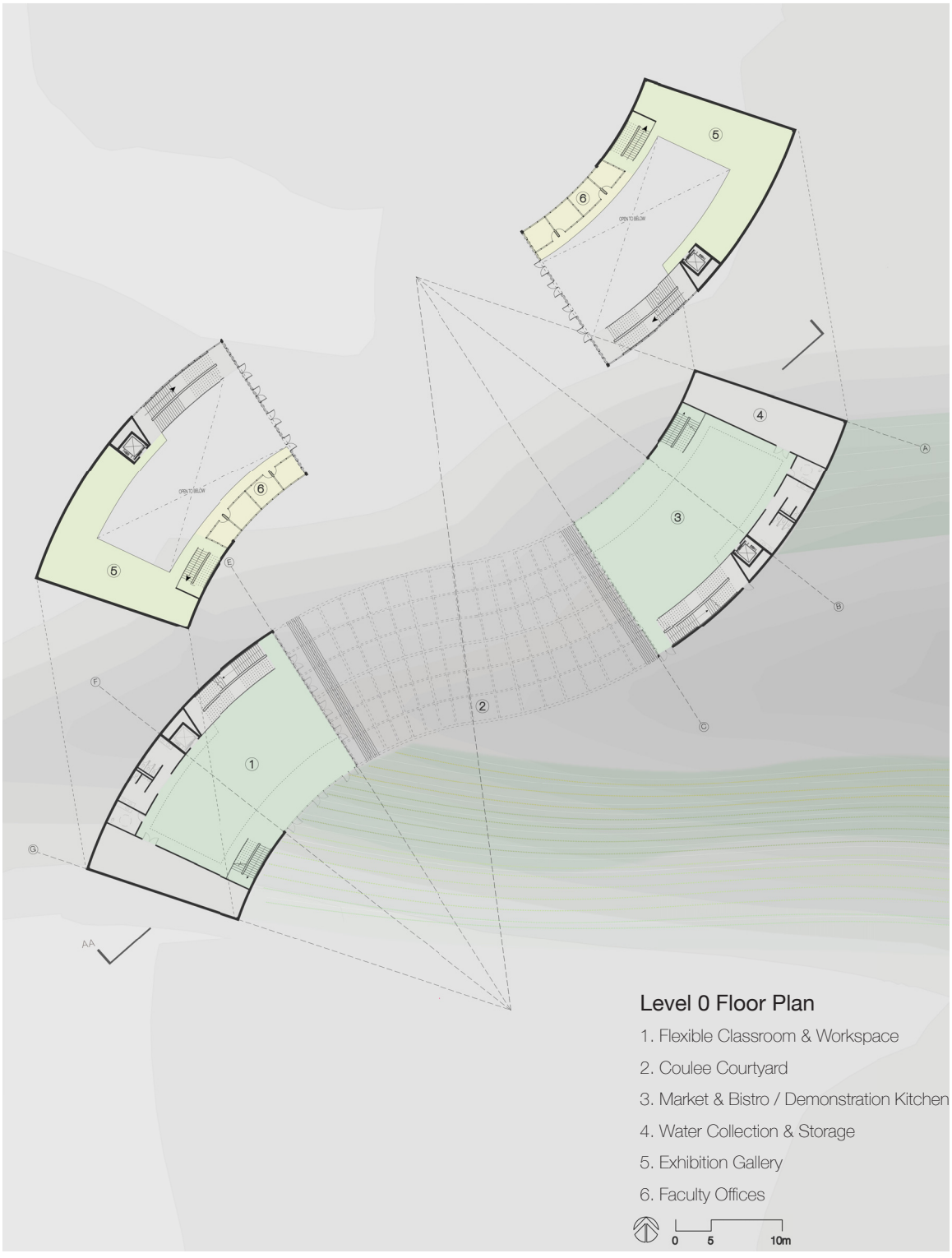
From a conceptual stand point, just as the site is composed of intertwined layers, both natural (river valley) and constructed (campus buildings), the horticultural center also interlaces ideas of the built environment and the natural landscape. The proposed design interweaves elements of nature throughout the building. The hydroponic vegetable market, the green roof, and the outdoor garden spaces are all integral to the overall design.

The proposed design is not intended to intrude upon the vastness of the coulees, but instead to mediate and balance the surrounding landscapes (built, cultivated and natural). As users begin to engage with the building, its playful nature will be revealed as visitors move from interior to exterior spaces and navigate their way through the premeditated layers of architecture and agriculture. The proposed design initiates a conversation about scale, specifically with regard to the diaphragm of scale between man and nature. In today's day and age, the dominance of mankind over nature has been of constant concern. However, the river valley, which passes directly though the urban context of Lethbridge, Alberta, illustrates that the relationship between man and nature is dynamic and complex. On one hand, the Oldman River Valley encompasses an awe-inspiring topography and is of enormous scale, while on the other hand, man's impact on the river valley is prominently evident in the residential developments, and the universities academic buildings that have been erected across the top of coulees. The design of the horticultural center inverses the scale between man and nature. To a single individual exploring the center the overall length of the bridge building may seem extensive. However, this perception of an inverted scale is re-introduced when the design is examined in relation to the surrounding context and scale of the River Valley. The design of the horticultural center exemplifies the individual layers of the natural, the cultivated and built environments of Lethbridge and also creates moments where it is appropriate for these individual layers to cross paths and merge into one cohesive landscape.

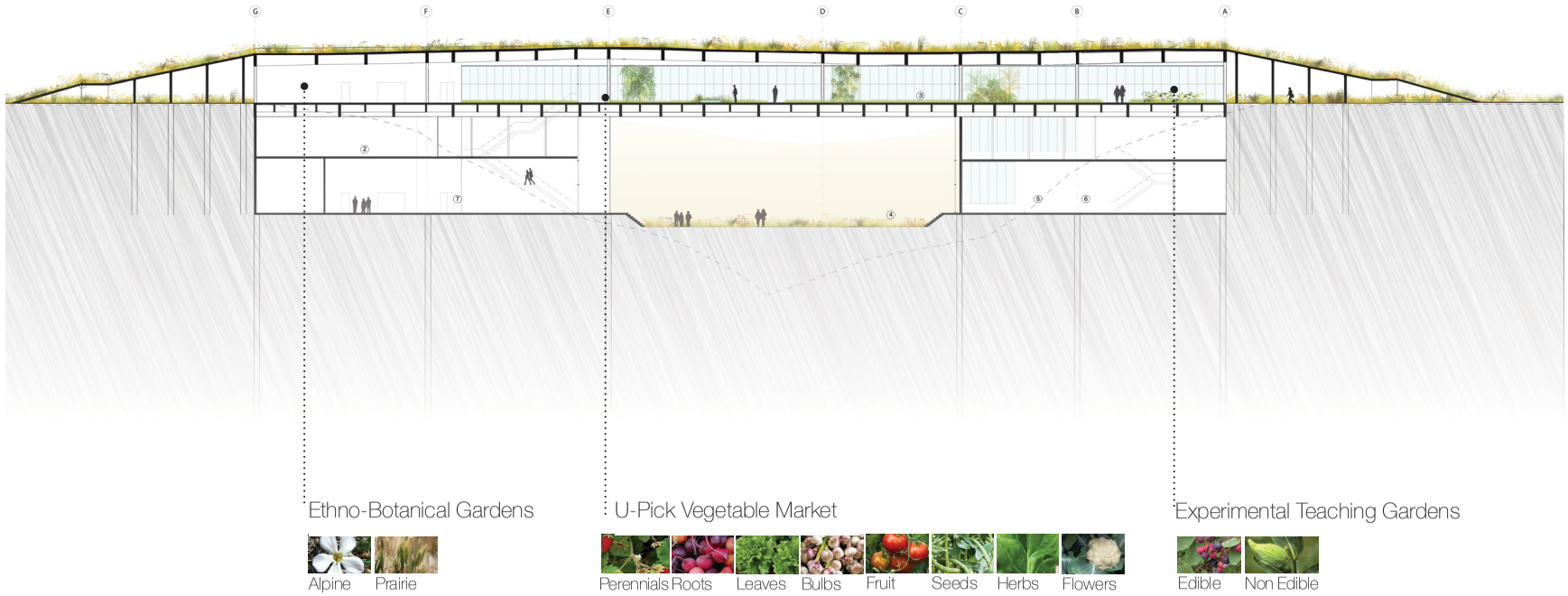
The horticulture center is an exciting opportunity for the University Campus to transition into a stimulating year round destination bringing life to the city through the integration of seasonal planting. Visitors are encouraged to meander between interior and exterior spaces and from ground level to roof level, each destination points provides a unique experience for the user.



Level 1 floor plan of the horticultural center.



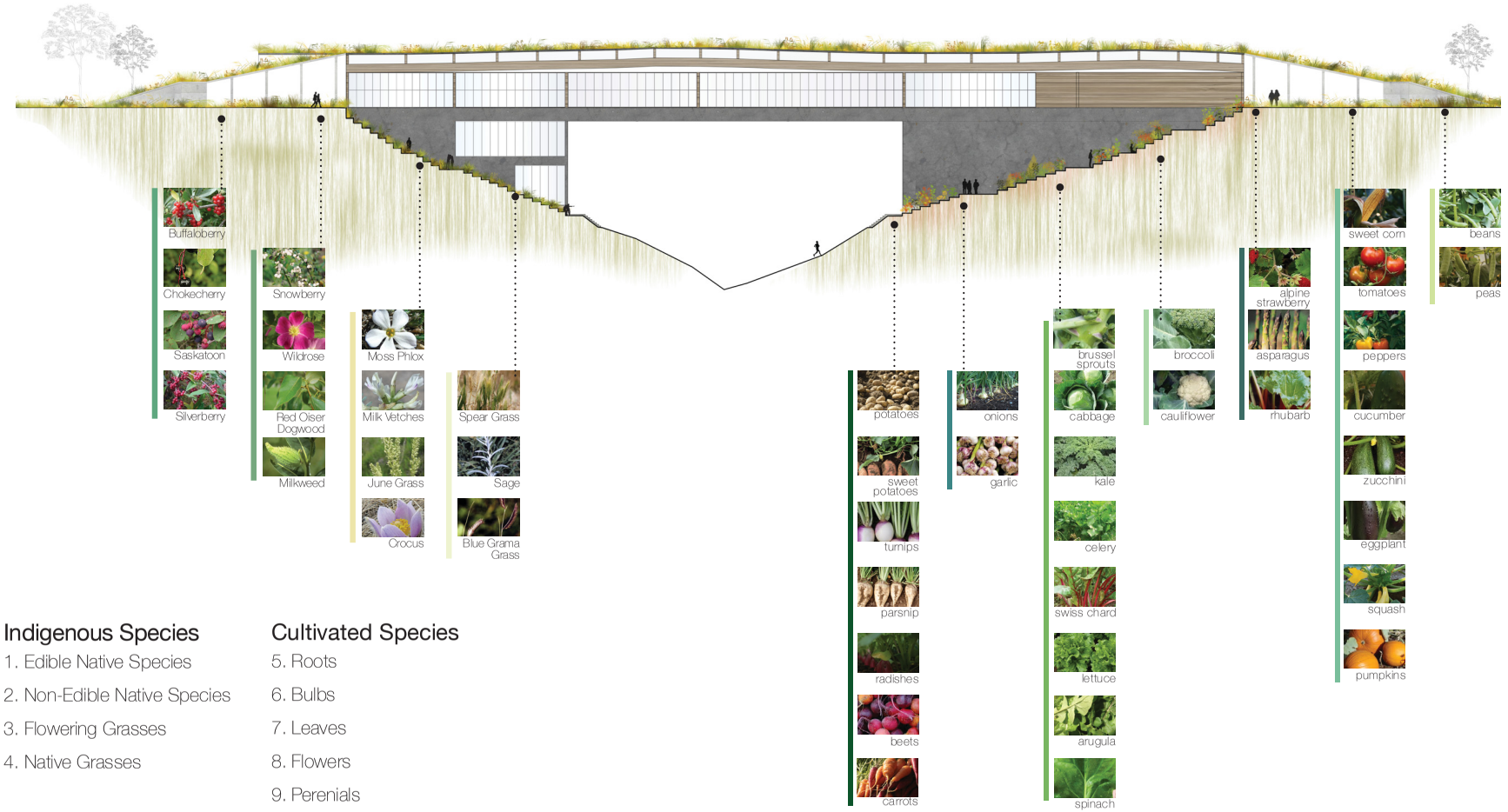
Level 2 floor plan of the horticultural center.



Programmatic Spaces

1. Outdoor Learning Gardens
2. Exhibition Gallery
3. U-Pick Vegetable Gardens
4. Coulee Courtyard
5. Market
6. Demonstration Kitchen
7. Flexible Learning Spaces

Section AA illustrates the relationship of the building to the landscape. The green roof is an integral layer, which weaves the building into the surrounding landscape. The green roof allows a seamless transition to take place as users move between the ground plane and the roof plane. The main level of the center is used primarily for growing edible and non-edible plant species, while the lower level is programed for flexible and interactive learning opportunities to take place.



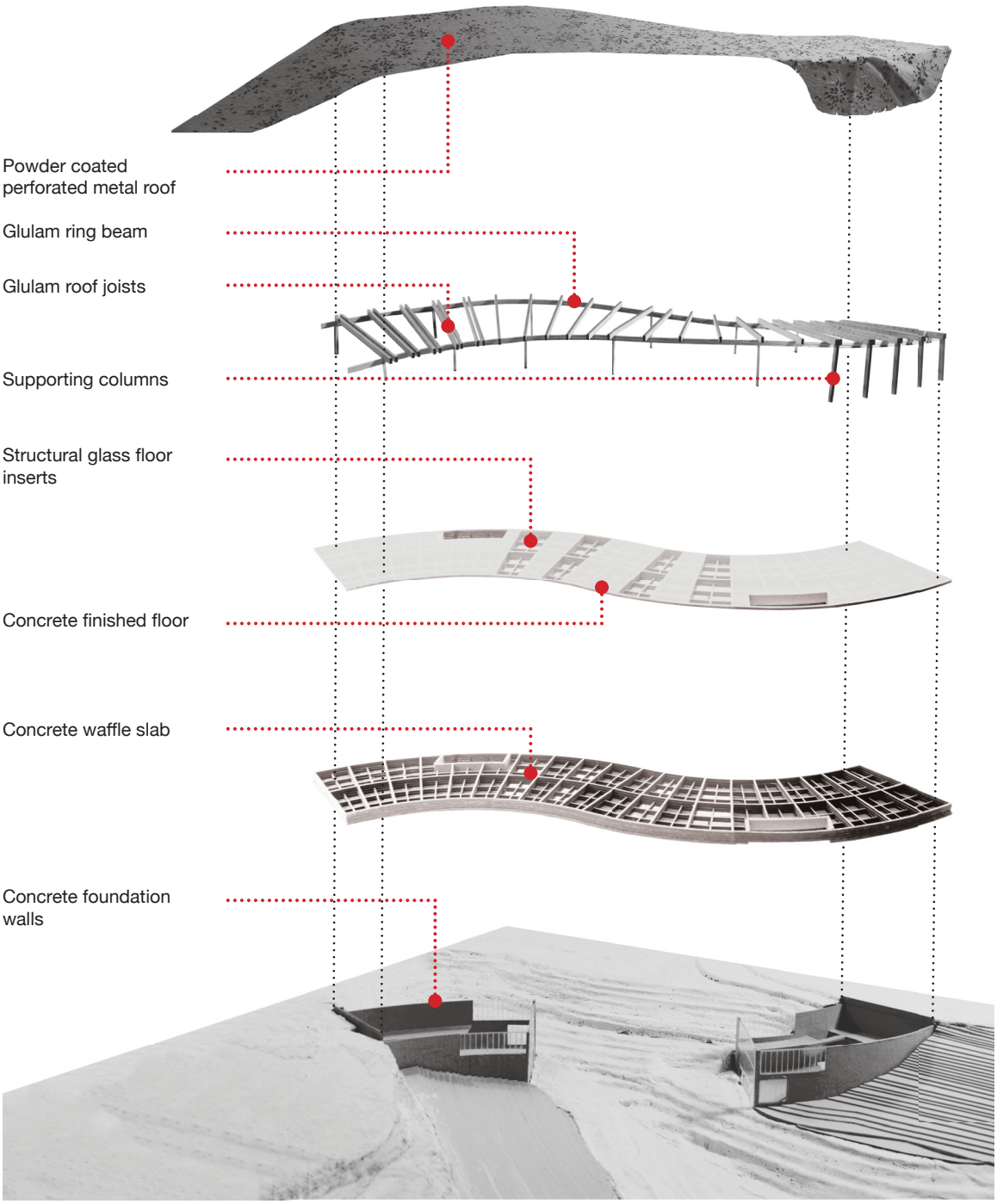
Indigenous Species

1. Edible Native Species
2. Non-Edible Native Species
3. Flowering Grasses
4. Native Grasses

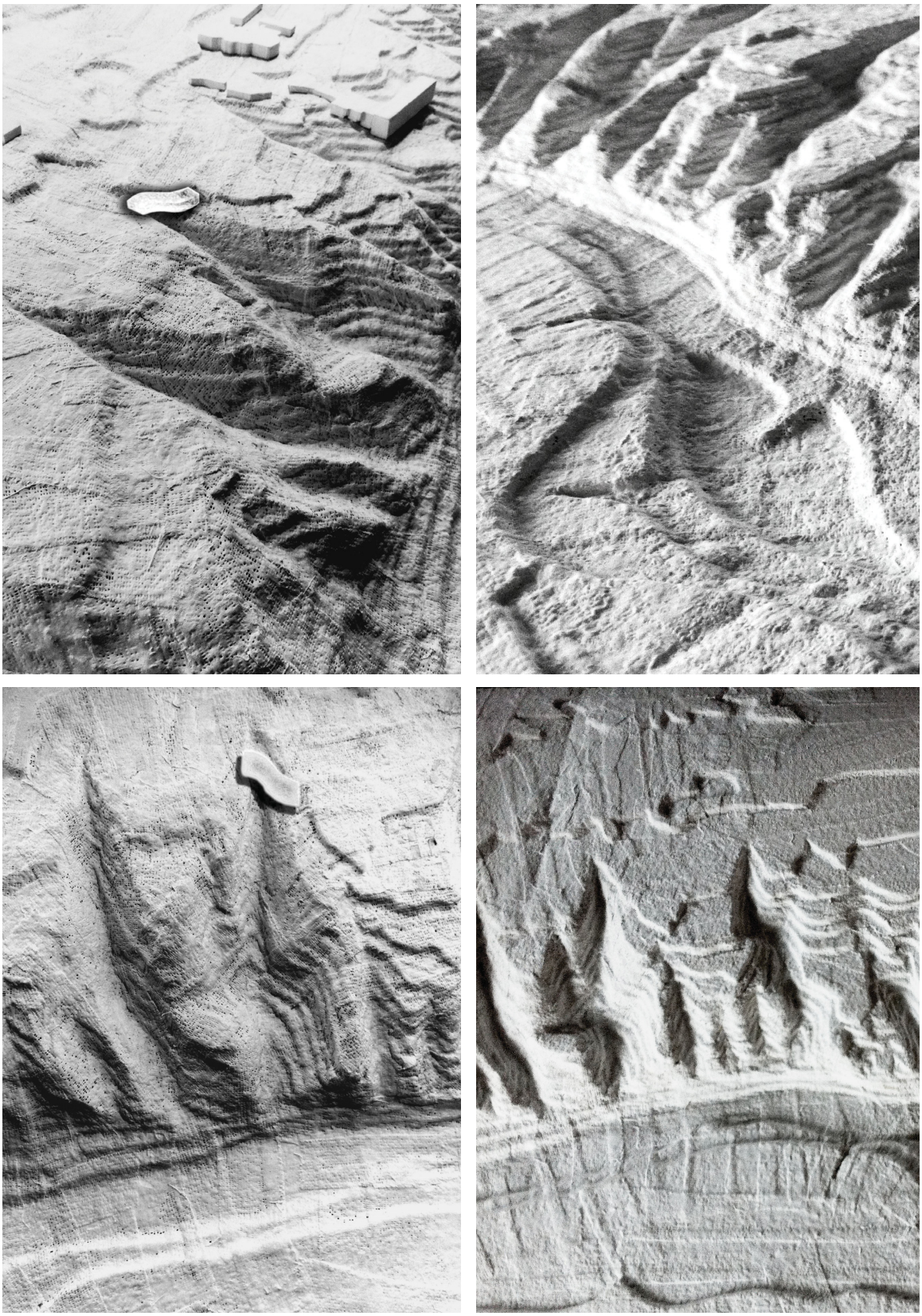
Cultivated Species

5. Roots
6. Bulbs
7. Leaves
8. Flowers
9. Perenials
10. Fruits
11. Seeds

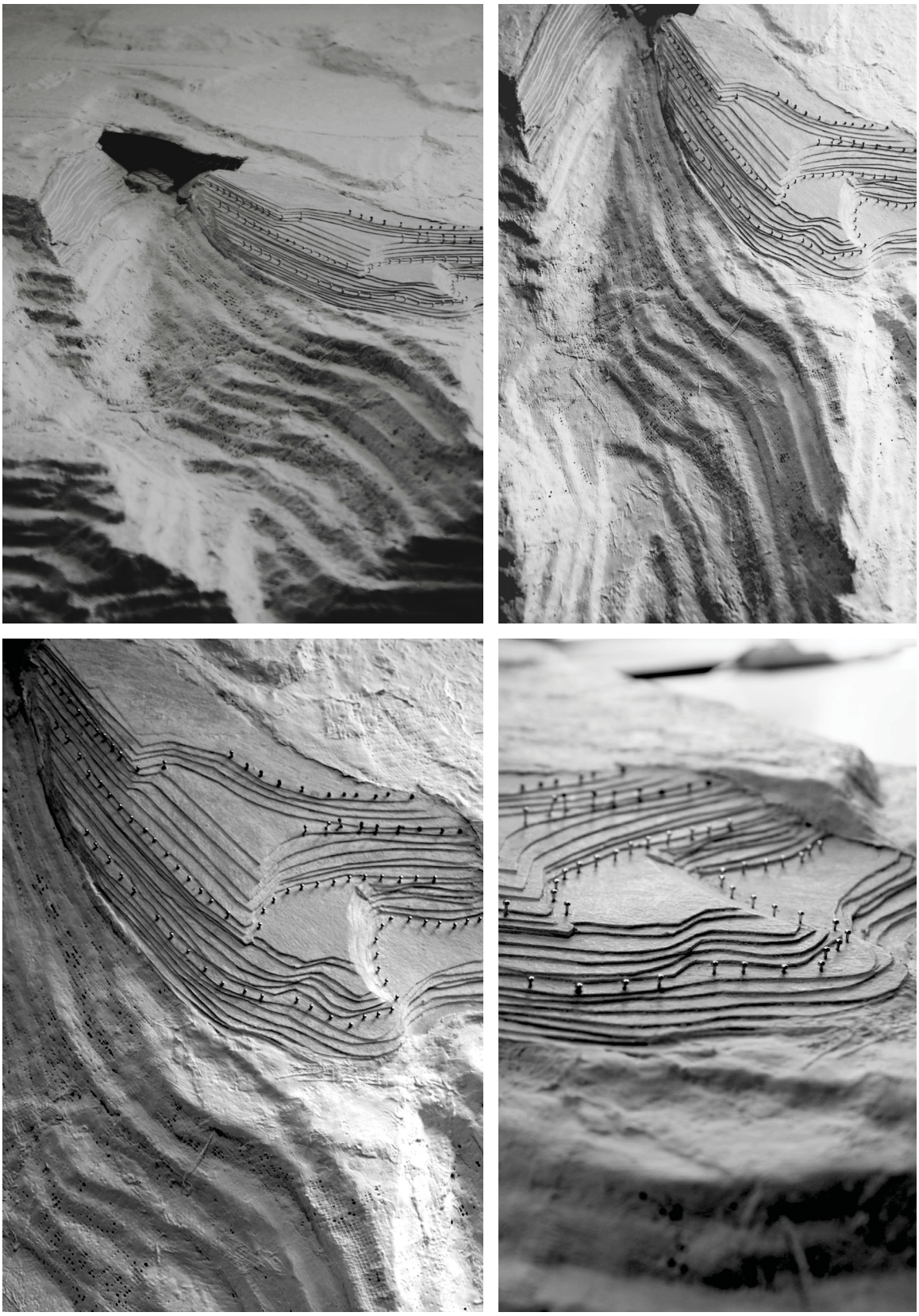
This elevation illustrates the relationship between the terraces and the plant species that they support. The cultivated terraces are oriented to receive southern sun exposure therefore, they are dominated by edible plants species such as fruits and vegetables. The opposing terraces are north facing and will receive far less sun exposure therefore, they are planted with a variety of indigenous plant species that are appropriate for shade conditions.



This structural axo depicts the building assembly and primary structural components.



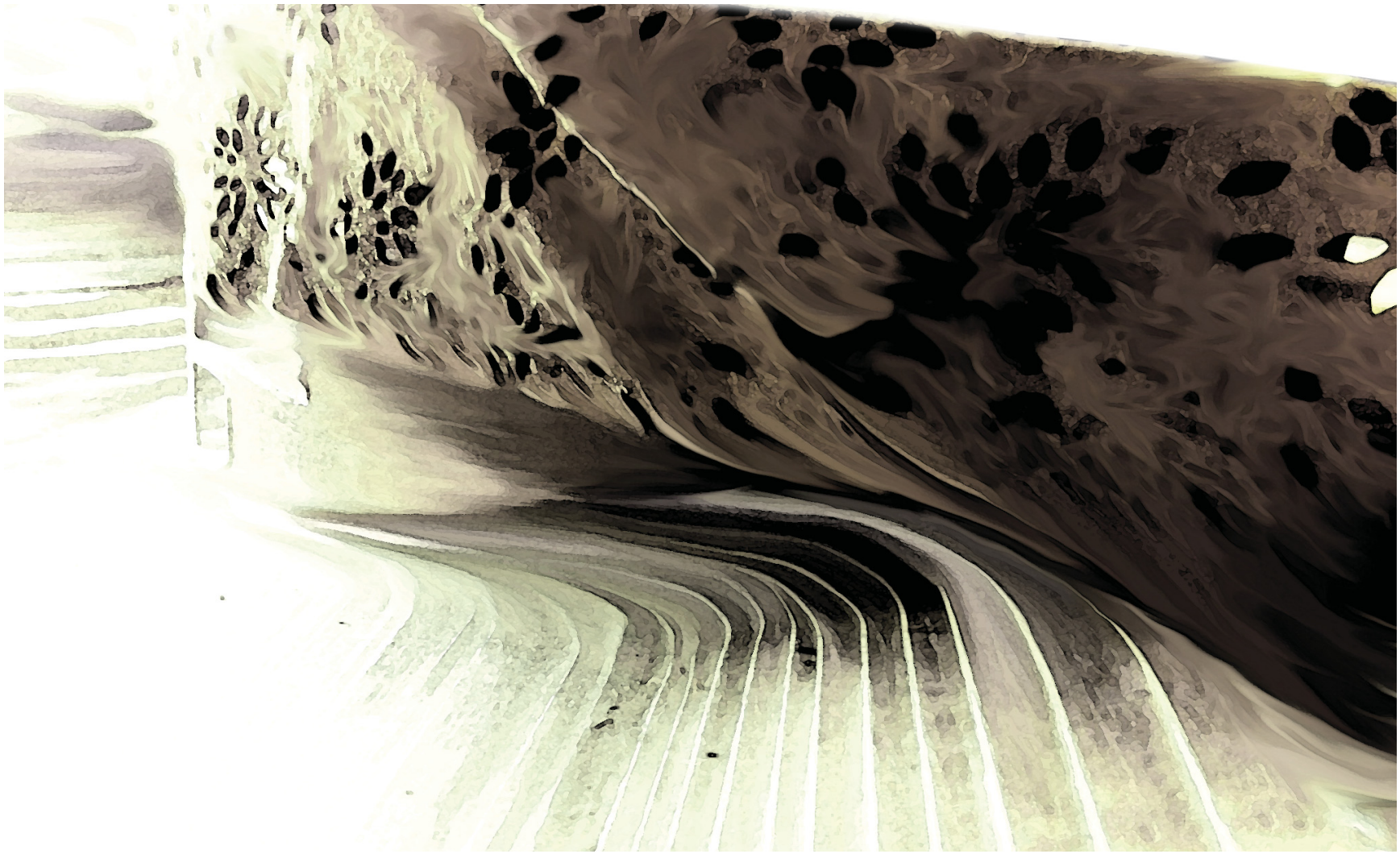
1:3000 Scale site model. Siting the proposed horticultural center within the natural landscape of the university campus.



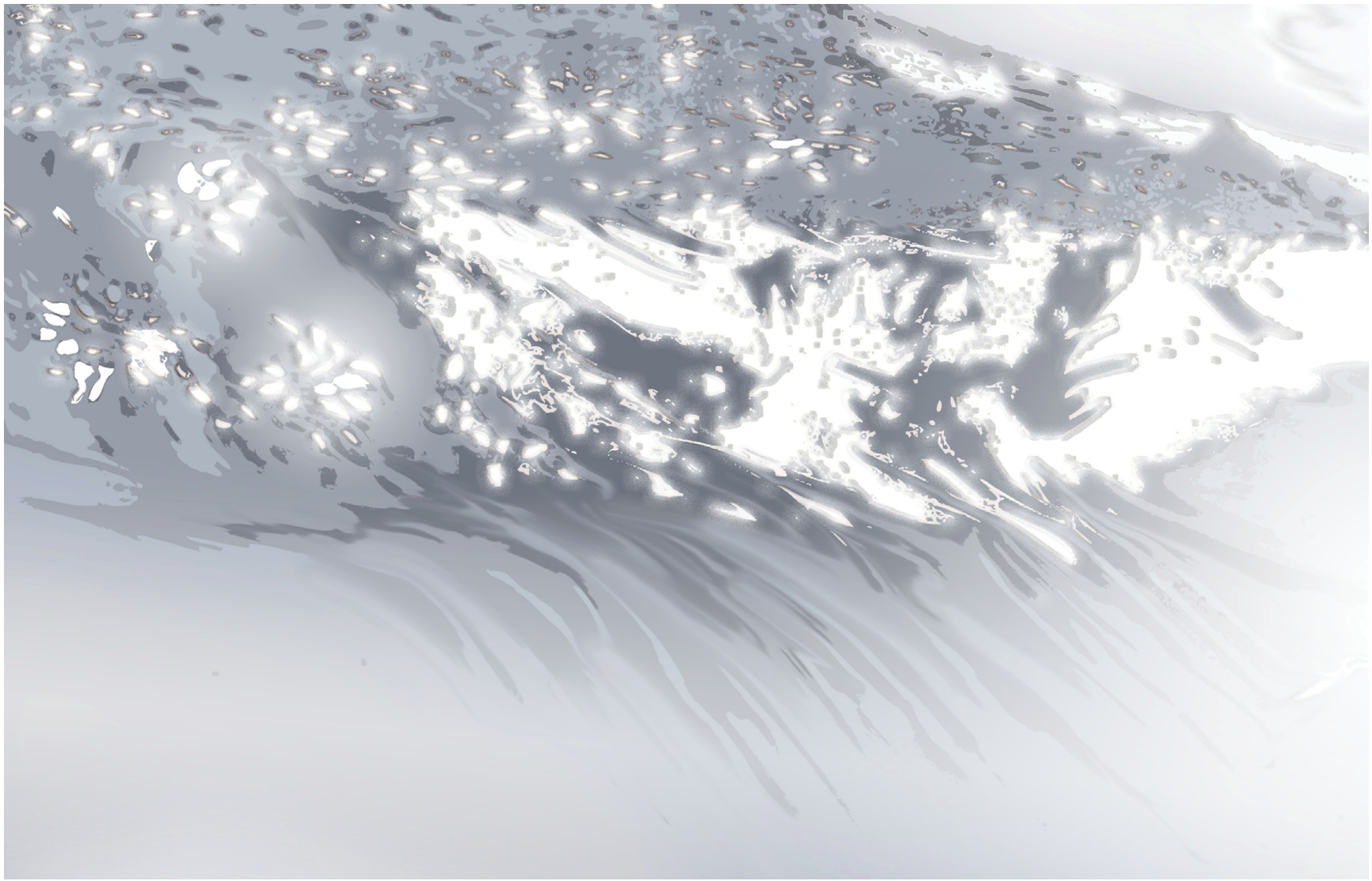
1:1000 Scale site model with cultivated terrace intervention.

1:200 Scale building model. These model photographs emphasize the span of the building over the coulees.

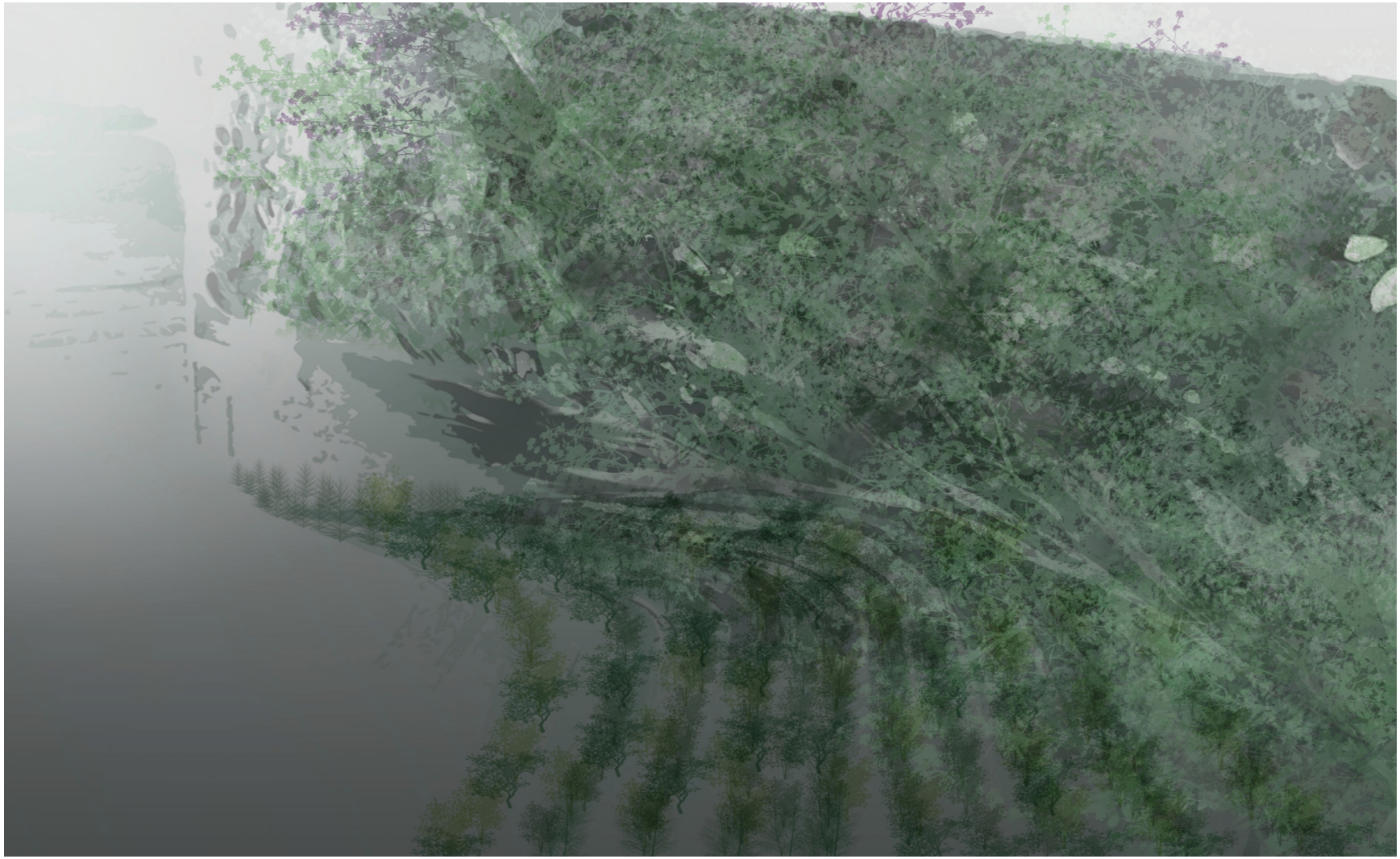
1:200 Scale building model. These model photographs focus on the integration of the green roof with the landscape.



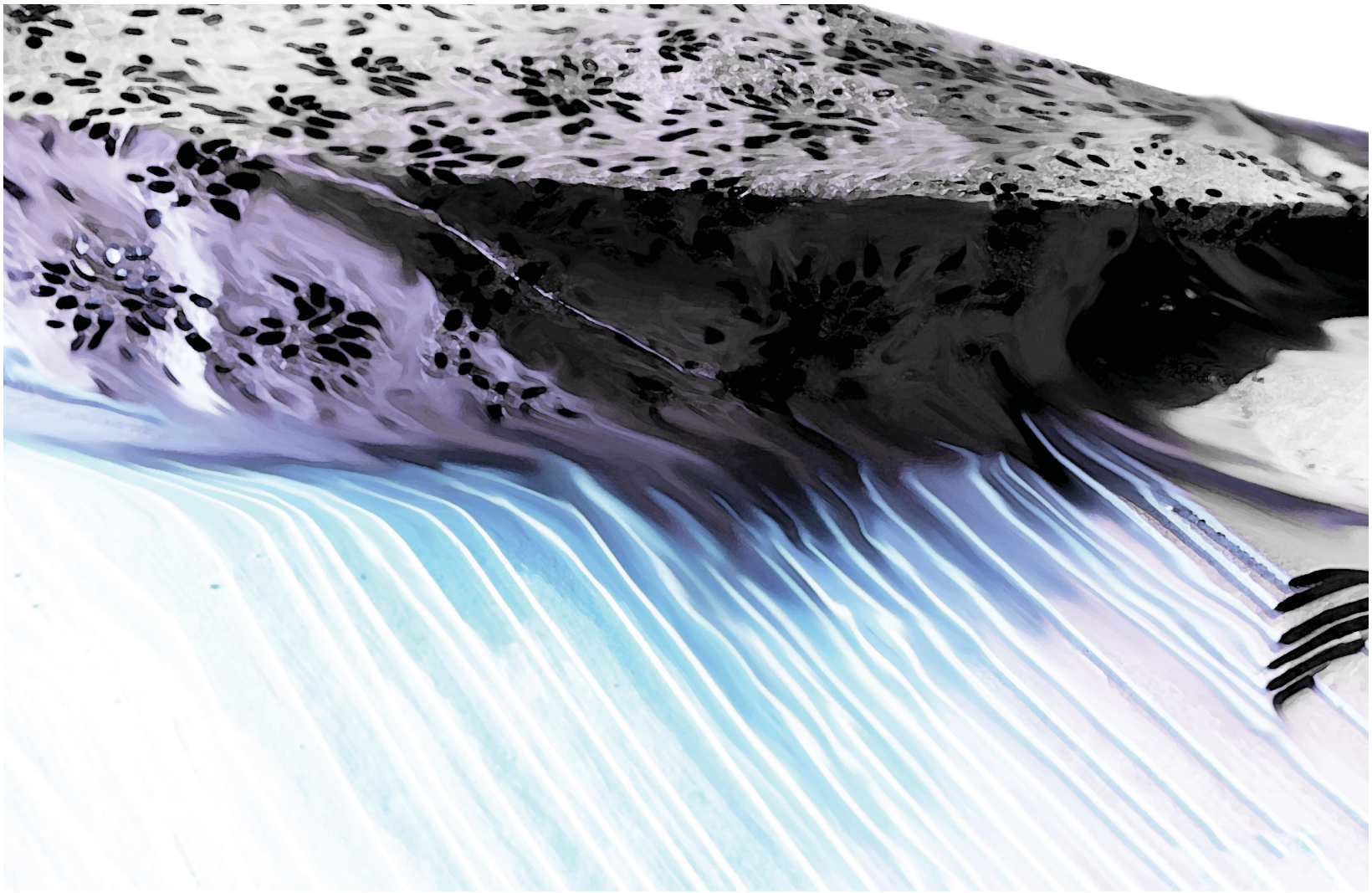
This drawing illustrates the importance of designing a building that grows from the land and exists harmoniously with its surrounding natural landscape. The building is meant to be an extension of the land, an extended surface for vegetation to flourish.



Light study of the perforated metal roof meeting the agricultural terraces.

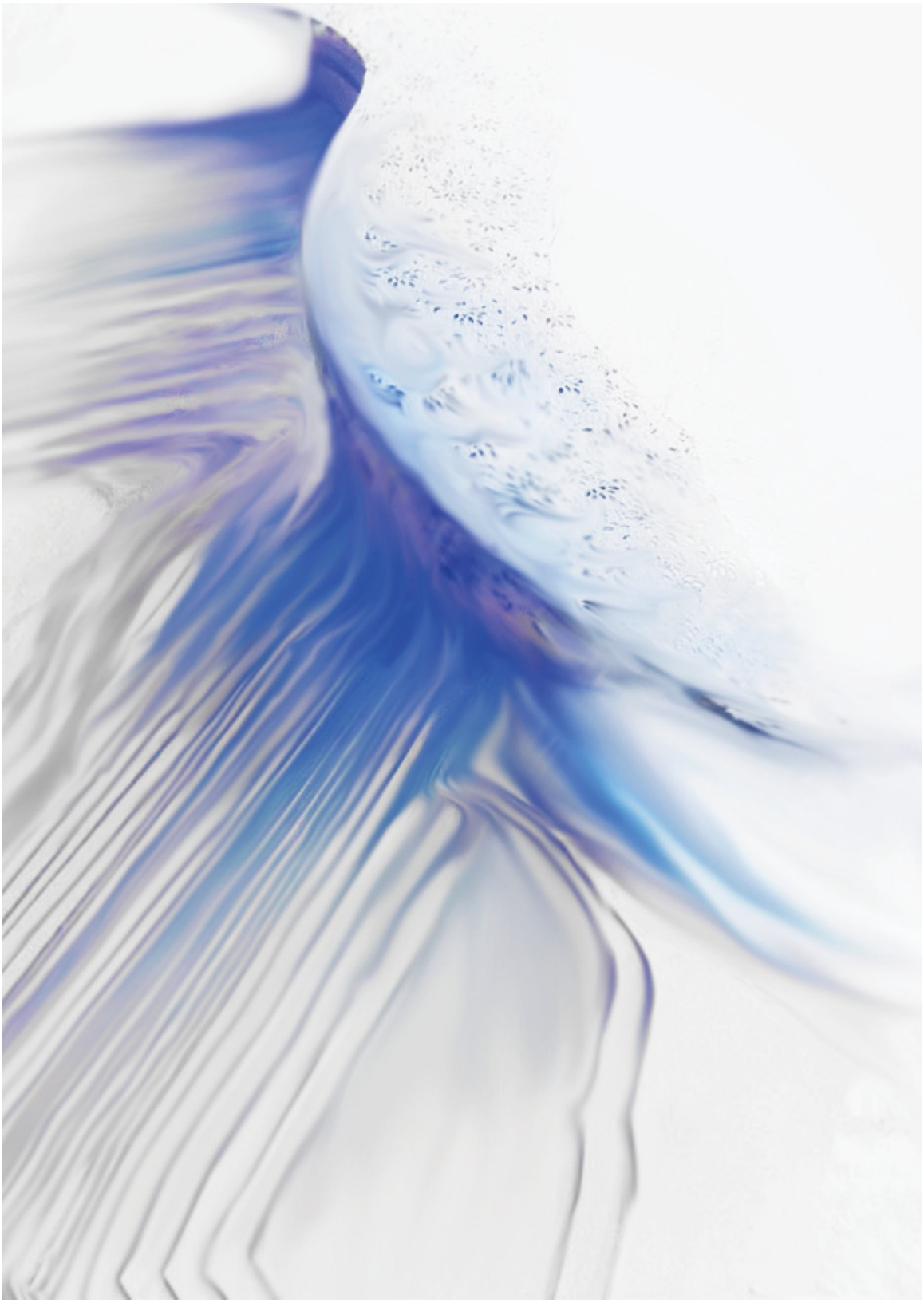


Vegetation growth study. This study illustrates the seamless transition point where the terraces meet the building. The vegetative layer is a critical component to unify the building with the land.



Water flow study. This study focuses on the connection between the terraces and the building, it illustrates how the continuity between the building and the land is able to create a positive interaction as water is collected by the building and then distributed back to the land.

This rendering illustrates the bridge-like characteristics of the building, which help create a minimal footprint preventing excessive intrusion upon the natural habitat of the indigenous plant and animal species of the river valley.



Water flow study of the terraces meeting the building. The building and the land work in unison. The roof is able to feed water back into the cultivated terraces while the vegetation is able to absorb and mitigate additional storm water runoff.

This rendering represents the interactive and personal exploration of visitors and users of the horticultural center. The design of the green roof allows users to explore and flow between the exterior of the building and the natural landscape without interruption, just as the vegetation continues to grow from the terraces to the roof without intermission.

Roof to sky study. This rendering illustrates how the roof meets the sky. The green roof creates a unique exploration opportunity for visitors to travel across the coulee landscape, it provides incredible viewpoints that look across the river valley, and it also establishes additional area for vegetation to grow.

Building study of the horticultural center inhabiting the coulee landscape.

CHAPTER 4: CONCLUSION

Urban agriculture is a growing trend in today's society. Human beings are experiencing an overwhelming conscious and subconscious desire to reconnect with their food and with the land from which it is grown. I firmly believe that we are at a critical turning point and it is time for us to take proper responsibility for our methods of food production as they directly impact both our health and the health of the environment. By interweaving architecture and urban agriculture I am hopeful that we will see positive changes in our neighborhoods and city centers. The natural and built environment is a physical manifestation of what society values at a specific moment in time, by changing what society values (for example, being able to be self sustainable) we in turn have the opportunity to change the landscape in which we live and vice versa. Architecture can be used as a design tool to re-establish and rebuild the framework of societies values: health and wellness, social interaction, respect for the environment, and sustainability.

This thesis explores how architecture has the ability to create a foundation for a productive greenscape to prosper within the urban environment of Lethbridge, Alberta. The architectural design was a specific response to a very unique landscape. Careful studies of two-dimensional mapping and three-dimensional model abstraction revealed the true nature of the site, which created opportunities for architectural interventions to directly respond to the studies. As a result the architectural design acts as a bridge to minimize the divide between the urban, the natural, and the rural landscapes found throughout the city. The overall success of the productive greenscape is primarily dependent on three intelligent systems: water distribution, solar absorption and nutrient recycling systems. The variety and types of crops that can be produced in Lethbridge are dependent on climate, the number of growing days, sunlight, wind patterns, soil type, geology, rainwater collection, and irrigation techniques. Although, the architectural response was created for a distinct landscape I hope that the ideas that were explored throughout this thesis can be used to demonstrate the potential for architecture to positively transform the environment in which we live and improve the quality of our overall wellbeing.

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