

THE FUTURE OF FOOD IN SUBURBIA

by

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I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

This thesis addresses resilience for the future of Canadian suburbs, through the lens of buildings and food, particularly against the backdrop of peak oil and climate change. Food access is an integral part of how a city sustains itself. There is growing evidence that the current global food system, the one that feeds many cities today, is “broken” or at least at risk. It has, in the past, produced an abundance of food. It has also brought along a number of unintended consequences, has neglected to embed equitable distribution patterns, and when faced with peak oil and climate change, risks some form of collapse.

This thesis focuses on the food distribution question. It suggests a new food system model for the City of Mississauga that couples the region's local systems with global networks in a set of local/global relationships. The research portion of this work provides an overview of the dynamic historical and present relationship between food and city infrastructure, touches on the issues facing suburban resiliency today, and investigates the challenges facing the food retail industry. It then draws lessons from large-scale typologies of urban agriculture being proposed in recent years by architects and urban designers. This work, specifically at the design stage, identifies the suburban supermarket as a local catalyst for transformation.

Today, the City of Mississauga is not food secure – that is, it does not rely on a safe, adequate, sustainable, or appropriate food supply. This thesis investigates how local and sustainable food systems can be integrated into the urban fabric and systems sustaining suburbs today. It further seeks to build on existing conditions, and answer how the suburban big-box typology, preferred by retailers, can contribute to food security.

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This work would have not been possible without the guidance, support, feedback, constructive criticism, knowledge, and encouragement of my thesis committee. A heartfelt thank you goes to my advisor, Val Rynnimeri, whose time and feedback has been especially critical in the development of this work. I am also thankful for the efforts of my former-and-current committee members: John McMinn, Tammy Gaber, Rick Andrighetti, and Jeff Lederer. Last, but not least, I would like to acknowledge the support of JA, MK and ADK, and of course, a big thank you to my family and friends who have seen this work grow.

For Mom and Dad, who came to Mississauga over 30 years ago.

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Glossary and Acronyms

Glossary

Big-box store (also called big-box, superstore, megastore, category-killer; can refer to the company that operates the store):
A large standalone retail establishment, typically part of a chain and specializing in one category of merchandise, or offering a large volume of general merchandise. They are typically over 50,000 square feet (4,600 square metres), one storey tall, and are often located in suburban areas close to highway interchanges. Examples include Wal-Mart and Home Depot.

Continuous Productive Urban Landscapes (CPULs):
CPULs are a series of connected agricultural and recreational corridors that weave throughout a city's fabric. The scheme was developed by Bohn + Viljoen Architects, and does not currently exist in any city today. In the words of the designers, they are designed to "encourage and allow urban dwellers to observe activities and processes traditionally associated with the countryside, thereby re-establishing a relationship between life and the processes required to support it." The designers emphasize that CPULs can occur at a variety of scales. Furthermore, not all productive landscapes need to be horizontal. Vertical landscapes are a possibility if vegetation is layered onto a building façade. As underused spaces become activated with landscape over time, they would create a sense

of connectedness that would help provide a visually cohesive urban experience.

Food security: According to the FAO, “Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Household food security is the application of this concept to the family level, with individuals within households as the focus of concern.”

Foodshed: A district that can support agriculture, environmental stewardship of land, and human dwellings by localizing the production, collection, processing and distribution of food within a specified community.

Green Revolution: A period of research and technological initiatives between the 1940s and 1970s, often cited as being led by Norman Borlaug. He led the development of high-yield grain varieties, synthetic fertilizers, hybridized seeds and pesticides. This in turn accelerated agricultural production around the world.

Power centre: A large shopping district built around the movement of private vehicles, containing big-box retailers (who become “anchor tenants”) coupled with smaller retailers in a strip-mall format. Common parking, usually surface, is shared amongst the retailers. A power centre loosely contains 23,000m² – 70,000m² of gross leasable area. They are primarily found in suburban areas.

Supermarket: A large, self-service store/chain selling groceries and various other goods, with an annual sales volume of \$2 million or more (USDA Foreign Agricultural Service, 2009). They are usually part of larger corporate chains, and are supplied by a distribution centre from their parent company. They are noted for being able to offer competitive prices on goods due to their large volumes and economies of scale. Larger, full-service supermarkets are often called hypermarkets, which contain department store elements such as banks, cafes, and pharmacies. In this thesis, the term ‘supermarket’ is used to encompass hypermarkets as well.

Urban agriculture (UA): A broad definition of urban agriculture is the practice of producing, processing and distributing food in an urban or peri-urban area. In this thesis, UA units also encompass consumption facilities (i.e. restaurants) and biowaste management. Urban agriculture is also used to contribute to recreational, educational, and relaxation spaces

in an urban environment. These UA systems access resources (i.e. space) in an urban area, services (i.e. labour), and products (i.e. technology) to generate further resources (i.e. food, microclimates, compost) for the area.

Urban resilience/resilient city: A city "that has developed capacities to help absorb future shocks and stresses to its social, economic, and technical systems and infrastructures so as to still be able to maintain essentially the same functions, structures, systems, and identity." (ResilientCity.org).

Acronyms

CPUL: Continuous Productive Urban Landscape

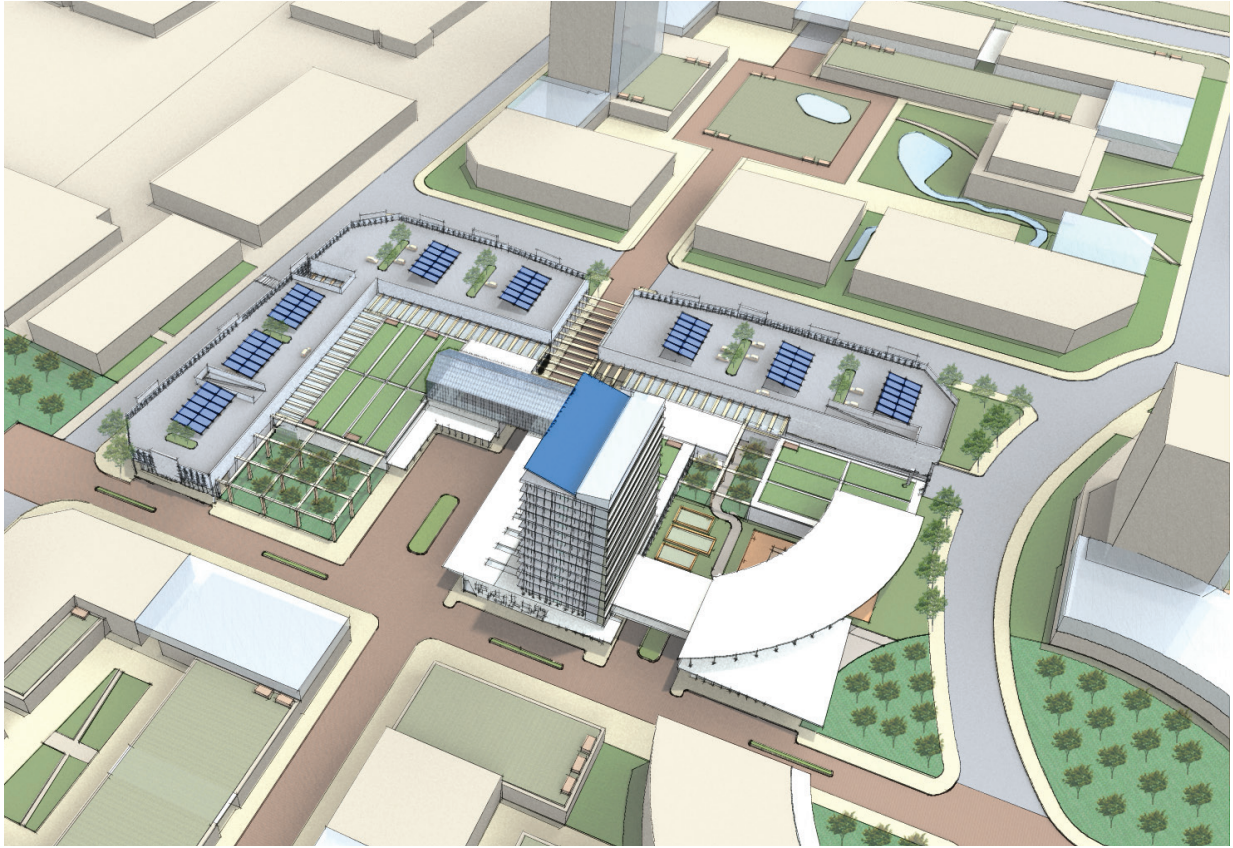
FAO: Food and Agriculture Organization of the United Nations

HTC: Heartland Town Centre

UA: Urban agriculture

UN: United Nations

WHO: World Health Organization



INTRODUCTION

A city is what it eats. Food is vital for our existence, yet the central place of food in our lives is often overlooked. The choices we make regarding food affect our health, the natural environment, our infrastructure, our homes, our relationships with each other, the vibrancy of our neighbourhoods, and drive large parts of our economy. Our food choices determine whether or not our cities have the infrastructure and urban amenities to deliver positive lifestyle benefits, or if our streets are littered with bland, sterile strip plazas that offer little in the way of healthy food choices or broader cultural value.

This question of food choices sits alongside the bigger, overall issue of how a city sustains itself. Historically, the relationship between food and cities is one that has been highly dependent, visible and connected to the broader region. Today, with the advent of cheap petrochemical energy and other modern technologies, this precariousness is no longer the case. Food itself has become increasingly invisible in our global and industrialized food system. There is also growing evidence that the current global system, which feeds most cities today, is teetering on “broken”. The system is vast, complex, and its problems are exacerbated by pressing issues, from climate change to persistent poverty, which affect virtually every human being on the planet.

In the midst of an inequitable food system, despite all our global efforts, we are facing several new issues of our time:

food security, peak oil, climate change, changing demographics, urban intensification and environmental city health. Global population, and with it, food demand, continues to climb. The forecasted world population of 9.1 billion in 2050 will likely require raising overall food production up 70% between 2005 and 2050 (FAO, 2009). While most of this growth is expected to take place in developing countries, the pressure for the creation and maintenance of an efficient and sustainable food system is also in the hands of industrialized nations. Agenda 21 (United Nations Conference on Environment and Development, 1992) states that:

By the year 2025, 83% of the expected global population will be living in developing countries.... Agriculture has to meet this challenge.... Major adjustments are needed in agriculture, environmental and macroeconomic policy, at both national and international levels, and developed as well as developing countries, to create conditions for sustainable agriculture and rural development.

Developed countries, such as Canada, not only need to change the way they deal with food for the sake of the developing Global South, but also for the sake of their own future.

The drivers of change for a new food system in this thesis are largely informed by what Paul Roberts, a journalist specializing in economic, technological and environmental issues, has defined as the limits to growth of the food system in his book, *The End of Food*. These limits of growth are:

- 1) The demand for food will rise as the population grows;

- 2) Climate change (will decrease global food output), and
- 3) The scarcity/price of petroleum, which provides cheap energy to the agricultural and transportation industry, will rise.

Some secondary drivers, as noted by the *2008 Future Value Chain* (a Global Commerce Initiative study), include: changing consumer attitudes and interest in the food supply, and pressure to reduce carbon footprints (Tieman, 2010). Further assumed transformative initiatives include: increasing public awareness regarding sustainability, and restricted sprawl, as emphasized in the *Places to Grow Act 2005* by the Government of Ontario.

In all this thinking, lack of food access is widely recognized as a distribution issue, and not a production issue (Roberts, 2001). The world is actually increasing its food surplus each year (food production has risen to over 2800 kcal per person since 1970), however one in six people still lack sufficient food (Arup, 2009, p3).

Emphasis on increased localization of food systems in cities is one way to help cities deal with the issues mentioned above. This is especially critical in the suburbs, which are highly dependent on the very systems that are failing. Looking at suburbs highlights the future: Canada is becoming an increasingly suburban country, with suburbs surrounding large cities growing faster than their urban counterparts (Dudley, 2007). While large homes and ample parking remain the

idealized dream, suburbia also comes with its flood of problems: social isolation, traffic congestion, increasing pollution, loss of valuable agricultural land, social isolation, and growing obesity and its health problems, to name a few.

This thesis will contribute to the growing discourse of how suburbs can be re-adapted to promote a more local urban agriculture - the growth, production, consumption and management of food - and how this transformation can lead to communities that prioritize human and environmental health, that are economically stable, and are enjoyable to live in. At a design project level, this work will investigate the design parameters required to successfully integrate today's supermarket big-boxes with urban agriculture into more diverse community designs, in order to build urban resiliency for evolving suburbs.

While urban agriculture and food security initiatives are certainly occurring at a global level and will impact the entire planet, the scope of this particular thesis work is limited to food issues in developed countries, specifically Canada. It is further focused on to low-to-medium density urban areas (i.e. suburbs). Suburbs are a good urban case study for developed nations because they are more resource consumptive and at greater risk than their historical urban counterparts. This work also assumes a 10 - 20+ year time frame, and will be relevant for the near future as long as suburban development models exist with continued investment from corporate Canada.

The overall work of the thesis is organized as follows:

Part 1 introduces the changing relationship between food and cities from past to present. It illustrates how both suburbanization and our current food system are historically driven by cheap fossil fuel energy, a strategy that has led to the big-box typology and corporate, large-scale supermarket chains we find today. It identifies the drivers of change for the near future.

Part 2 takes a look at the concept of urban resiliency and a further examination of supermarkets. It recognizes how supermarket chains could play a role in creating resiliency in the suburbs.

Part 3 culminates in a design proposal at two scales in the City of Mississauga, a large Canadian suburb to the west of Toronto. The first design is an urban design of the Heartland Town Centre (HTC). The HTC is an exemplary site to explore the re-adaptation of big-box blocks with urban agriculture as it is Canada's largest power centre complex. Approaching 18.6 hectares of commercial space and growing, its commercial success testifies to the influence of power centres in Mississauga, and its physical formation is undoubtedly a large and persistent element in the suburban landscape. If urban agriculture in Canadian cities is to become more mainstream, it needs to be integrated with places and players that have already been built and have large economic and social influence. The Heartland Town Centre is such a place, one that houses such urban actors

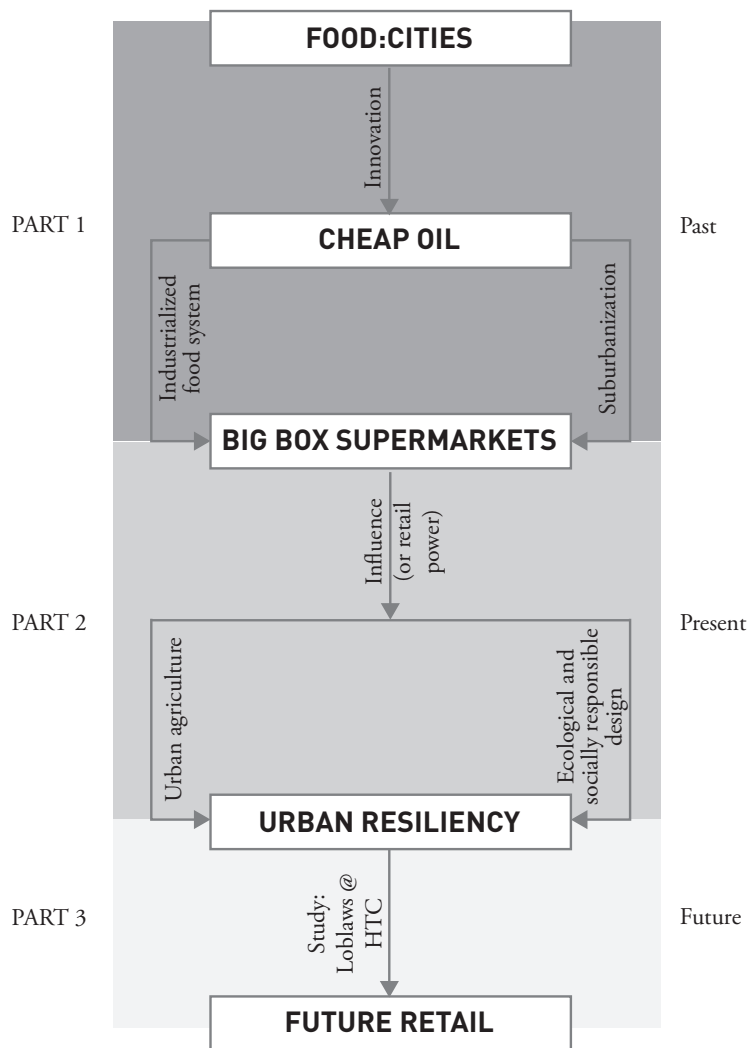


Fig. 1. Thesis narrative

and financial players.

A closer look is then taken at the relationship between urban agriculture and an influential actor in the second part. The bulk of the design proposal is completed at this stage. A block-scale design within the HTC is done for an existing Loblaws big-box supermarket. Through a physical reconstruction of the supermarket, changes are suggested to the corporate operation of Loblaws in the pursuit of a new strategy of sustainable food and urban resiliency. In a design sense, this leads to several physical implications.

This symbiotic and spatial relationship between the built environment and food will provide opportunity for architects to be involved in what a sustainable food system looks like.

LITERATURE REVIEW

GLOBAL FOOD

There exists an abundance of literature regarding global, industrialized food and food security. This discussion ranges across social, environmental, economic and political effects completed by a variety of agencies. It has been brought into the public consciousness and popularized by food journalists such as Michael Pollan.

Technical snapshots of the state of world food are comprehensively captured by the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO) and the World Resources Institute. Two particular sources have served this work as key visual summaries to the abundance of statistics regarding world food. One is *The Atlas of Food* by Tim Lang, Professor of Food Policy at City University London, and Erik Millstone, Professor of Science Policy at the University of Sussex. The book effectively and visually communicates global statistics through the use of mapping. The other is *Drivers of Change: Food*, a set of knowledge cards by global engineering firm, Arup, that identifies 25 key drivers associated with food. The drivers are looked at through a “STEEP” (Social, Technological, Environmental, Economic and Political) framework, crosscutting countries, contexts and regions. It provides a good introduction to key issues, yet does not dwell specifically on one place, city or way of life (for example, issues from the Global North and Global South

are both present). The works above have provided the global statistical backbone of this thesis.

Other works are those that take the several narratives found within global food (its origins, and impact on health, the environment, etc.) and culminate them in a call for change. The *No Nonsense Guide to World Food* by Toronto's prominent food expert, Wayne Roberts, cohesively describes food as a system, linking problems that may seem unrelated (climate change, obesity, economic vulnerability, oil dependency etc.) to the current state of our food. His book is largely about the interconnected nature of industrial food, and emphasizes that the end of such a system is nigh. In *The End of Food*, journalist Paul Roberts investigates the future of food, and the gap between the modern food industry and the populations it is designed to serve. He defines the system as the "food economy" due to its complex nature and connection to the economic backbone of contemporary cities. It is these two works that initially helped focus the thesis scope on the retail/distribution question of the food system, as they described the power players. *Food Policy*, another work by Tim Lang, with David Barling (senior lecturer at the Centre for Food Policy at City University London) and Martin Caraher (Reader in food and health policy in the Centre for Food Policy at City University London), clearly asserts that the power in the value-added food chain for western economies is in the hands of the supermarket. Market reports by the Office of Consumer Affairs (Government of Canada) and international

market researchers, Datamonitor and Euromonitor, further confirm this.

The aforementioned works helped define the problem and need-for-change narrative in this thesis. They underscore and support the assumptions that the end of cheap oil, climate change, increased urbanization, population growth and changing demographics are key factors that demand the reconfiguration of our food system before it faces a future of crisis. They have documented the nature and consequences of the global food system as it is configured, and outline a set of issues that are so evident that there is little room for general debate on the need for some form of change. Virtually every work regarding the industrial food system mentions its future vulnerability as a pivotal case for its transformation. Due to the wealth of information regarding the unsustainable nature and consequences of the global food system, this thesis does not set out to prove that the food system is in trouble. That is not its focus. Rather, it builds upon the works that have already done so, in order to address ‘what next’ in relation to a specific urban environment. This is the point of focus for the architect and urban designer.

SUBURBS

The specific urban environment studied in this thesis is limited to that typical of developed nations. Suburbs in Canada are still growing, as opposed to many of their American counterparts

in crisis since the real estate collapse in 2008. Canadian suburbs are also changing in demographic composition, especially in the area that this thesis focuses on: the City of Mississauga. A comprehensive look at the state and trends of the City are found on the Peel Data Centre website and in studies by Henson Consulting Ltd. The Region of Peel's *A Picture of Health: A Comprehensive Report on Health in Peel (2008)* illustrates the health and demographic trends in Peel Region, where the City of Mississauga is situated. It readily, for example, admits the role of the suburban, automobile-based, physical environment in promoting personal obesity. Such information is used to focus the design towards the health and demographics of the residents of Mississauga.

As today's suburbs have grown, they have been fed by industrialized food; their physical form and food network are sister systems which rely on the same vulnerable resource to drive their growth. If the end of cheap oil is nigh, as authors like Paul Roberts indicate, so is the end of global food and suburbs as we know them. Despite this, suburbs continue to grow in Canada. Given this, the financial, social, health and environmental problems of suburbs have been well documented and written about in works such as those by James Howard Kunstler. Such problems serve as the motivation for the following works that look at how to 'fix' the suburbs:

A work like *Retrofitting Suburbia: Urban Design Solutions for Redesigning Suburbs* documents the physical transformations that

are occurring in some American suburbs, which are, since 2008, for the most part in decline as opposed to Canadian suburbs. It is written by two architecture academics: Ellen Dunham-Jones, architect and professor at the Georgia Institute of Technology, and June Williamson, Associate Professor of Architecture and Urban Design at the City College of New York / CUNY. The work argues for the necessity of an approach called “incremental metropolitanism”, that is, the gradual intensification of suburbs, and recentralizing cities around new and existing suburban centres. Their discussion follows New Urbanism and Smart Growth principles. The work, however, does not mention the impact of the food system on suburbs, how suburbs are fed, or how that system will have to change in order for suburbs to meet the demands of the future.

Suburban Transformations by Paul Lukez, an architect and expert on suburban planning, advocates an Adaptive Design Process. This method uses mapping, time and change to create unique identities and character in suburbs and edge cities. It synthesizes the ideas of New Urbanism, Smart Growth, landscape architects, geographers and new typologists. The building typologies and design tools, using the operations of “erasing” and “writing,” have been an invaluable resource in informing the urban design in this thesis. However, the work does not mention the impact of food on the built environment or how it can be used to create local identity.

Sprawl Repair Manual by Galina Tachieva, partner and

Director of Town Planning at Duany Plater-Zyberk & Company, Architects and Town Planners, is the only one of the three that accounts for the need for local food production, but still, does not go into detail. Her prototypical repair strategies for urban blocks and thoroughfares have been valuable in informing the urban design in this thesis. While the need for design strategies to mitigate the suburbs, be they New Urbanist, Smart Growth, or a mix, is apparent, there has been surprisingly little recognition by designers that food is a design issue in suburban areas.

Big Box Reuse by multidisciplinary artist, Julia Christensen, is a catalogue of case studies of how big-boxes have been re-adapted. It has proved less useful than the three mentioned above. While it does talk about transforming the big-box, the case studies are about using abandoned shells geared towards community or institutional uses. It does not ask how operating, thriving big-boxes can be retrofitted. Furthermore, design is limited to the building itself and little is said about the wide urban block these buildings are situated in.

FOOD SYSTEM SOLUTIONS

There have been many proposed strategies to fix food systems without involving designers or architects. For example, urban agriculture has been implemented and is occurring across the globe today without the need for architects. This is particularly true in the Global South, where industrial agriculture has

a lesser complete presence, and there is less of the complete functional division between food and city characteristic of developed cities today. In the developed world, examples of small to medium urban agriculture schemes exist today that help localize food production, consumption and distribution. An excellent resource to find such places is at the City Farmers News blog, based in Vancouver, which testifies to the different forms urban agriculture can take. It highlights new urban agriculture initiatives; however, these are for the most part community-based and small-scale. Works such as *Growing Community Food Systems* by Erika Allen in the *Post Carbon Reader*, speak of the non-profit organization's role in community based food activism, and putting distribution into the hands of local residents. Aside from localized community action, countries and cities across the world have been establishing food councils and are developing food strategies as they struggle to prepare for feeding a growing population.

To stipulate what an alternative food system could look like, Canadian municipal, regional and federal food strategies were looked at. These helped inform the players and ingredients in a sustainable food system in this thesis. To understand the current Canadian food economy, the Government of Canada's Office of Consumer Affairs website, and Agriculture and Agri-Food Canada website are invaluable resources for key statistics and trends. The Canadian government's *Canada's Action Plan for Food Security (1998)* outlines broad strategies to combat

hunger within its borders, protect agricultural land, prevent and prepare for emergencies, and to uphold the economic viability of Canada's food producers. The Toronto Food Policy Council's papers *Feeding the City from the Back 40 (1999)* and *Food Secure City (2000)*, along with the Metcalf Foundations Food Solutions paper series [specifically *Scaling up Urban Agriculture in Toronto (2010)* and *Menu 2020: Good Food Ideas for Ontario (2010)*] have also been useful and relevant in this thesis work to outline the food economy in Mississauga. Most of the above strategies focus on policy or programmatic changes, yet there is an element of the creation of food infrastructure, and allowing for urban agriculture as a land use. This is most evident in *The Way to a City's Heart is Through its Stomach* (which argues for a "food-based infrastructure" approach to urban planning), and *Placing the food system on the urban agenda (1999)* by Pothukuchi et. al. The latter work argues for using the urban planner as a partner in food security. Nina-Marie Lister, Associate Professor of Urban and Regional Planning at Ryerson University, has a body of work called *Placing Food* which provides a look at Toronto's foodscape, food deserts and food concerns. She takes into account vulnerable populations, and the diversity of the population, ending with a call to moving towards food security. She highlights current agencies, programs and institutions in Toronto that are contributing towards that goal. Her work shares several themes and conclusions with that of Wayne Roberts.

For the most part, however, these are policy-oriented works and are not directly focused on urban design or architectural issues. Also, while the public sector needs to pull its weight in terms of policy changes, and while the nonprofit sector can certainly mobilize its human resources towards community food strategies, few of these papers talk about the private sector or working with corporations - both those responsible for food distribution and retailing, and those responsible for urban development itself.

FOOD AS A DESIGN ISSUE

Given the policy emphasis of the above works, it is only recently that food has been looked at as a design issue for architects and planners to improve cities and increase food security for specific locales. Architect Carolyn Steel's *The Hungry City* has been a particularly relevant body of work. It is especially intriguing due to the fact that it is written by an architect, with specific attention to how food influences the shape of our cities. The book is about the more direct physical relationship between food and cities, how city populations eat, and the enormous effort that goes into feeding them. The last section is dedicated to ways that designers can rethink cities through the lens of providing sustainable food, or in other words, "sitopia".

Continuous Productive Urban Landscapes edited by architect and educator, Andre Viljoen, is another excellent resource about food systems and their effect on cities, written

by architects. It admits the non-role of the architect in current urban agriculture schemes, but then emphasizes putting food at the centre of urban design, arguing that cities should essentially be productive farms that are visually and spatially linked in a series of networks. The concept of Continuous Productive Urban Landscapes from the book has been adapted and integrated into the final design work of this thesis.

The essays and case studies in the *Food + the City* issue of popular magazine, *Architectural Digest*, further looks at the benefits and importance of urban agriculture in helping obtain food security. It provides a comprehensive look at food in different cities around the world. The essays are written by a diverse set of authors, including an environmental psychologist (Karen Franck), architect (Rachel Hurst), urban designer (Susan Parham) and design educators (Jane Lawrence and Gil Doron). The essays touch on what food can bring to small- and large-scale urban areas, what markets and informal eating venues can bring to city life, ways that food in the city breaks boundaries between classes, and who benefits/loses when it comes to gastronomic culture and urban regeneration. The concrete examples given in the essays are useful for developing a set of case studies and precedents. These examples include an analysis of Australia's eating places; different scales of urban agriculture found all around the world - from window box herb gardens to city farm; and a look at successful gastronomic quarters such as Campo dei Fiori in Rome, and Borough Market in London.

Most theoretical and polemic literature, and design iterations and initiatives, in the developed world are for dense cities like London or New York City. Or there are historic food-city plans such as Le Corbusier's Radiant City, and Ebenezer Howard's Garden City -- two central icons of modernism -- that posit starting from scratch. There is also a lack of new critical design focus on the suburbs when it comes to food, and how exactly critical players in urban development and design can get involved. This is the knowledge gap that this thesis seeks to fill: it connects the major players, like big-box supermarkets, with sustainable food strategies in what will be medium density, growing suburban cities, in an overall strategy that is initiated through spatial design.

COMPLEX SYSTEMS AND DESIGN PRINCIPLES

The design principles established in this thesis are based on the factors needed to create sustainable food systems in cities (see Food Systems Solutions), on complex ecosystems thinking, and on the idea of “resilient cities”.

Complex ecosystems thinking was pioneered in part by environmentalist, urban activist and University of Waterloo faculty member, James Kay. Such a systems approach means looking at the relationships between a number of inter-linked and hierarchic factors such as abiotic, biotic, cultural and energetic aspects of a complex situation. The approach embraces uncertainty and unpredictability as a central

organizing principle. Such work is echoed in *Thinking Resilience* by the notable educator (and creator of the "ecological footprint" concept), William Rees, in the *Post Carbon Reader*. Linear, reductionist views of system behaviour are being replaced by a more integrative analytical methodology, where ecological, social and economic systems are seen as interlinked and always changing and adapting. In *Cities People Planet*, cities are described as "eco-technical systems" by Herbert Girardet, co-founder of the World Future Council and documentary producer. He argues that the linear metabolism and infrastructures that support many modern cities needs to be replaced by circular systems that mimick the closed-loop cycles of nature -- in effect, a complex ecosystem approach.

At website ResilientCity.org, resilient urban design concepts are also largely based on closed-loop principles and on stepping away from fossil fuel dependence, creating circular metabolisms. The ongoing discourse and design strategies proposed on that website have greatly influenced the design principles applied to the Heartland Town Centre in this thesis.

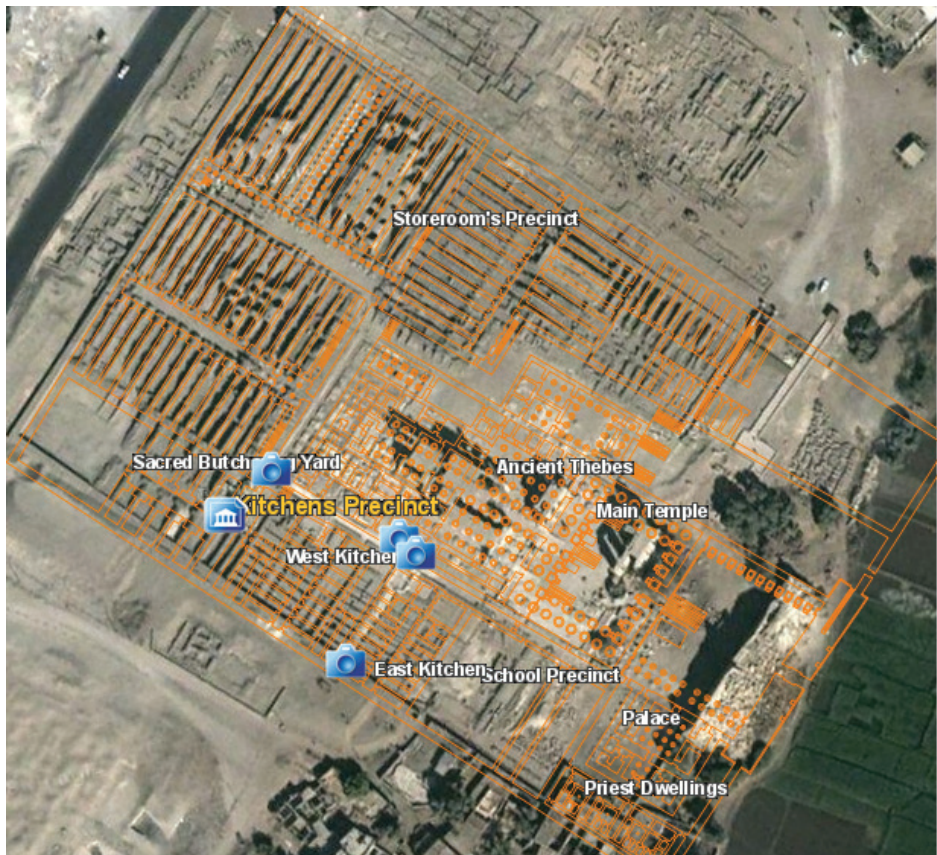


Fig. 2. The Ramessesum at Thebes, 1279 BCE

PART 1: How We Got Here

1.1 The Historic Relationship Between Food and Cities

Historically, urban settlements formed simultaneously with the advent of agriculture. Productive, agricultural lands on the earth can be traced back thousands of years to the early civilizations that boomed in places like the Fertile Crescent. Land and the countryside were valued in those societies, and agricultural rites were often tied to the founding of cities and the appeasing of gods. Managing the food supply was the responsibility of powerful civic authorities, as such a task was much too important to leave in the hands of outsiders. Therefore, the temple, which was often the backbone of early urban settlement, served dual purposes: it was a place of religious significance, and it was central for the storage and organization of food. The Ramesseum at Thebes, for example, is an urban artifact from ancient Egypt (Fig. 2), that could hold grain to support 3,400 families (Steel, 2008, p.77). Food itself was a renewable resource based on the sun's energy and the predictability of climate. Muscle power from humans and animals alike was used to cultivate land and transport food; diets were co-ordinated with growing seasons and geography; storing food required building typologies with root cellars, or the creation of processes for preserving food through natural means; and food was cooked by fire, and packaged in reusable or biodegradable materials (Bomford, 2010).

In the pre-industrial world before the advent of modern



Fig. 3. John Ogilby's "A Large and Accurate Map of the City of London", 1676

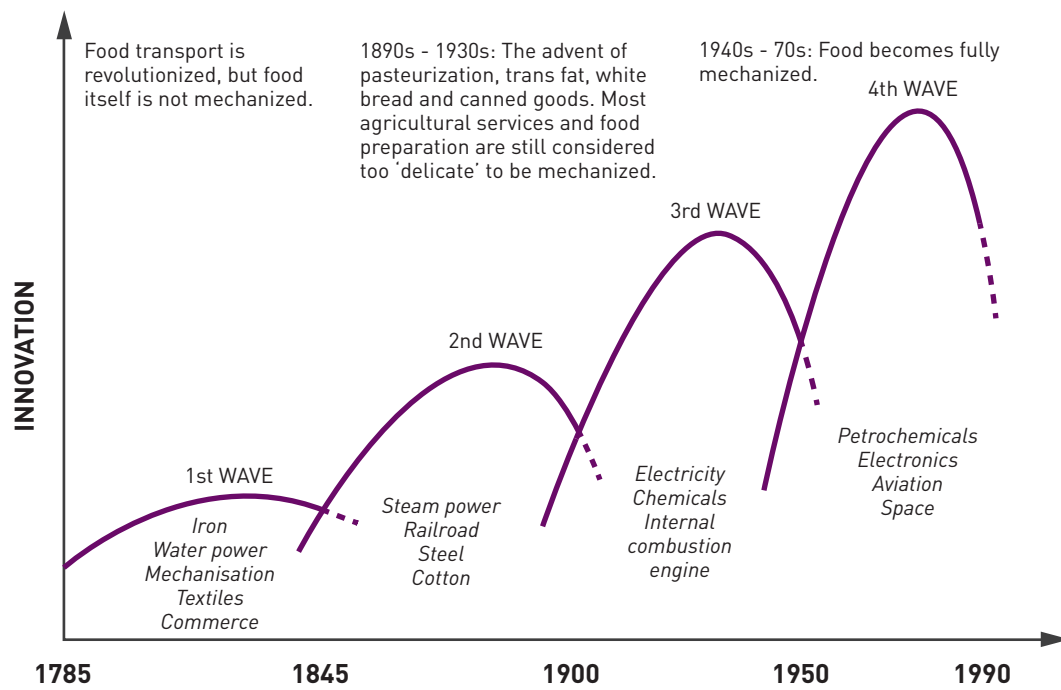


Fig. 4. Waves of innovation into the 1990s

railways, transporting food over large distances was difficult. Given the physical challenges of doing so, cities were often small in size and compact in form. Local food supply limited the growth of cities and to sprawl unnecessarily over farmland was not done willingly. Transporting grain harvests over long distances and by ship over water ran the risk of rotting food. Meat, such as cattle, however, could literally “walk themselves to the market” (Steel, 2008, p.67). Livestock could therefore be raised farther from urban cores. Despite this advantage, animals were still slaughtered as close to the market as possible, often in the open. The sights and smells of animal slaughter were an integral, albeit not too pleasing, aspect of pre-industrial city life. Street names in towns and cities also reflected the influence of food. In London, United Kingdom, for example, one can find street names such as Corn Hill, Bread, Garlick and Fish Streets to name a few, suggesting a time when city streets were teeming with edible perishables. Food, food production and storage could not be easily housed in closed stores, therefore open markets became urban food hubs and central public spaces (Steel, 2008, p.120).

Markets were the primary source of food for urban populations all over Europe well into the 19th century. They were the nuclei of cities, forming significant nodes with arterial streets leading into them. City plans, such as John Ogilby’s *Large and Accurate of the City of London* in 1676 (Fig. 3) are testament to this (Steel, 2008, p.118). Since markets were often the only large,

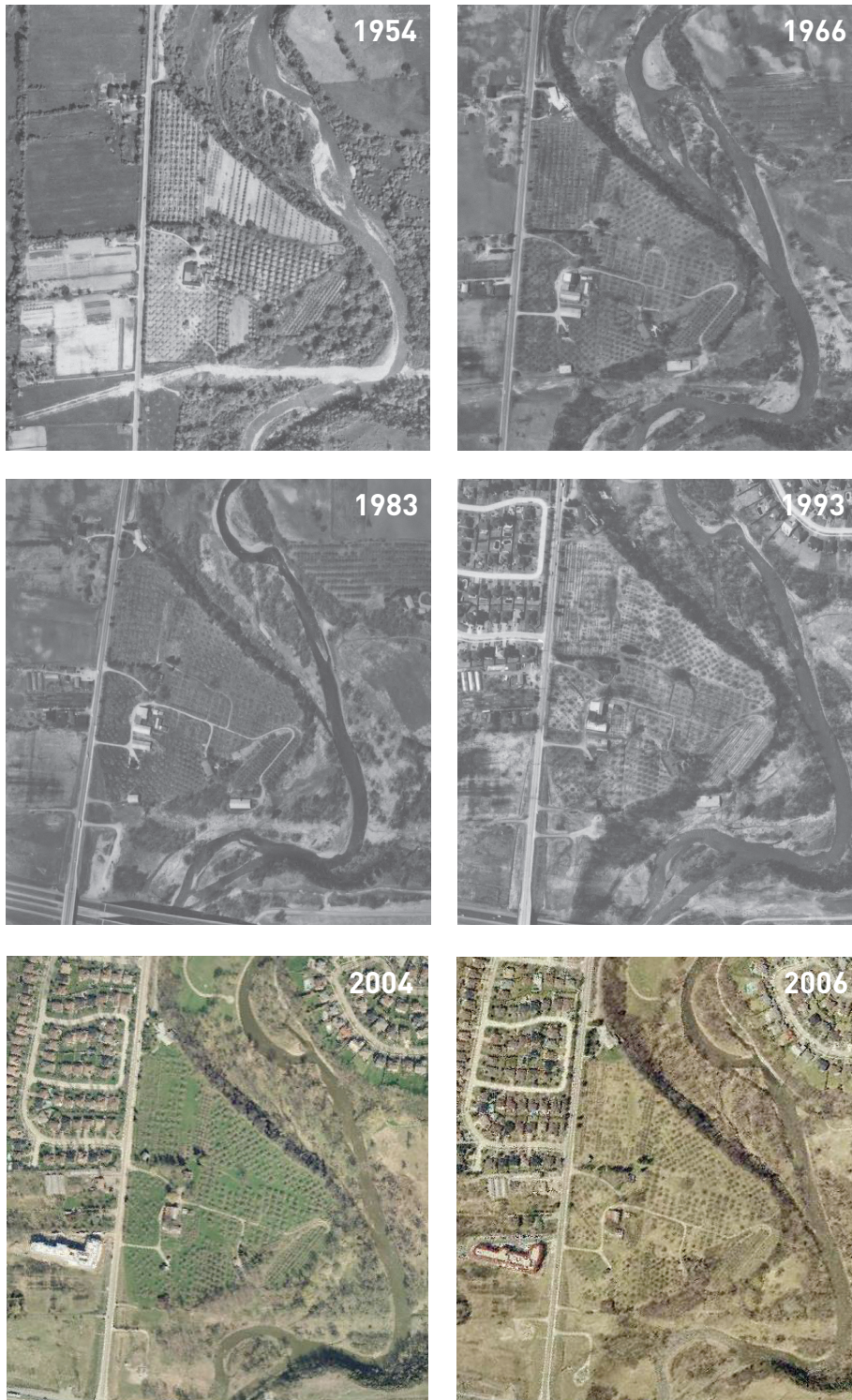


Fig. 5. *The disappearance of Riviere Fruit Farm, Mississauga*

The Riviere Fruit Farm, near Mississauga Road and Highway 403, was the last orchard to survive development. It operated from 1926 until 2004 through the Pinchin Family. This is where local apples were grown. The aerials show transformations as subdivisions surrounding the property grew. The orchards were mostly planted in the 1930s. As years went on, the property was severed until only 33 acres remained. Towards its latter days, the owners also started raising and selling turkeys.

open public spaces, they also doubled as civic and ceremonial spaces attracting public fountains and major buildings. Food was thus tied to civic life. For example, London's central food market of Cheapside was transformed to host the arrival of queen Mary de Medici. The food processing and retail establishments around markets, such as butchers, bakers and public eateries, are other examples of spaces inhabited by food. In *The Death and Life of Great American Cities*, 20th century urbanist Jane Jacobs, remarked that good streets are still animated by people engaging with food, thereby creating a sense of community and local identity.

1.2 Food and Cities Today: From Visible to Invisible

The arrival of the railways in the mid-19th century started to change the face of cities. Food could be brought in from far-off regions. This new relationship began a disconnect from food production and cities that has become so prevalent today. The waves of technological and infrastructure innovation and the way they changed the food system into the 1990s is shown in Fig. 4. The greatest transformation to industrialized cities and the food system, however, began in the 1940s when cheap fossil fuel energy became the backbone of contemporary urban economies.

What did such cheap fossil fuel energy mean for the way cities were built in North America? Automobiles accelerated the growth of suburbs on urban peripheries and

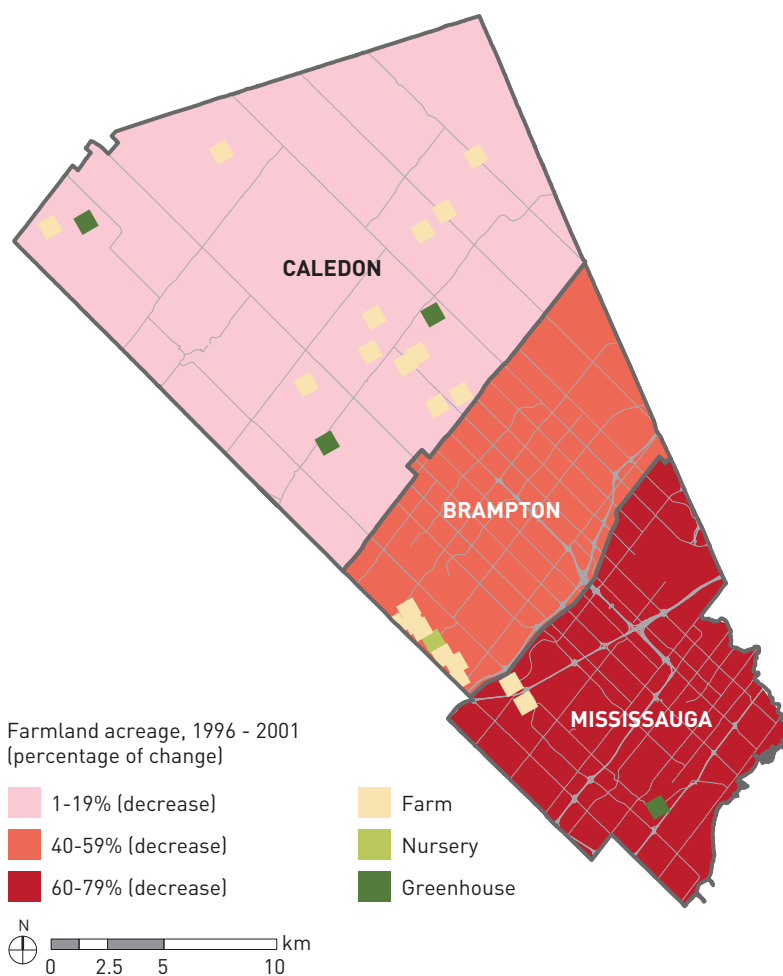


Fig. 6. *Farm Land, Peel Region (2009)*

Over the last few decades, there has been a significant loss of farmland in Mississauga. Today, only two family farms are remaining and both sell meat and dairy. No orchards are left. In 1976, the total farmland in Peel was 155,507 acres culminating in 1064 farms. In 1996, the total acreage dropped to 120,026 acres, comprised of only 689 farms.

decoupled cities from their agricultural hinterland. While suburbs grew in North America for various reasons, two of the main driving factors were large-scale road building initiatives in the 1920s to the 1970s, and mass-produced automobiles that quickly gained popularity - all due to the cheap and abundant supply of energy (a gallon of gas was \$0.18 USD in the 1950s) (Peirce, 2007). In 1945 to the 1990s, suburbanization occurred in America at unprecedented rates and followed the new highways. New forms of food retail such as interior markets and supermarkets grew. By the mid-1950s, small "ma and pa" grocery stores were a distant memory and in their place were larger-scaled supermarkets with comprehensive offerings. By the 1990s, these became supercentres and more Americans lived in suburbs than in urban and rural areas combined (Peirce, 2007). As subdivisions grew and land uses were reconfigured, an incredible loss of agricultural land ensued. In relation to Mississauga, this is illustrated by Fig. 5, Fig. 6 and Fig. 7.

What did cheap fossil fuels mean for the overall food system? They distanced the gap between producer and consumer due to cheap transportation. They increased output due to synthetic fertilizers, pesticides and other petrochemicals in the Green Revolution; and they mechanized farming which in turn reduced the need for human labour and reduced the price of food. Today food prices are heavily correlated to the price of crude oil, as was seen in the food crisis of 2007-2008. Starting in the 1950s, developed nations saw the beginnings of

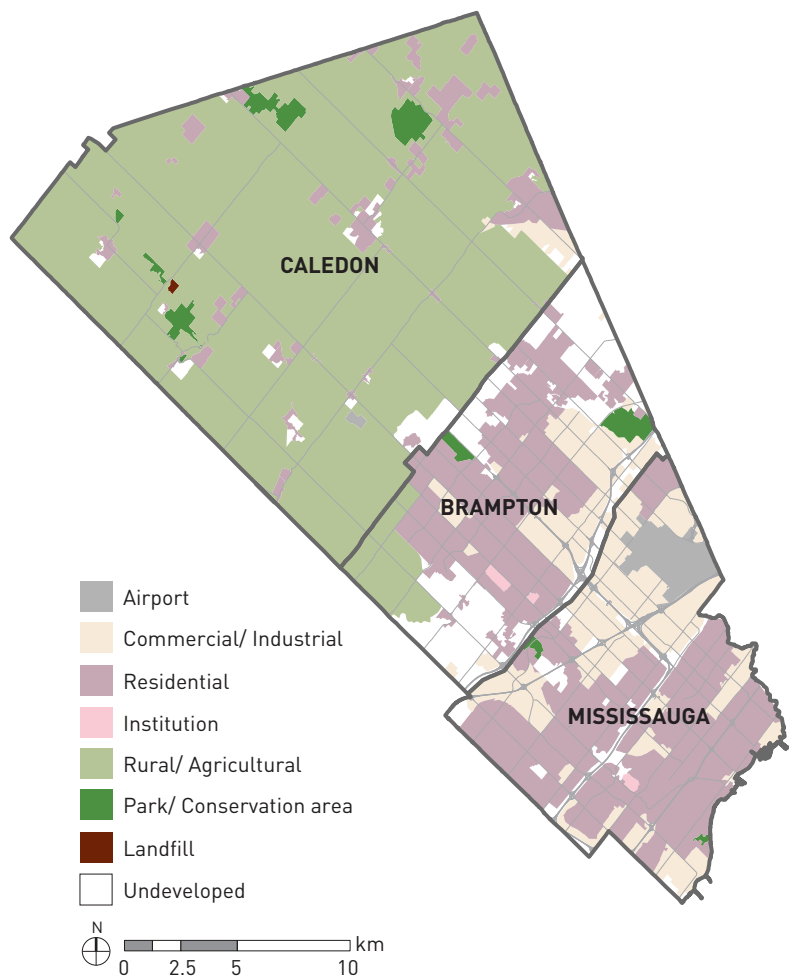


Fig. 7. Land Use, Peel Region

As development pressures mount, more and more farmers sell off land to developers resulting in what we see in Mississauga's land use plan today. Most agricultural areas are in Caledon, while few remain in Brampton and virtually none in Mississauga.

what is now our global food system. The Industrial Revolution that had taken place in factories in the 1800s was applied to agriculture and food processing in the form of nationalized industrialization, centralization and compartmentalization (Toronto Public Health, 2010, p.10). It was believed that industrializing the food system via the Green Revolution of the 1960s and 1970s - at a time of cheap fossil fuels for diesels, pesticides and fertilizers - would increase food production and thus, the quality of life for all the world, not just wealthy nations. At this point, “agribusinesses”, the dominant food players in the market, came onto the scene.

In *The No Nonsense Guide to World Food*, author Wayne Roberts describes eight major changes that modernism brought to the food system:

- 1) It changed how food was produced (increased mechanization).
- 2) It changed who produced food - it was no longer the farmer but a general labourer who worked for agribusiness.
- 3) It changed where food was produced; suddenly all types of food qualified for outsourcing, rather than just luxury items.
- 4) Food became heavily processed before being sold (the addition of chemicals and forms of packaging for example, as opposed to being bought in a no frills manner in bulk).
- 5) The point of purchase for food shifted away from the farmers market and local store, towards the supermarket and today, even the gas station and drug store.
- 6) It changed how food at home was prepared – household skill

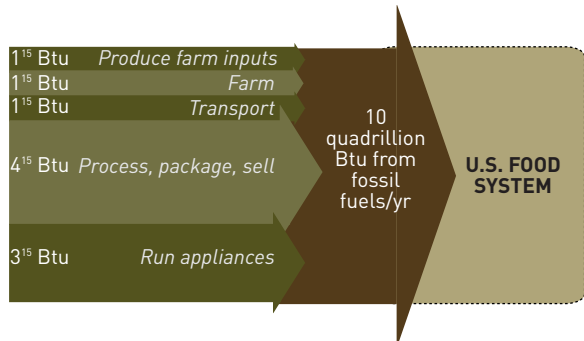


Fig. 8. Fossil fuel energy distribution in the American food system

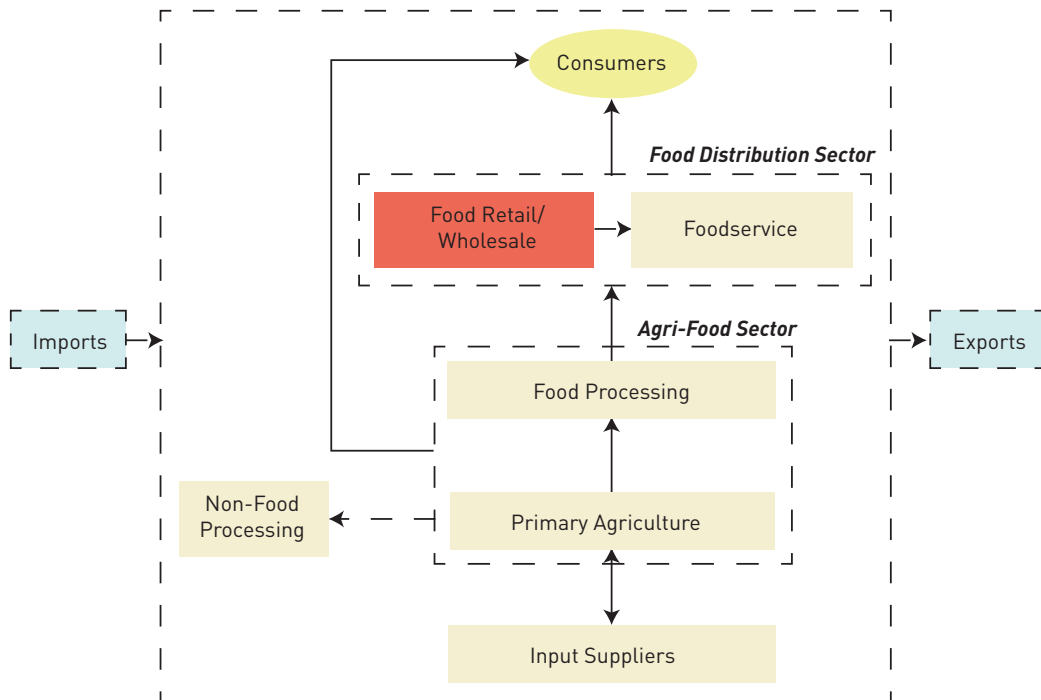


Fig. 9. The Canadian Agriculture and Agri-Food System

levels declined with the use of appliances and ready-meals.

7) It changed where food was eaten, with less eating in the kitchen and more eating in front of screens or in restaurants.

8) It changed how food was eaten. What was once a social activity that involved rituals, intimacy, and celebration, became replaced by rushed solo meals on the go, disconnected from nature, tradition and social connections.

This shift towards reliance on non-renewable energy over a short period of two hundred years is fairly new in human history, yet has had a profound impact on the way we live and on our food system. In 1840, just before the industrialization of cities, the American food system depended more on renewable energy sources; labour in the system came from 70 percent (12 million) of the population. By 1900, less than 40 percent of the population (30 million) farmed, and 3 quadrillion Btu of fossil fuel energy was consumed by the food system. Today, less than one percent of the population (2 million) farm, and the fossil fuels consumed to support the entire food system is 10 quadrillion Btu (Bomford, 2010). Fig. 8 shows current fossil fuel energy distribution. Each calorie of food requires approximately 7-10 calories from fossil fuels to reach the plate. (Bomford, 2010). Food is no longer a renewable resource but an industrial product.

Our past to present relationship with food is one that has gone from being largely visible, directly and visually linked to the growth and welfare of a civilization, to becoming

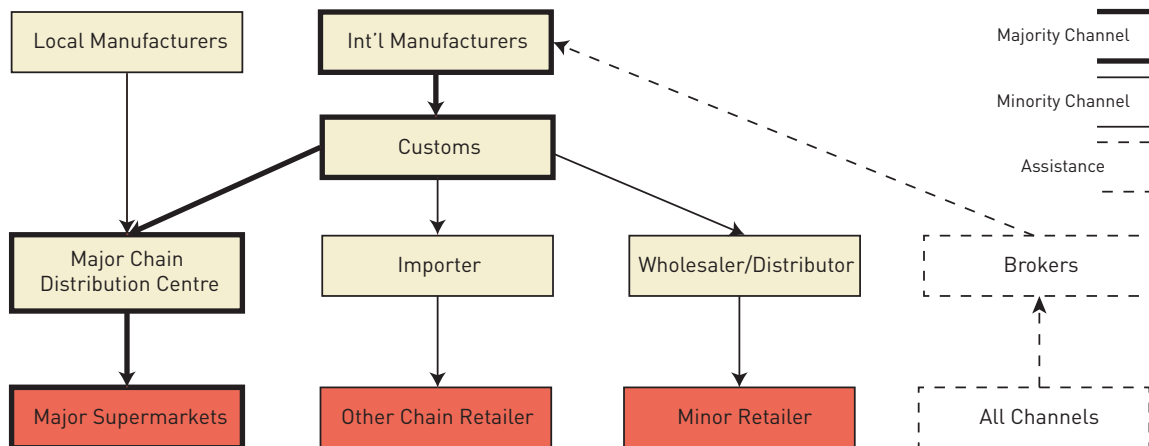


Fig. 10. *Simplified Supermarket Distribution Channels in Canada*

A large amount of imported food enters the Canadian marketplace through intra-company transfers by major supermarkets. These major supermarkets, who are all involved in wholesaling and retailing, have distribution centres where large volumes of products are directly transported. Chain-owned warehouses may also supply independent grocers and franchised stores.

virtually invisible in our cities. Food enters and leaves in a process unbeknownst to most citizens. The Canadian food system is shown in Fig. 9 and Fig. 10. There exists a mobile, invisible food system today, where food simply passes through and appears on supermarket shelves, regardless of local limits of climate or season. This is what Nina-Marie Lister, Associate Professor of Urban and Regional Planning at Ryerson University, calls "placeless food". In *Placing Food* she writes: "The elemental knowledge of what we eat is disappearing... On the table, seasons no longer matter; nor does distance traveled, cost, or the farmers' name." (p.150). Today, the acts of growing, preparing, eating and sharing food in modern cities have been undervalued in day-to-day existence.

Distribution flows in our current food system are no longer restricted by geography, and are no longer tied to the local economic, natural energy and economic flows of the city products are sold. As Pothukuchi and Kaufman write in the journal of *Agriculture and Human Values*:

...the technologies of the industrial revolution that mechanized farming, transportation, refrigeration, and food processing in industrial countries ensured that even when suburbs and exurbs swept through previously rural terrain, the loss of local farmland that historically served cities, went unnoticed in local grocery stores. Food was always "there", unproblematic, even if no longer local (p.214).

Our food system is invisible to us due to three main reasons:

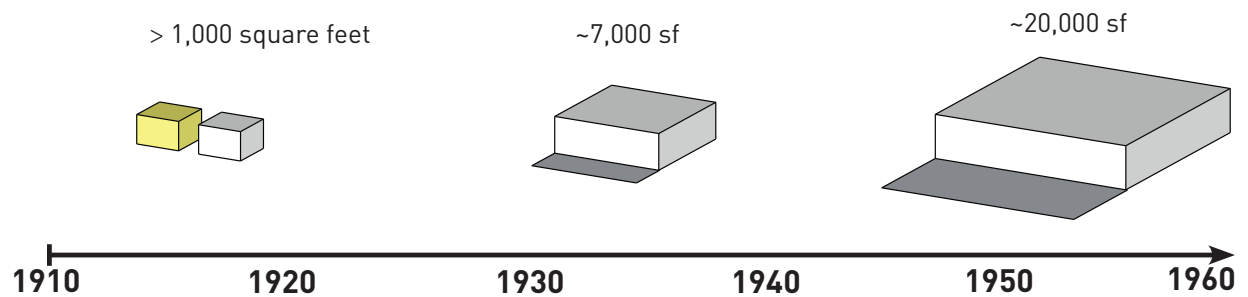
- 1) Modernization that leads to the loss of farmland that once served urban areas goes unnoticed because food is always “there” in supermarkets (Pothukuchi et al., 1999);
- 2) Supermarkets promote a false sense of security. Urban dwellers often take the food system for granted and the bigger the gap between producer and consumer is, the less comprehensible the system is. This has the effect of reducing a citizen's ability to challenge the status quo (Viljoen, Bohn, Howe, 2005, p.21); and
- 3) Food has not been seen as an urban issue in policy making, one that is on par with transportation, housing, or employment for example. There is an institutional separation between urban and rural policy (Pothukuchi et al., 1999). The time-tested and positive, symbiotic relationship between a city and its hinterland has deteriorated over the last 200 years (Smit, 2005). The disappearance of food from the urban fabric has had many “unintended consequences” both nationally and globally that are described in Section 1.4, showcasing a need for change.

1.3 The Supermarket

The industrialization of food and the rise of supermarkets and suburbia go hand in hand. Unlike in ancient Mesopotamia and medieval Europe, the supply of food today has passed beyond government control and into the hands of private businesses, lending further to its invisibility. Where once public markets were the nuclei of cities, with food passing through them, we

now have private supermarkets in buildings that have become quintessential hubs in their own right. The supermarket is the dominant form of food retail in the suburbs today and a physical manifestation of corporate globalization. Fig. 11. shows how supermarkets have increasingly become ever larger elements in the urban fabric. Unlike public markets, however, supermarkets are not shared civic spaces and do not play a further civic role. They are often suburban, corporately-run, “non-places” that offer no sense of local identity created by the public itself.

Industrialized food and big-box supermarket formats have proven to be efficient and profitable for those in the developed world, whether in North America, Europe, and now even in a modernizing Asia. The industrial food system has brought benefits for consumers: an abundance of food at low prices, the availability of diverse produce at any season, and the mechanization of once backbreaking and even dangerous work. It has, however, prioritized mass production over social and environmental well-being. While big-boxes have offered lower prices, squeezed inefficiencies out of the system, offered convenience, longer hours of operation, one-stop shopping, and free and ample parking; they have brought crowds and traffic congestion, created exhausting and disorienting semi-public spaces, lack transparency/community control, lack satisfactory service, have global supply chains with globalized environmental costs, and have caused the destruction of historical urban areas and the closure of small businesses (OCA, 2004).



Early 1900s:

The first self-service store: The Piggly Wiggly in Memphis, USA, 1916 by Clarence Saunders. He offers food at very low prices, at the expense of eliminating the communal aspect of the all-purpose ma and pa stores that Americans were accustomed to buying their food from (Steel, 2008, p.136).

Primarily offers dry groceries. Butchers and "green grocers" (wet produce) are still separate but usually clustered together for convenience. Chains such as Safeway, Kroger and A&P start developing and expanding nationwide. Self-service stores start appearing all over America.

1930s - 40s:

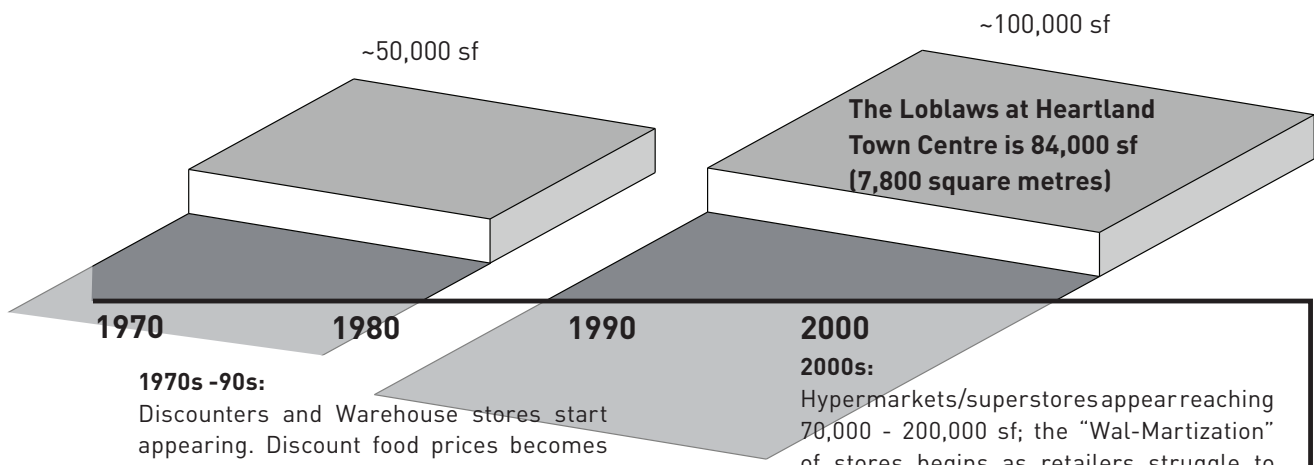
Supermarkets start appearing; chains start merging. Free parking is offered. Utilitarian, no frills design.

1950s-60s:

The "Golden Age" of the supermarket. Increasing suburbanization accelerates growth. Standardized designs and architectural branding are used to develop identities for chains (i.e. glass arches of Safeway). They become "one-stop shops" with a variety of grocery products and general merchandise as well.

Fig. 11. Evolution of the Supermarket Format

Supermarket structure today primarily falls into that of the "big box" format, which are increasingly dominating the Canadian retail landscape. Yellow denotes mixed use.



1970s -90s:

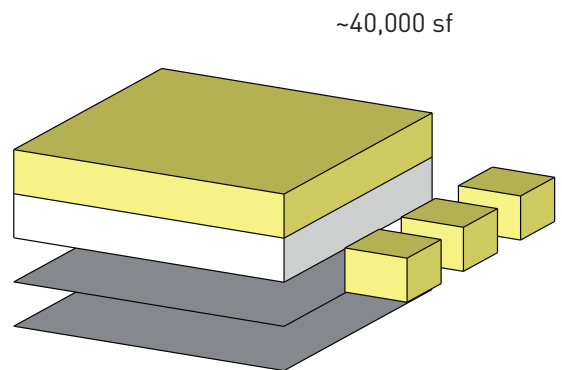
Discounters and Warehouse stores start appearing. Discount food prices becomes popular (large volumes, low prices). Free parking is abundant.

Average store size in the 1970s is 20,000 sf.

Upscale grocers provide a different shopping experience to the discounters. Average store sizes in the 90s is 50,000 sf.

2000s:

Hypermarkets/superstores appear reaching 70,000 - 200,000 sf; the "Wal-Martization" of stores begins as retailers struggle to compete with Wal-Mart Supercentres (which enter the Ontario market in 2005).



2020+

Population growth, urbanization, environmental challenges, economics and food security issues force supermarkets to redefine themselves. Average store size is 40,000 sf. Parking is integrated. Other uses (commercial, residential) are stacked and/or closely related to supermarket infrastructure.

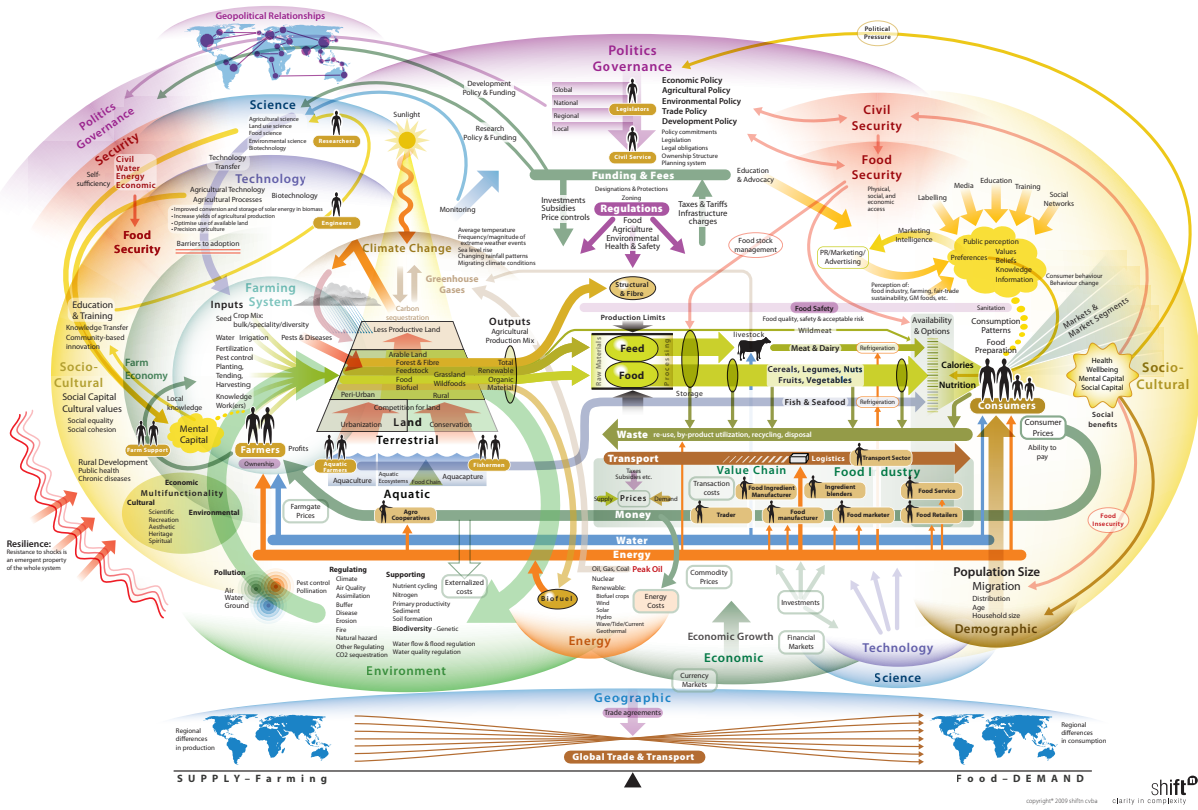


Fig. 12. Global food system map

This illustrates the large, complex and interconnected nature of the global food system which modern cities rely on. It highlights the major players involved and showcases how food is involved in virtually every essential system and aspect of life (from energy production, cultural trends, to transportation etc.).

1.4 The Need for Change and its Drivers

Three major issues regarding the food system for the developed urban landscape drive the need for change. These issues showcase that if things continue as is, modern society is headed to some form of systemic collapse. They are: environmental degradation leading to climate change, peak oil, and a broken and vulnerable food system brought down by both climate change and the loss of cheap energy sources.

These are not entirely new scenarios. In 1972, a think tank at the Massachusetts Institute of Technology (MIT) known as the Club of Rome, released a report titled *The Limits to Growth* (Meadows et al., 1972). It used early computer modeling to examine three future global scenarios: “standard run”, “comprehensive technology” and “stabilized world”, based on the way five subsystems of the global economic system (population, food production, industrial production, pollution and consumption of non-renewable resources) interacted with each other. A time scale from the year 1900 to 2100 was used (Turner, 2008). The essential message of the results of the modelling was that:

continued growth in the global economy would lead to planetary limits being exceeded sometime in the 21st Century, most likely resulting in the collapse of the population and economic system; but also that collapse could be avoided with a combination of early changes in behavior, policy and technology (Turner, 2008, pp.1-2).

Almost four decades later in 2008, the Commonwealth

Scientific and Industrial Research Organisation in Australia tested the predictions of the original MIT report. Using more powerful computers, more sophisticated modelling techniques, and more recent data, author Dr. Graham Turner concluded that the “standard run” (business-as-usual) scenario is not far off, while the “comprehensive technology” and “stabilized world” scenarios are overly optimistic. All five of the subsystems the model is based on have grown and are growing today with the anticipated adverse effects.

Environmental Degradation

According to Jared Diamond, biologist, social ecologist, and author of the popular book *Collapse*, the processes by which past societies have undermined themselves can be straightforwardly listed. Eight of Diamond's twelve processes are environmental issues directly related to and compounded by our current food system:

1) *Deforestation and habitat destruction* - Shifting land uses to commercial agriculture from forests accounts for 50% of the deforestation that is taking place worldwide, according to the FAO (Murray, 2010).

2) *Soil problems* - Food production annually extracts approximately 270 million tonnes of nitrogen and phosphorus from soil, in addition to other nutrients, and does not redistribute them effectively. Forty percent of soil nutrient loss is due to erosion primarily caused by inefficient and unsustainable agricultural

practices (Arup, 2009, p.16).

3) *Water management problems* - Conventional agriculture is very dependent on water resources; it consumes about 70% of the world's freshwater (Murray, 2009), leaving 24% of the world's river basins in distress (Arup, 2009, p.20), in a time when the United Nations' 2003 *World Water Development Report* lists water management as humanity's most serious challenge for the 21st century.

4) *Overhunting* – An alarming amount of species and genetic biodiversity has been lost. According to the FAO, 75% of the genetic varieties of crops has been lost since the 1900s (Arup, 2009, p.18), as farmers increasingly favour monoculture farming.

5) *Overfishing* – The FAO reports that almost 80% of the world's fisheries are fully or overexploited, depleted or in a state of collapse (Arup, 2009, p.17). Fish is the most widely eaten source of live protein.

6) *Effects of introduced species on native species* –Although genetically modified (GM) foods have brought benefits such as improving crop resilience, their environmental risks include constricting vertical/horizontal gene flow, invasiveness, reducing biodiversity, and contaminating other species.

7) *Human population growth* - Global population is increasing, thus meaning more food, space, water and energy resources are being consumed to sustain life. Its stabilization point is unpredictable.

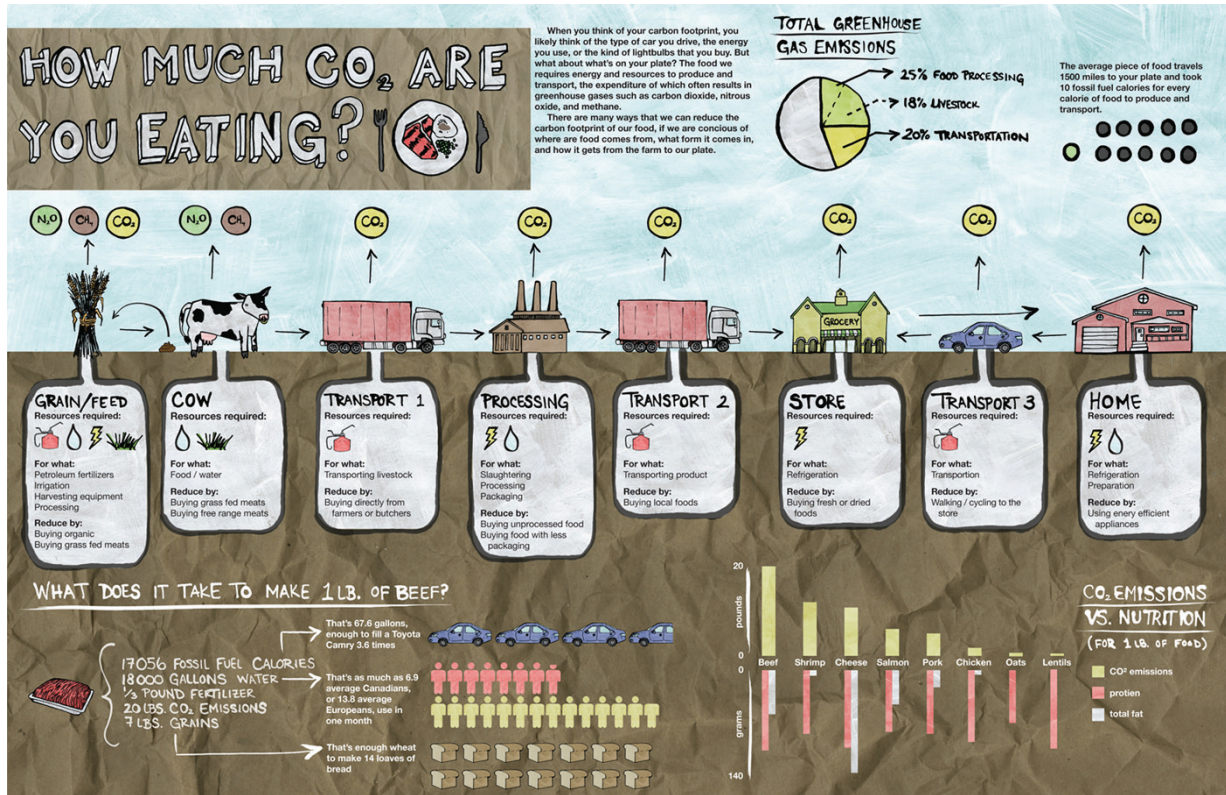


Fig. 13. Greenhouse gases embedded in the food chain

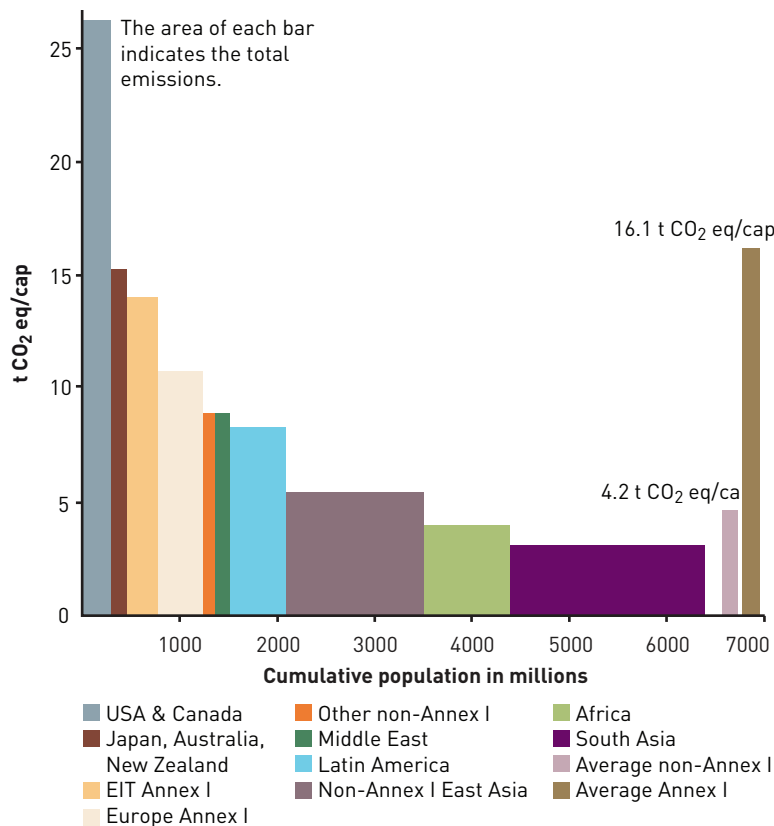


Fig. 14. Per capita emissions of greenhouse gases for populations in different parts of the world

8) *Increased per capita impact of people* - The problem with unprecedented population growth is the ecological footprint of each citizen. Citizens in developed nations such as the United States, western Europe and Japan, consume thirty-two times more resources than those in the developing world (Diamond, 2005). However, even this is changing as once "low-impact" people, such as those in developing countries, are adopting high-impact living standards.

9) *Human-caused climate change* – Climate change affects the food system, and the food system affects climate change. They are interrelated processes. In 2007, the Intergovernmental Panel on Climate Change (IPCC) concluded that global temperatures will increase between 1.1 and 6.4 degrees Celsius. The effects of climate change (temperature rise, changing weather patterns, water scarcity, flooding) will effect food production. As previously described, the food system is heavily dependent on fossil fuel energy which contributes to greenhouse gas emissions. The food system is responsible for 30% of pollution and greenhouse gas emissions (Toronto Public Health, 2008, p.12). The embedded carbon in the food system is illustrated in Fig. 13. A 2006 study by the FAO found that livestock farming/meat production is responsible for emitting more greenhouse gases than the world's transport systems (Murray, 2010). Meat consumption has been on the rise, exacerbating the problem. The production and consumption of food represents almost 1/3 of the UK's carbon footprint; this figure is likely

to be similar for other developed countries (Millstone, Lang, 2008; Murray, 2010). Furthermore, agricultural activities, such as animal production units and nitrogen fertilizers, emit a significant amount of methane and nitrous oxide into the atmosphere. Although it is predicted that climate change will have the most detrimental effects on the Global South, Fig. 14 shows that much responsibility lies in the Global North due to a disproportionate and higher emissions per capita.

10) *Buildup of toxic chemicals in the environment* - The industries that support our food system contribute pollution into our environment through the use of fossil fuels. Water pollution problems are further exacerbated when chemical fertilizers and pesticides used on farms seep into local water systems.

11) *Energy shortages* - Since the world relies heavily on fossil fuels for cheap energy, there will come a time when oil, natural gas and coal will not be as readily accessible as they are today. This means that the methods of finding deeper reserves will most likely come at a higher environmental cost.

12) *Full human utilization of the earth's photosynthetic capacity* - A plant's ability to fix solar energy (to grow) depends on its geometry and biochemical structure, and temperature and rainfall. This "photosynthetic ceiling" was first calculated in 1986, and it was estimated then that humans had already used, diverted, or wasted around half of Earth's photosynthetic capacity (Diamond, 2005). Taking into account the rates of population growth, it is predicted that most of the earth's photosynthetic

capacity will be used by mid-21st century.

Jared Diamond's *Collapse* describes how environmental degradation have caused past societies, such as the Easter Islanders to collapse, and states that modern society can still learn from these past examples. He acknowledges the obvious differences between modern society and ancient societies - namely, technological innovations and intellect. However, he also highlights two other differences that do not work in our favour: 1) Population increase, which also increases how much is at risk, and 2) Globalization, where now, a highly populated world is increasingly connected to the point where tensions in one society can easily spill onto another; the problems of environmental degradation, disease, human rights issues, etc, become everyone's problems. The issue of collapse is not a thing of the past, only described in textbooks about ancient societies. It is a very real concern. Yet Diamond also takes a view of "cautious optimism". He advocates the view of the Dutch, amongst the world's most environmentally aware citizens, who see the world as one self-contained unit, where all are interdependent on each other. He sees reasons for hope in top-down and bottom-up approaches, and states that the solutions to the twelve issues listed above are within our grasp and control.

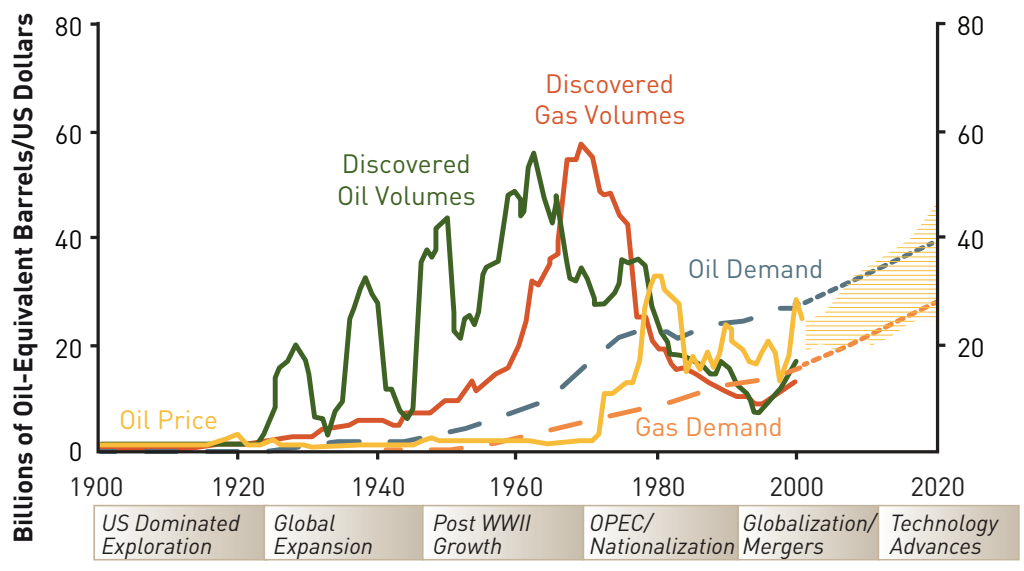


Fig. 15. Fossil fuel projections through 2020

Peak Oil

As journalist and activist filmmaker, James Howard Kunstler, adamantly and unapologetically describes in his recent pessimistic work, *The Long Emergency*, we are at the end of the cheap fossil fuel era. In 2005, he wrote that based on research by experts, global oil production peak would occur sometime between 2000 and 2008 (Fig. 15). This would require a tremendous shift in the patterns of daily life in the developed world for: “It is no exaggeration to state that reliable supplies of cheap oil and natural gas underlie everything we identify as a benefit of modern life” (p.2).

As outlined earlier in this work, the food system also relies on cheap, non-renewable energy sources. The processing, packaging, transportation and storage of food accounts for 80% of the energy used to place food on the table (Lim, 2010, p.101). In the United States, this system uses an estimated 15% to 20% of primary energy use (TFPC, 1999). Produce traveling by air uses more than four times the amount of energy by weight as road transport, nearly 40 times more than rail, and 44 times more than marine (Ngo & Dorff, 2008). The average food item sold in Toronto has traveled nearly 4,500 kilometres (TPH, 2008).

A Broken and Unjust Food System

Clearly, there is a need for change driven by the sheer global injustices and local inadequacies in the food system.

As a global community, we are food insecure. The present, industrial food system has produced an abundance of food, but has neglected to embed equitable distribution patterns. Exploitation, poverty and human rights violations are inherent in this system. The \$6.4 trillion food economy has ironically impoverished more people than any other economic sector; around 170 million food producers are child labourers (W. Roberts, 2008, p.15). There are over 7 billion people on the planet today, close to 1 billion of which suffer from chronic hunger according to the United Nations. In Canada, the majority of the population knows where their next meal is coming from and have enough resources to prepare a meal, and Canadian spending on food is among the lowest in the developed world (Agriculture and Agri-Food Canada, 2001). Still, over 7% of Canadian households experienced food insecurity in 2007-8 (Health Canada, 2011) and in 2005, HungerCount (2006) estimated that more than 800,000 Canadians visited a food bank in a typical month. The number of Canadians relying on food banks is at a record high.

To highlight more global imbalances, a few countries that were once self-sufficient, such as India, are now importing large quantities of food (Magdoff, 2008, p.4). Developed nations have become highly dependent on imported food from countries that are beginning to impose export restrictions (Lim, 2010) so they can continue to feed themselves. Ironically, Canada is one of the world's leading producers and suppliers

of high quality foods, however, it is still import-dependent (Agriculture and Agri-Food Canada, 1998). As a case in point: Canada has the ability to produce excellent domestic apples – there were almost over 4,000 farms reporting harvesting of apples in 2006. However, the United States is both our top apple exporter and importer. Canada spends more than three times as much importing apples than it receives in fresh apple exports (Ngo et. al, 2008). With many more examples like this, over 30% of a Canadian’s diet today comes from imported food (Grant et. al, 2011).

Food production and distribution was once in the hand of civic authorities, so it could be managed and controlled to provide adequately for the city overall. Today, world food is not controlled by regional governments, but rather by a small number of transnational corporations. These lack regulation and accountability, adding an elusiveness and opaqueness to a system that is crucial for our sustenance. Seventy-five percent of human food is grain-based, and three companies, Cargill, Archer Daniel Midlands and Bunge, control about 90% of the global grain trade (Arup, 2009, p.11). When a country depends largely on the global, opaque, corporate food system for its food supply, it places itself at risk from the shocks faced from that system. As a result of higher gasoline prices, for example, the Canadian Consumer Price Index rose 2.4% from December 2010 (Statistics Canada, 2011).

As the control communities have over their food has

been relinquished to multinationals, there has been a significant loss in food traditions and food literacy. This is not just a North American trend. In the United Kingdom, ready-meals are used in 77% of households (Arup, 2009, p.5). The loss of farming/growing food as a skill is sweeping all developed nations as a younger generation seeks less physically demanding and more profitable work.

At a smaller, local scale and from a civic health perspective, produce on supermarket shelves is at least 5 days old, and have lost most of their nutritional value. Preventable diet and inactivity related diseases are associated with an estimated 20,000 to 47,000 premature deaths in Canada every year, and food-related diseases resulted between \$2.5 and \$4.6 billion in healthcare spending, responsible for draining between \$5.3 and \$9.9 billion a year from the Canadian economy (Serecon Management Consulting Inc., 2005). Ironically, despite the food availability crisis for many, the World Health Organization (WHO) also considers obesity an epidemic and as proof, diabetes rates are increasing. Diets today are more based on processed foods and often contain a lot of salt, sugar, animal proteins and processing chemicals. There are increasing concerns over food safety from diet sources.

Our food system is clearly "broken" and a new discourse needs to take place; this discourse can address the limits to growth and prevent collapse. A city's health, prosperity, and from what it looks like, its very survival, is linked to the security

and quality of its food supply.

This thesis looks at creating sustainable food systems through localizing food and creating healthy environments via major players in the suburban environment. These players are described in the following Part 2. The question of what this looks like is explored in Part 3. Here, an exemplary area in the City of Mississauga, that has been shaped by the forces described in Part 1 is examined on two scales; one at an urban scale, and the other at a block scale. This was done to help visualize what an intervention in a local context could look like.

Table 1. Benefits of Implementing Urban Agriculture

SOCIAL	<p>UA projects often build community cohesion, civic ownership, spread awareness on food knowledge and skills, provide leisure and recreation, and beautify neighbourhoods. A focus on local, seasonal foods and recipes, through engaging in food activities, fosters a sense of community that crosses culture, age, gender, ethnicity and economic class. They also provide opportunities to learn about and put in practice healthy diets, local ecology, and sustainable production methods. Local food plays an important role in the culture of a city, creating “third spaces” that are lively and flavourful.</p>
ENVIRONMENT	<p>UA interventions reduce the damage done by the conventional food system. By using organic, sustainable food production methods, UA protects biodiversity and prevents toxic leachates. It tackles waste issues by seeing waste as a resource, reducing pressure on landfill through the use of composting methods, and reduces the amount of energy required to produce and distribute food through the elimination of long-distance transport, resource-intensive packaging and unnecessary storage. It was suggested that if food in the UK were produced organically, consumed locally, and in season, the level of CO₂ emissions would be reduced by 22% (Doron, 2005). UA further helps regenerate the rural landscape by reducing pressures on them to produce things like monoculture crops, and exemplifies a viable city land-use alternative to vacant, or under-utilized lots. Productive landscapes in cities act as carbon sinks, and reduce the urban heat island effect.</p>
ECONOMIC	<p>A study by the David Suzuki Foundation in 2009 (<i>Ontario’s Wealth, Canada’s Future: Appreciating the Value of the Greenbelts’ Eco-Services</i>) found that the Ontario Greenbelt provides \$2.6 billion a year in ecological services which include rich soil, carbon capture and storage, pollination and recreational opportunities. Urban farming creates new, green employment opportunities. Encouraging the purchase of local produce supports local farmers and improves affordable food access for the community. <i>Buy B.C.</i>, a “buy local” campaign in British Columbia, found that it created 1,900 jobs over three years (Metcalf Foundation, 2010). Supporting local vegetable gardens, farmers markets, and local food retailers puts money back into the community. The US government’s <i>Urban Gardening Program</i> estimates that every one dollar investment in food growing projects yields six dollars in produce (Doron, 2005). Other economic incentives for urban agriculture are avoiding costs of waste disposal, and increased economic value of land through successful projects.</p>
HEALTH	<p>Food grown in the city, without toxic chemical inputs, can provide nutritional health benefits. It increases the availability of fruits and vegetables, ensures freshness, and does justice to the nutritional content of produce (since they can be picked ripe and spend reduced time in storage, without being subject to conventional agri-chemical residues). Research done in Flint, Michigan among 766 adults found that household members who participated in a community gardens consumed fruits and vegetables 1.4 times more per day than those who did not participate, and were 3.5 times more likely to consume fruits and vegetables at least 5 times daily (Alaimo, 2008).</p>
SECURITY	<p>By establishing food immediacy and supply within cities, urban agriculture contributes to food security. This local supply can prevent food emergencies in cities and be part of an equitable distribution system that curbs hunger. By generating income for marginalized or low income groups, UA can help provide a social safety net and reduce the need for temporary safety nets such as food banks. UA can make a significant contribution to meeting the needs of urban residents around the world.</p>

PART 2: Urban Resiliency and Supermarkets

2.1 Urban Agriculture and Resiliency

The issues described earlier defined the problem of our food system and of the way suburbs are built and operated. It is evident that change needs to occur for the sake of the survival of city inhabitants. A city must develop capacity to not only deal with the challenges of the 21st century, but to do so in a way that maintains its identity and services; in other words, a city must become resilient.

Making suburbs resilient to food supply and price shocks in the upcoming future is the central design initiative of this thesis, and includes establishing local, community food systems in the form of urban agriculture (UA) schemes. Such a resilient food system in general requires collaboration between government agencies, the private sector, and non-profit organizations at multiple scales. It is a system that will be adaptable to the shocks of peak oil and climate change, as well as being economically and socially feasible, especially to private sector actors. It will combine the local natural, economic and human resources in a city to deliver sustenance for that city. Table 1 highlights the benefits of UA, which encompass social, environmental, political, economic and personal health advantages. Appendix A shows some of the key attractors in a typical food system and what efforts can be made to move towards a more resilient one.

Urban agriculture has existed from the beginning

Table 2. The Foodshed

	SCALE - Small (S), Medium (M), Large (L)
GOVERNANCE Public Non-profit Private	MANAGEMENT UNITS Production Unit (PU) Processing/Consumption Unit (CU) Distribution Unit (DU) Waste Management Unit (WMU)

	S	M	L
Public	Easement gardens (PU); Productive street trees (PU)	Community Gardens (PU); Food banks (DU); Public compost site (WMU); Under-utilized public buildings (PU)	Public farms and greenhouses (PU); Waste plant (WMU); Food Festivals (CU); Cogeneration facilities (WMU)
Non-profit	Guerrilla gardening movements (PU)	Public schools (PU); Community kitchen/ kitchen incubator (PU)	Processing Plant (DU); Food Festivals (CU)
Private	Backyard garden (PU); Compost harvesting (WMU); Home kitchens (CU)	Unique, local eateries (CU); Neighbourhood store (DU); Food co-op (DU/CU)	District store (DU); Farmers' Market (DU); Community-Supported Agriculture (DU)

These are some examples of UA units that exist or can exist within foodsheds.

of cities and has been adopted in different ways throughout human history; from the irrigation networks in ancient Persia to the stepped farming terraces of Macchu Picchu. Built interventions have varied in scale, context, ownership, and have been used to create ‘foodsheds’. Foodsheds by definition are districts that can support agriculture, environmental stewardship of land, and human dwellings by localizing the production, collection, processing and distribution of food within the specified community. Food enters the public and private realms at manageable and accessible scales, as shown in Table 2. In this work, they are different than our conventional food system because they advocate the localization of food production, and the localization of the industries and actors involved with its management. They promote agriculture units in urban areas that can contribute to alternative food systems that are transparent and also greatly resilient. Such units are about increasing the visibility of food to its inhabitants in all its stages (from seed to waste) within an urban fabric, thereby increasing accessibility, reducing land-destroying urban sprawl, and putting notions of healthier food in the public conscious throughout the built environment.

Urban agriculture can take a variety of forms, sparked by the resources and ingenuity of urban farmers: “Because of its various scales and locations, urban agriculture can be the subject of all design profession – from landscape and urban design, to building and interior design, and even product design”

(Doron, 2005, p.54). Windowsills with container gardens to energy-from-food schemes are all part of such systems of urban agriculture. By examining the food system and foodshed as complex ecosystems with various components, it is hoped that manageable and executable strategies can be found that can help our Canadian suburbs adapt to upcoming shocks, market fluctuations and changing demographics with ease.

Many protagonists like Ebenezer Howard and his 19th century Garden City, have stepped forward with visions of idealized urban worlds suited for agriculture. Some movements that look at how to build resiliency for existing cities in order to equip them for the challenges of climate change and peak oil have been researched for this thesis:

The first of two leading examples is the Transition Town Movement. The Transition Town Movement is founded on the principles of permaculture. It aims to localize socioeconomic systems through low-carbon initiatives and the reduction of dependence on distance supply chains. Hence, local food is a significant aspect of this movement.

The second example, the Slow Cities (Citta Slow) movement, initiated in northern Italy, is founded on the principles of Slow Food. The aim of Slow Cities is to renounce fast-paced, homogenized culture for lifestyles that are more relaxed, slower-paced, and connected to their local environment and people. To become a Slow City, cities are assessed in six categories: environmental policy, quality of urban fabric,

infrastructure, *local produce and products*, hospitality and Citta Slow awareness (Footprint Choices, 2011).

Local food is clearly a strategy for developing resiliency in cities, and this can manifest in a variety of ways with a variety of players. When it comes to Canadian suburbs like Mississauga, the urban area of this thesis design work, it is the supermarkets that are an integral part of the food system and the suburban fabric today, and should be evolved to provide an opportunity for large-scale food source change that remains relevant to our consumer-based society.

2.2 Why Focus on Food Retail?

Over the last thirty years, the economic and political power along food supply chains has shifted from farmers to manufacturers, and now to retailers (supermarkets) and traders; this is a shift from producer-driven to buyer-driven supply chains. As Lang et. al state in *Food Policy*:

... value has increasingly been captured near the consumer by retail buyers rather than the primary producer (the farmer/grower)... the dominant position of food manufacturers has given way to the retailers (supermarkets have the power to dictate the terms of contracts and act as gatekeepers to a large volume of consumers)... (p164).

This is shown in Fig. 16 and Table 3.

Food retailers exercise enormous influence on a country like Canada's food supply, and their breadth of influence transcends a variety of scales. Globally, they have

Canadian food retail industry value in **2010:**
\$88 billion.
Projection in **2014:**
\$110.2 billion.
(Datamonitor, 2010)

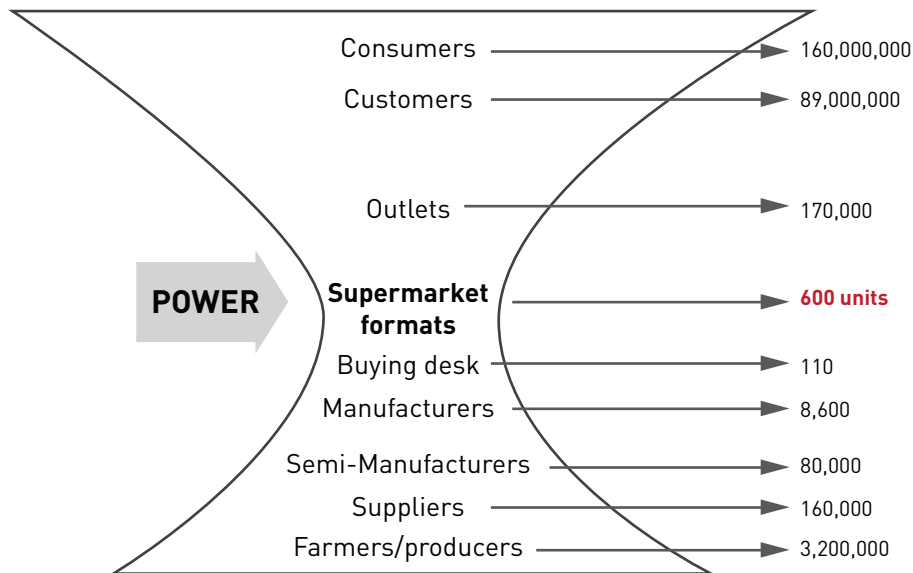


Fig. 16. *The supply chain funnel in Europe, 2003*
 Shifting the supply chain: Retailers, not farmers, dominate the food supply.

Table 3. Shifting domination in 20th century Western food value added chains

Period	Farmers	Manufacturers	Wholesalers	Logistics	Retailers	Food-service	Marketing
< 1900	DOMINANT	Minor	Major in a few trades	DOMINANT	Very minor	Dominant (domestic)	Minor
1900-50	Declining (except WWII)	DOMINANT	Major in a few trades	Declining	Minor	Declining (except WWII)	Emerging (USA only)
1960-70	Rebuilding (subsidized)	DOMINANT	DOMINANT	Rebuilding	Emerging	Minor	Emerging
1980-2000s	Declining	Declining	Rapidly Declining	Linked to retail dominance	DOMINANT	Emerging	Important
2000-10	Returning?	Uncertain	Minor	Squeezed	DOMINANT	Uncertain	Important

Source: Lang, T., Barling, D., & Caraher, M. (2009), p 166.

international trade flows and agreements as well as global environmental impacts; regionally, the food they stock effects health and nutrition, the local economy and small businesses. On a community level, they can provide spaces of learning and growing, and contribute to philanthropic projects. In the *No Nonsense Guide to World Food*, Wayne Roberts describes how, by the 1970s, supermarkets became pivotal players in the food industry. Their more direct access to consumers was leveraged to control the entire food chain through aggregate or bulk buying and they imposed price points on processors who in turn imposed price points on their suppliers (i.e. farmers) (p.42).

Furthermore, supermarkets have and are continuing to develop private labels, which further take away power from processors. Supermarkets have complete control over their private label products, from conception to packaging and are able to squeeze the processors' profit margins (Millstone, Lang, 2008, p.33). Half of sales at the world's food retailers will come from private label products by the year 2025 – up from 25% from now (Gerlsbeck, 2011). On a national scale, Loblaw's private labels (*President's Choice* and *no name* brands) have been and continue to be extremely successful, being the number one and number two consumer packaged goods brands by sales in Canada, respectively (Loblaw Companies Limited, Building Out From the Core: 2010 Annual Report, 2010).

Canadian food retailers are part of a much bigger food chain. Some of the largest companies in the world are

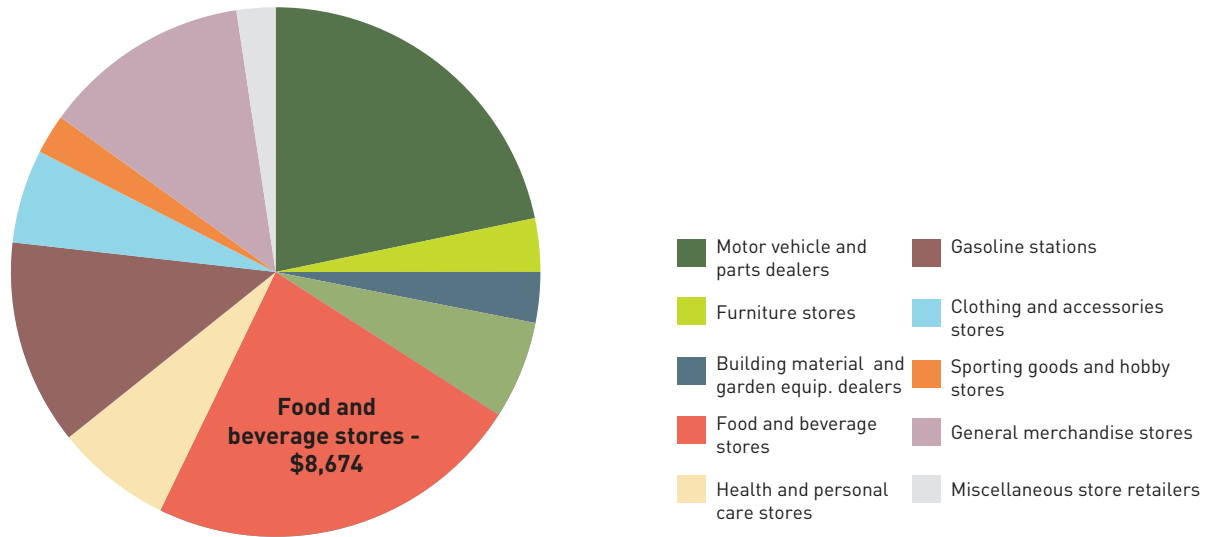


Fig. 17. Retail Sales by Industry, July 2011 (\$ millions)
 Food and beverage stores led retail sales by accounting for 23.1% of Canada's total retail sales in July 2011. Supermarkets and other grocery except for convenience accounted for 71.0% of that. The supermarket sector accounted for 16.4% of Canada's total retail sales.

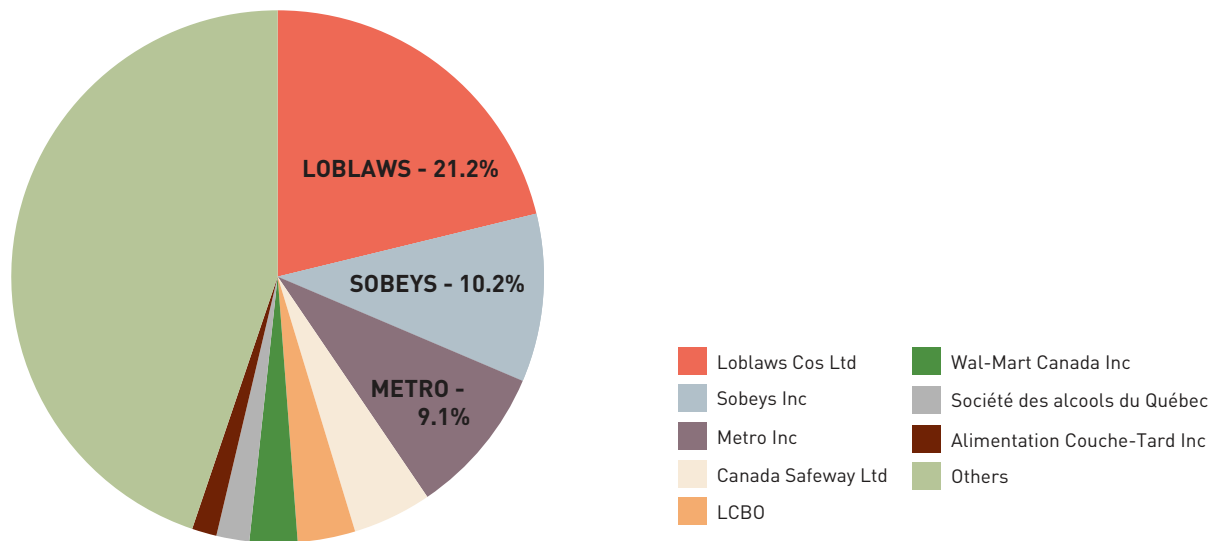


Fig. 18. Grocery Retailers Company Shares, 2010 (% retail value)
 The big three - Loblaws, Sobeys and Metro - dominate the grocery retail market.

involved in the food sector, having a large impact on global supply chains. Large supermarkets control over 52% of world food sales (Arup, 2009, p.15).

2.3 The Food Business and the Canadian Business Marketplace

The food sector is directly responsible for generating more than 9% of Canadian GDP (Grant et. al, 2011). Food retail plays a significant role in that. Canadian food retailers dominate the retail dollar in Canada (Industry Canada, 2010) (Fig. 17), and in the food dollar, it is the wholesale and retail trade sector (value-added services of food) that dominates. This reflects the cost of warehousing, stocking shelves, advertising and profit margins. As described in Fig. 10 in Part 1, most major supermarkets, who are involved in wholesaling and retailing, have their own distribution centres where large volumes of products are directly transported. A large amount of imported food enters the Canadian marketplace through intra-company transfers by these major supermarkets.

Supermarkets remain the leading grocery retail format in Canada, accounting for 33% retail value share in 2010 (Euromonitor, 2011). They also account for the leading share of outlets and selling space. Their sales totalled \$60 billion in 2010, or 68.1% of food retail industry value (Datamonitor, 2010). Canada has the most oligopolized food economy in the developed world, where 40% of the market is controlled by

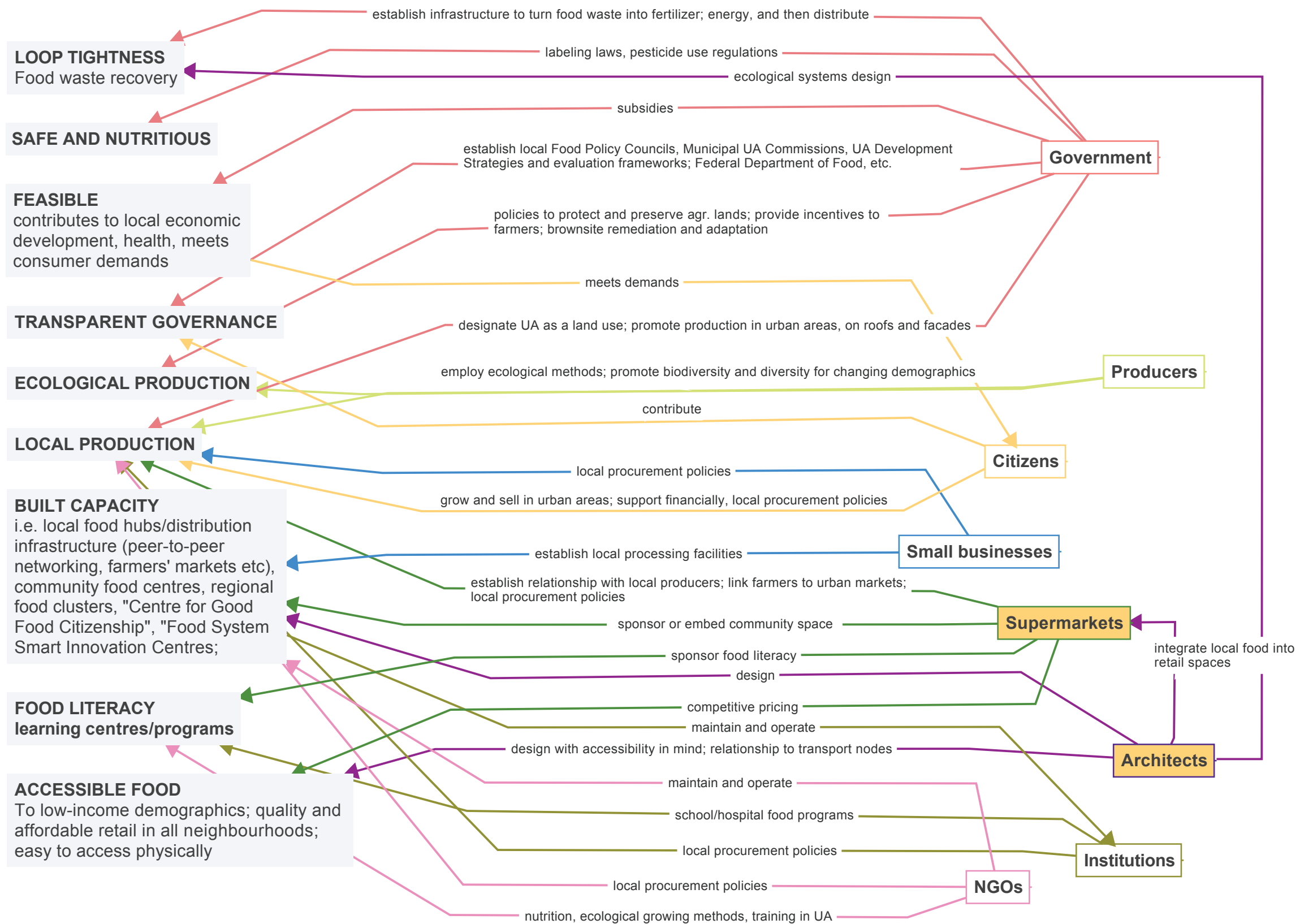






Fig. 19. Principles gathered for a sustainable food system from national, regional and municipal food security plans in Canada

four or less firms (TFPC, 1999). Five major retailers dominate the mass grocery retail sector in Canada; in order of most sales in 2010 these are Loblaws, Sobeys, Metro, Safeway and Wal-Mart. As Fig. 18 illustrates, the “big three” - Loblaw Cos Ltd., Sobeys Inc. and Metro Inc. - made up almost 41% market share in 2010. Their strength lies primarily in supermarket, hypermarket and discounter store formats.

2.4 The Role of Supermarket Chains in Urban Resiliency

The key components in a sustainable food system and the players that should be involved are described in the organizational web in Fig. 19. As shown in the web, the supermarket's role lies in: leveraging their muscle with supply chains and partnerships, and in implementing urban agriculture; making policy changes to redefine their procurement processes like pushing for sustainable products; and making physical changes through urban area and UA integration, and ecological and socially responsible design. Table 4 looks at large-scale urban agriculture schemes, and how they can be incorporated into food retail. Inspiration gained from these schemes include: having supermarkets act as anchors in new gastronomic quarters; designing micro-CPULs that can be incorporated into large power centre blocks; integrating vertical farming in residential tower facades; and having supermarkets adapt their business models to become food hubs where they support small-

Table 4. Precedents for Design: Large Scale UA Schemes

TYPE	EVALUATION/ LESSONS LEARNED	PRECEDENT
<p>Gastronomic Quarters Gastronomic quarters are marketplaces where the primary focus is on food in its various forms - from fresh foods to restaurants serving meals. They are larger than farmers' markets and are considered a permanent fixture in the city. Gastronomic quarters are intended to mark the spatial dimensions of food enlightenment. Successful markets are often urban squares that contain a series of well-configured outdoor rooms; these are usually built with perfectly designed height-to-width ratios creating a feeling of cosy, enclosed space.</p> <p>Precedents: Les Halles, Paris (established 1183); Borough Market, London (established 1276); Faneuil Hall Marketplace, Boston; South St Seaport, NYC</p>	<p>Gastronomic quarters score well on the following:</p> <ul style="list-style-type: none"> - They promote local identity and sense of place (culturally significant "third places"); - They are long-term fixtures - They provide access points to good, local, diverse food - The spaces are scaled for humans - They increase value of property in area; beneficial to food producers, processors, entrepreneurs <p>Design consideration: Supermarkets can act as anchors in new gastro quarters</p>	 <p><i>Fig. 20. Faneuil Hall Marketplace, Boston</i></p>
<p>CPULs Continuous Productive Urban Landscapes (CPULs) are a series of connected agricultural and recreational corridors that weave throughout a city's fabric. The scheme was developed by Bohn + Viljoen Architects, and does not currently exist in any city today. In the words of the designers, they are designed to "encourage and allow urban dwellers to observe activities and processes traditionally associated with the countryside, thereby re-establishing a relationship between life and the processes required to support it." CPULs can occur at a variety of scales; vertical landscapes are also possible.</p>	<p>Benefits of CPULs include: the promotion of local identity and sense of place (cohesive visual connectedness); environmental benefits (curbing urban heat island effect, waste management etc); social value for all: amenities, recreational and therapeutic places; beauty; scaled for humans; food production; the encouragement of new enterprises to develop to occupy these spaces; increasing value of adjacent property.</p> <p>However, there is an issue of density. The schemes are proposed for sites with densities between 92 - 450 persons/ha; Mississauga averages 44 persons/ha.</p> <p>Design considerations: Micro-CPULs can be incorporated into large power centre blocks</p>	 <p><i>Fig. 21. CPUL scheme in Middleborough, UK</i></p>
<p>Vertical Farms Vertical farming was born out of the concept of growing food indoors, in tall structures as opposed to horizontal ones. The concept is largely credited to Dr. Dickson Despommier of Columbia University. He argues for concentrating agricultural production in a series of towers within cities, while leaving the hinterlands to return to wilderness. 'Freeing' the countryside would counter the negative environmental impacts the agricultural industry has had on it. Growing food solely within a city would enforce an ultra-local diet. Vertical farms count on technology to accommodate the amount of food that will need to be produced. It is believed that 1 indoor acre is equivalent to 4-6 acres that are outdoors (depending on crop).</p> <p>Proposed designs: The Living Tower by SOA Architects, The Pyramid Farm by E. Ellingsen and D. Despommier</p>	<p>The primary benefit of vertical farms is intensive, hyper food production. They also prevent the degradation of hinterlands through monoculture/industrial farming.</p> <p>However, there is the issue of available technology and efficiency; their large ecological footprints currently do not make them feasible. They also require little human input, being of little social value aside from food production. Further, their appropriateness for low-medium density suburbs is an issue.</p> <p>Design considerations: The concept of farming in vertical spaces can be employed on a miniature scale in residential towers facades</p>	 <p><i>Fig. 22. The Living Tower</i></p>
<p>Food Hubs Similar to gastronomic quarters but with emphasis on connecting local producers to markets. Producers need access to things like trucks, warehouses, processing space, and storage. These things require capital investment, infrastructure maintenance and dedicated oversight - things that small and mid-sized producers often can't afford or manage themselves. Hence food hubs can help. A food hub is "a centrally located facility with a business management structure facilitating the aggregation, storage, processing, distribution, and/or marketing of locally/regionally produced food products" (Barham, 2010). By actively coordinating these activities along the value chain, food hubs are providing wider access to institutional and retail markets for small to mid-sized producers, and increasing access of fresh healthy food for consumers, including under-served areas and food deserts.</p> <p>Precedents: La Montanita, New Mexico; Detroit Eastern Market, Detroit</p>	<p>Food hubs are excellent strategies for:</p> <ul style="list-style-type: none"> - Local food production and access - The promotion of local economic development (encourages partnerships between big and small enterprises) - And because they are scaled for communities <p>Design considerations: Supermarkets can adapt their business models to become food hubs; support small-medium business spatially and through partnerships</p>	 <p><i>Fig. 23. La Montanita Co-op Food Market</i></p>

medium business through partnerships, and by acting as the main draw that brings consumers into spaces co-habited with smaller players.

David McInnes, chief executive of the Canadian Agri-Food Policy Institute, recognizes the need for a systems approach to the food supply chain and the relationships between its players:

The key is, how do we get a food system that works better together? Now we have an (industrial) supply-chain model where the farm produce gets picked up by the processor and then is sold to the retailer...

But it's best to think of food systems, where the producer has an interest in the final product, and the producer, processor and retailer are all working together to develop a better product, which then includes the research sector, health, environment, the regulators and trade officials (Postmedia News, 2011).

The giant Canadian food retail chains control enough real-estate to permit them enormous flexibility to change their store formats and local marketing approach to match demographic changes in neighbourhoods. For example, as of 2010, the supermarket real estate owned by Loblaw in 2010 was 33.8 million square feet. Total retail square footage including franchises was 50.7 million square feet (Loblaw Cos. Ltd., 2010). Further, since most of the energy cost of food comes from food processing, packaging, storage and preparation (Bomford, 2010), if the energy in these sectors were reduced, it could reduce fossil-fuel dependence.

Food retailers themselves are realizing the need for



Fig. 24. Tesco Tramore, Ireland

TESCO, one of the UK's leading supermarket chains, is taking steps towards re-designing their buildings. Their first eco-store in Ireland follows the principles of saving energy, being energy efficient, and of using renewable elements.



Fig. 25. Balzac Fresh Food Distribution Center (Walmart), Canada

Walmart opened its first sustainable fresh food distribution center in Alberta. Green features include the utilization of hydrogen fuel cells, renewable energy (solar, thermal, wind), LED lights, energy efficient doors, and "smart" refrigeration. It is estimated to be 60% more energy-efficient than Walmart's standard refrigeration centres.

change. According to Hendrickson et. al (2008), they strategize around lowering supply costs, global surveillance, risk reduction, market differentiation and the avoidance of public controversy. With these in mind, sustainable practices are on their agenda. They are assessing their environmental impact, ethical sourcing, community impact and social roles (Fig. 24 and Fig. 25). Appendix B shows how Loblaw Cos. Ltd is dealing with these issues.

The notion of scaling down physically in size, allowing for more pedestrian-friendly frontages, and retrofitting existing structures is also on the radar for supermarkets. This is noted in the recent trend of big-boxes inhabiting downtowns and other urban areas where real estate is limited. This has forced these business to rethink how to inhabit constricted or existing physical space. As Ed Sonshine, CEO of developer RioCan says, "They're used to building a one-storey store that's 100,000 square feet with another seven acres of parking... That just is impossible in the city. Even if you could find it, you could never afford it." In Toronto, for example, these retailers are settling for spaces between 8,000 to 20,000 square feet. Physical examples of how Loblaw has been entering the urban market are shown in Fig. 26 - Fig. 28.

New consumer trends are a particularly large driving force for retailers. Despite relative affluence and food security, consumers in the developed world are described as living through an "age of anxiety." Due to this, manufacturers and retailers are



Fig. 26. Loblaws on Queen Street, Toronto

A 45,000 square foot Loblaws supermarket at the base of a condo tower at Queen Street West and Portland Street in Toronto. The complex also hosts an 8,000 square foot Joe Fresh and a 29,000 square foot Winners.



Fig. 27. Loblaws in Maple Leaf Gardens, Toronto

The Loblaws inside the historic Maple Leaf Gardens, despite being large (at 85,000 square feet) serves as an example of a retailer retrofitting an existing structure in an urban area. Sensitivity to its downtown clientele is evident by the market-style features of the interior, where the shopping experience is elevated to be that of a “theatre of a food”.

struggling to re-establish consumer trust, and governments are urging a reconnection between food and consumers (Jackson, 2010, p.147). There is also the rise of the "New Millennium" or "LOHAS" (Lifestyle of Health and Sustainability) consumer. These are consumers who are concerned with the environment, ethics, food safety and quality of food. They are willing to pay more for variety, quality and freshness, convenience and foods that are healthful (Agriculture and Agri-Food Canada, 2001); these include youth and aging baby boomers:

Amongst the youth market, there is increasing environmental concern regarding food (even leading to the avoidance of certain categories like meat), concerns with safety of the food supply. Access to information is also important as more and more consumers are connected and demanding than ever before (Agriculture and Agri-Food Canada, 2001).

Today's consumers are typically ethnically diverse, eco-conscious, value-conscious and reliant on digital communication.

A recent survey in May 2012 by Pollara, a leading Canadian public opinion and market research firm, indicates that amongst over 1000 Canadian adults surveyed, that Canadians are likely to buy local - even paying as much as 16% more for local vegetables, and 19% more for meat. Residents in Ontario and British Columbia were willing to pay a higher premium. The study cited listed Canadian consumer's top reasons for buying local as: supporting Canadian businesses (28%), freshness (14%), concerns for the environment (10%) and safety (9%).



Fig. 28. *Loblaws on St. Clair Avenue, Toronto*

At St. Clair Avenue West and Bathurst Street in Toronto is a large urban scale format of a Loblaws supermarket. It is connected to the underground Toronto Transit Commission system, has decked and surface parking, and a pedestrian bridge connection to the Joe Fresh store adjacent to it.

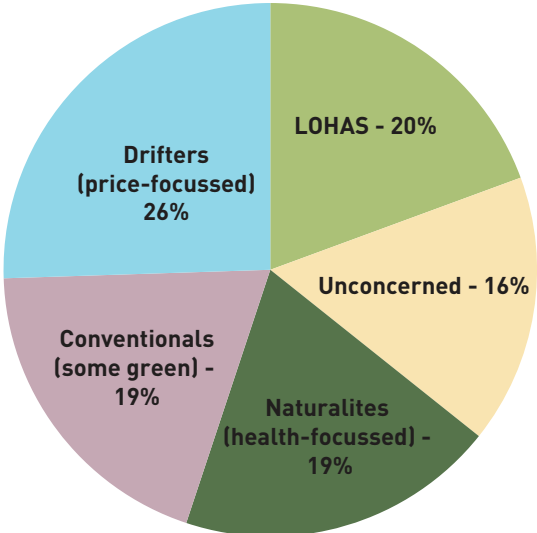


Fig. 29. *Types of Consumers (% US Adults)*

In the 21st century, there is a growing number Lifestyle of Health and Sustainability (LOHAS) consumers. These consumers are willing to pay premiums for products/services that are environmentally sustainable, socially conscious and have a health benefit. These values drive their purchasing decisions and are forcing corporations to become more socially responsible and transparent in their practices.

Although Canada is relatively food secure today, designing for food security is a step towards having healthy, resilient communities that can cope with the demands of the future. Effective large-scale change will come from a peer-to-peer model for the masses; from bringing together small scale players such as producers, with large scale players like supermarkets; and in creating a sense of place and urban environment enjoyable for residents.

2.5 Strategic Design Goals

The goals of this work's design initiatives are drawn from the large-scale urban agriculture schemes and resilient systems thinking research discussed already. They are:

Goal 1: Contribute to the Resiliency of the Suburbs

Mitigating the effects of peak oil and climate change is central to the future of cities. This can be achieved by designing for tight, circular, resource loops that reduce waste produced and energy consumed, and shifting away from fossil fuel dependence.

Strategies are shown below:



Decentralized, renewable energy production



Visible and celebrated closed-loop waste management. Food = energy. (Pictured: The R.C. Harris water treatment plant, Toronto, Ontario).



Reduce energy demands. Passive techniques such as daylighting.



Local food production and management.

Fig. 30. Design Goal 1: Urban Resiliency

Goal 2: Create a Sense of Place in the Suburbs

Communities that prioritize human and environmental health, provide amenities at a human scale, and have distinct identities are enjoyable places to live in. Ways this social investment can be achieved are:



Celebrate local natural and cultural identity



Create human-scaled, enjoyable environments

Fig. 31. Design Goal 2: A Sense of Place

Goal 3: Create Positive Social, Health & Economic Impact

These include responding to culture and demographic needs, increasing local vitality by encouraging local economic development, increasing access to good food, and encouraging pedestrian movement to promote walking and exercise.



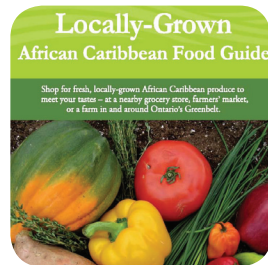
Walkable block structure and greener urban environments



Access to healthy, local food



Shared spaces and community/ business partnerships



Adaptation to demographic tastes

Fig. 32. Design Goal 3: Positive Social, Health and Economic Impact

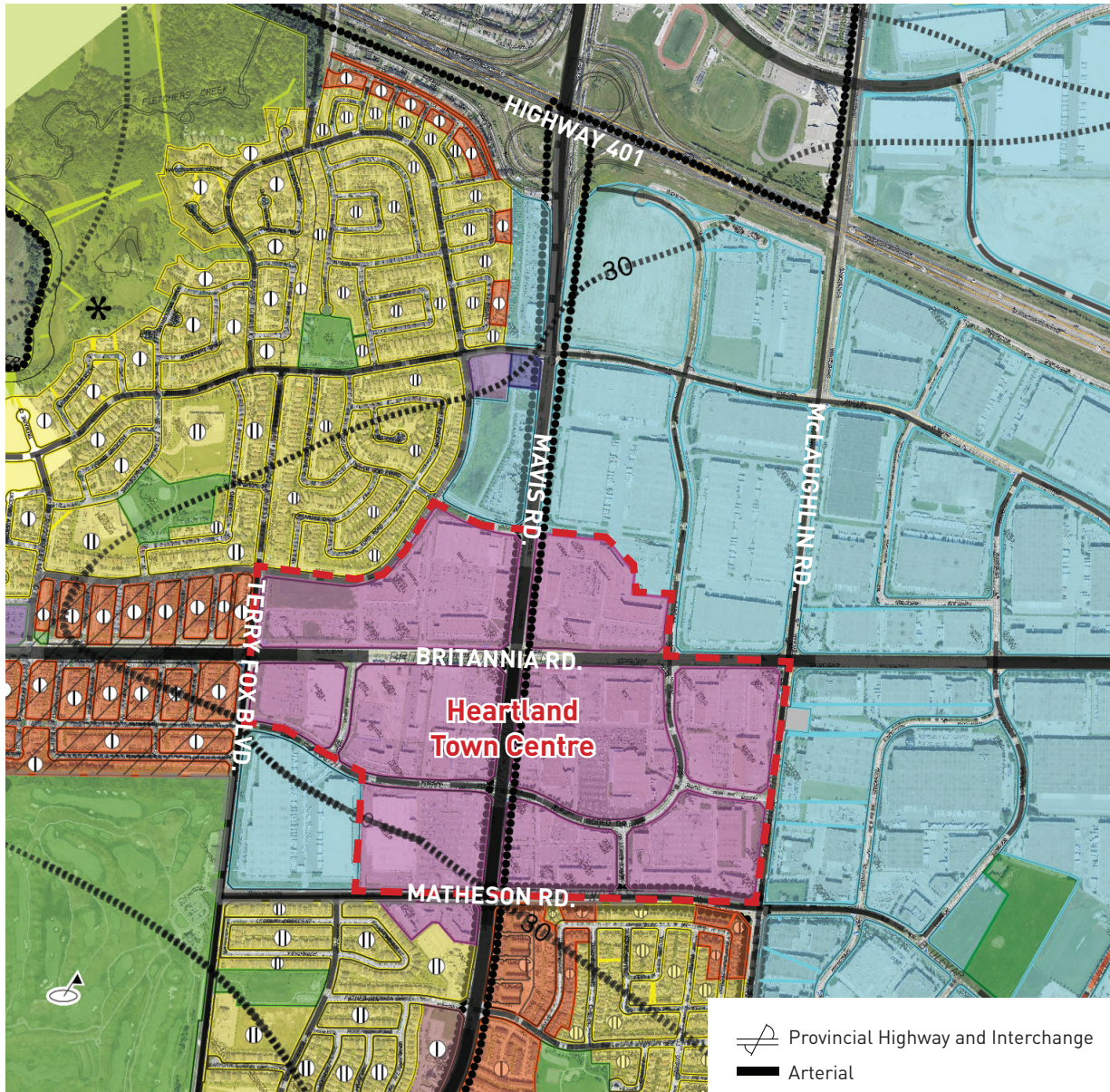
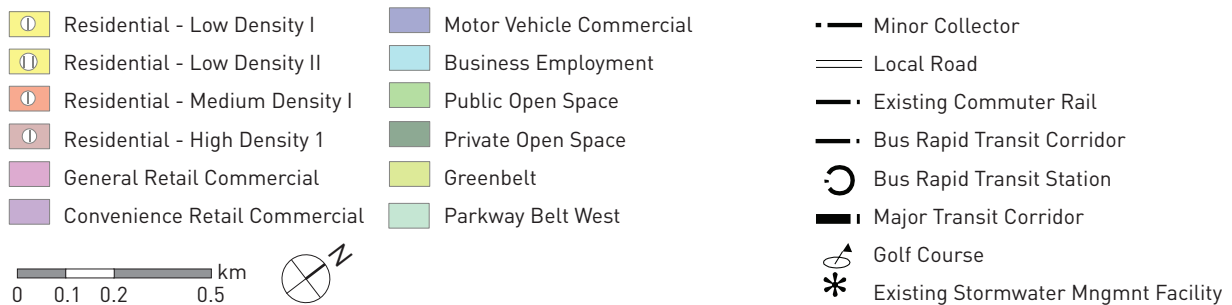


Fig. 33. Existing context and land use of the Heartland Town Centre site



PART 3: Design Proposal

3.1 The Site

Part 1 addressed how the advent of cheap oil played a significant role in the development of North American suburbs and the industrialization of our food system. This led to the development of building typologies such as big-box retail outlets, which is the preferred building form for several major food retailers (supermarkets) found in suburbs today. Part 2 looked at the concept of urban resiliency and a further examination of supermarkets. It recognized how supermarket chains could play a role in creating resiliency in the suburbs. Part 3 is a design proposal to demonstrate the ideas and concepts developed in the past two parts. The site chosen for the urban-scale design proposal is the Heartland Town Centre (HTC), a power centre in Mississauga, Ontario. To further look at how a big-box supermarket can play a role in transforming its site with a sustainable food system in mind, a more detailed design proposal is done for one of the HTC blocks, on which a Loblaws supermarket is currently situated.

The Heartland Town Centre is one of Canada's largest power centres, owned by the Orlando Corporation. It includes over 160 stores and 185,000 square metres (2 million square feet) of constructed space. Major anchors include Rona, Best Buy, Home Depot, Canadian Tire, Staples, Winners, The Brick, Wal-Mart and Loblaws. Parking is dealt exclusively with surface parking - over 10,530 lots in total. This meets the minimum



Fig. 34. Urban agriculture (UA) components on the HTC site

- UA - Distribution
- UA - Processing/Consumption
- Existing Retail
- Bus routes
- Bus stops
- Buried river tributary



requirement of 5.4 parking spaces per 100m² of commercial space. The site sits in between a business park and industrial corridor to the west, and residential areas to the east and south. The north part of the site leads to access to Highway 401, a major gateway into the City and a major backbone artery of the Greater Toronto Area (GTA). The site's land use is shown in Fig. 33.

The HTC was developed when private ownerships of land (i.e. farms) were purchased and then rented out until development could begin. It is estimated that 10-20 farms were disassembled for the HTC. Development on the site began in the late 1980s to early 1990s. As work progressed, residential subdivisions grew in the surrounding area. The only urban agriculture components on the site are Processing/Consumption and Distribution units as highlighted in Fig. 34. Processing/Consumption units are in the form of chain restaurants, fast food outlets, and a few standalone family restaurants. Distribution units are in the form of superstores such as Wal-Mart, Loblaws and Costco. There is clearly a lack of diversity on the site when it comes to urban agriculture.

The site is also underserved by public transit; this is not surprising as many consumers shop at the outlets and wholesalers to stock up on a large quantity of items. Currently, an automobile is necessary to easily access the HTC. Urban issues regarding the site include: lack of walkable block structure, lack of food units, lack of identity, underused and

exposed parking for most days of the week, and lack of civic space. River tributaries that once ran through the site are also now buried, so there is no presence of nature at all.

The Loblaws Block and Store

As previously mentioned, Loblaw Companies Ltd. is a significant player in the Canadian food system. It is the largest food retailer in Canada and one of the country's largest private-sector employers, with over 135,000 full-time and part-time employees. The Loblaws supermarkets have a diverse set of private labels and instore offerings, including *Joe Fresh*, a clothing line, *PC Financial*, a financial services company, and *PC Mobile*, dedicated to mobile services.

The first Loblaw Groceteria, a self-serve and cash-and-carry store, was founded by Canadian grocer, Theodore Loblaw, and opened in 1919 in Toronto. The brand quickly expanded throughout Ontario, New York, and Illinois. In 1947, Garfield Weston of the prominent and affluent Weston family, acquired a large share of Loblaw stock; to this day, Loblaw Companies Ltd. is a subsidiary of George Weston Ltd. Throughout the 1970s and 1980s, private labels such as the *no name* brand and *President's Choice* were introduced and secured their hold in the Canadian marketplace. Loblaw supermarket chain ("Loblaws") formats became larger and larger, as did their instore offerings, such as the inclusion of a pharmacy in 1981. Throughout the 1990s and into the 2000s, Loblaws started offering health-oriented lines, such as their *Blue Menu* and *PC Organics* items,

and continued to diversify their product offerings to include clothing, financial services and mobile services. They also developed an online portal for consumers. In recent years, they have started issuing Corporate Social Responsibility Reports (2008), opened an environmental flagship store which reduced carbon emissions by 15% through the use of a low-temperature system (2008), and installed the first wind turbine at a store in Nova Scotia. Today, the Loblaws supermarket chain is largely trusted by Canadian consumers. The progressive values of the chain, and their stronghold in the Canadian market, can be leveraged to make significant change towards food security. The design portion of this work will go on to explore the physical implications of such; ones that will move Loblaws away from the current format it currently occupies, which is described below.

The 'Loblaws block' is 32,510m² (350, 000 ft²) - an average of 230m wide and 141m long -- and is located towards the southeastern end of the HTC site. Currently, only Loblaws supermarket occupies the block.

Loblaws supermarket is 7,803 m² (84,000 ft²) in a big-box format. As described by Fig. 11 in Section 1.3, the supermarket format has gone from small "ma and pa" stores of less than 1,000 square feet, to monolithic "everything-under-one-roof" giants of up to 200,000 square feet in the last one hundred years.

Architectural characteristics of the big box are largely unremarkable and highly generic, as chain store facades may

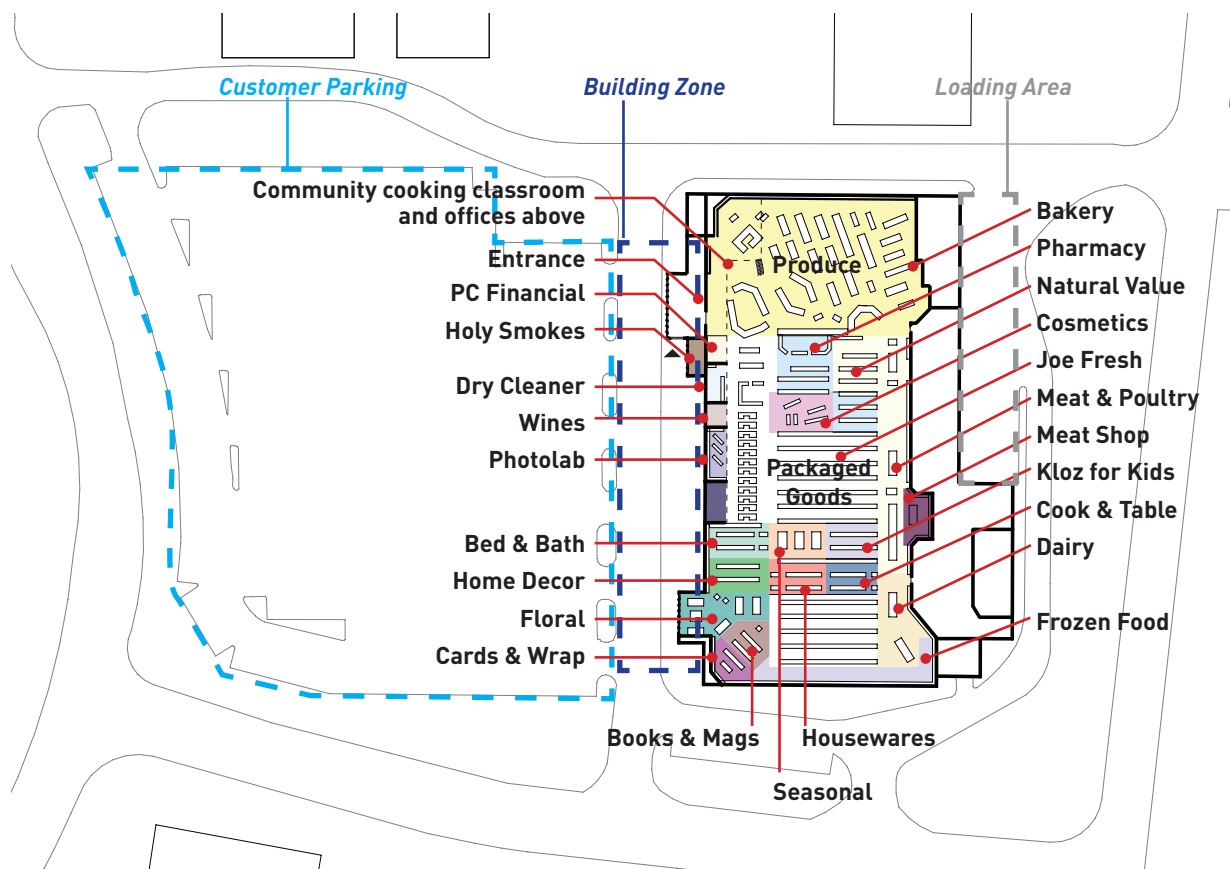


Fig. 35. The existing Loblaws block and store

The Loblaws block contains the typical ingredients: customer parking, a building zone, and a loading area. The Loblaws supermarket is clearly not limited to food. It has extensive offerings such as financial services, home decor, wines, clothing, and more.



look virtually the same driven by corporate identity standards, regardless of their locale. Other typical characteristics of big-box development are:

- large, rectangular, single-storey, lightweight steel construction with few or no windows
- a footprint between 50,000 to 200,000 square feet
- located near highways and only accessible via an automobile; heavy reliance on shoppers with vehicles
- large, impervious parking lots
- little or no community or pedestrian amenities or provisions

Big box stores have three main site areas and plan in their design (Low Impact Development Center, Inc., 2005):

1) *Circulation and customer parking:* The size of the parking area is designed to accommodate vehicles during peak hours and holiday seasons. This often means the parking area is underutilized most of the year.

2) *Loading areas:* These areas accommodate trailer storage and large trucks and their turning requirements, hence they require a sizable amount of unobstructed paving. Loading areas are often screened from view and located to the rear of the building. Employee parking may also be found in this area.

3) *Building zones:* These areas are located adjacent to the building, and provide a buffer between the entrance of the building and the drop-off area. Sidewalks are an example of this.



Fig. 36. Loblaws back-of-house and loading area
A bland and unwelcoming back-of-house area where trucks load, faces McLaughlin Rd., a major artery into the Loblaws block and the HTC at large.



Fig. 37. Blank/minimal facade relationship between Loblaws and adjacent building
Despite the printed pedestrian crossing, the lane between the two stores is not inviting to pedestrians.

The Loblaws at the HTC essentially follows the same pattern (Fig. 35). Its back-of-house area faces McLaughlin road, an arterial road. There is no relationship between the Loblaws supermarket and its neighbours to either side. Parking spaces, all surface, number 508. However, the store has attempted to make their entrance more welcoming to the public through the use of large windows, gabled roofs and a wide, landscaped building zone. They also have a second storey for community functions (a cooking class).

To understand the operating structure of the existing Loblaws, the energetic flows relevant to it and this thesis are shown in Fig. 41. It shows how 'global' existing energetics are.



Fig. 38. Loblaws front elevation (main entrance)



Fig. 39. Loblaw's main entrance streetscape

Through a transparent facade, widened sidewalk, lighting and landscape elements, some effort has been made to make the main entrance of the Loblaw's supermarket more pedestrian-friendly.



Fig. 40. Community cooking classroom on second floor

This community space within the supermarket indicates the company's progressive values and investment into social well-being. Some of their locations also include a gym, run by a third party.

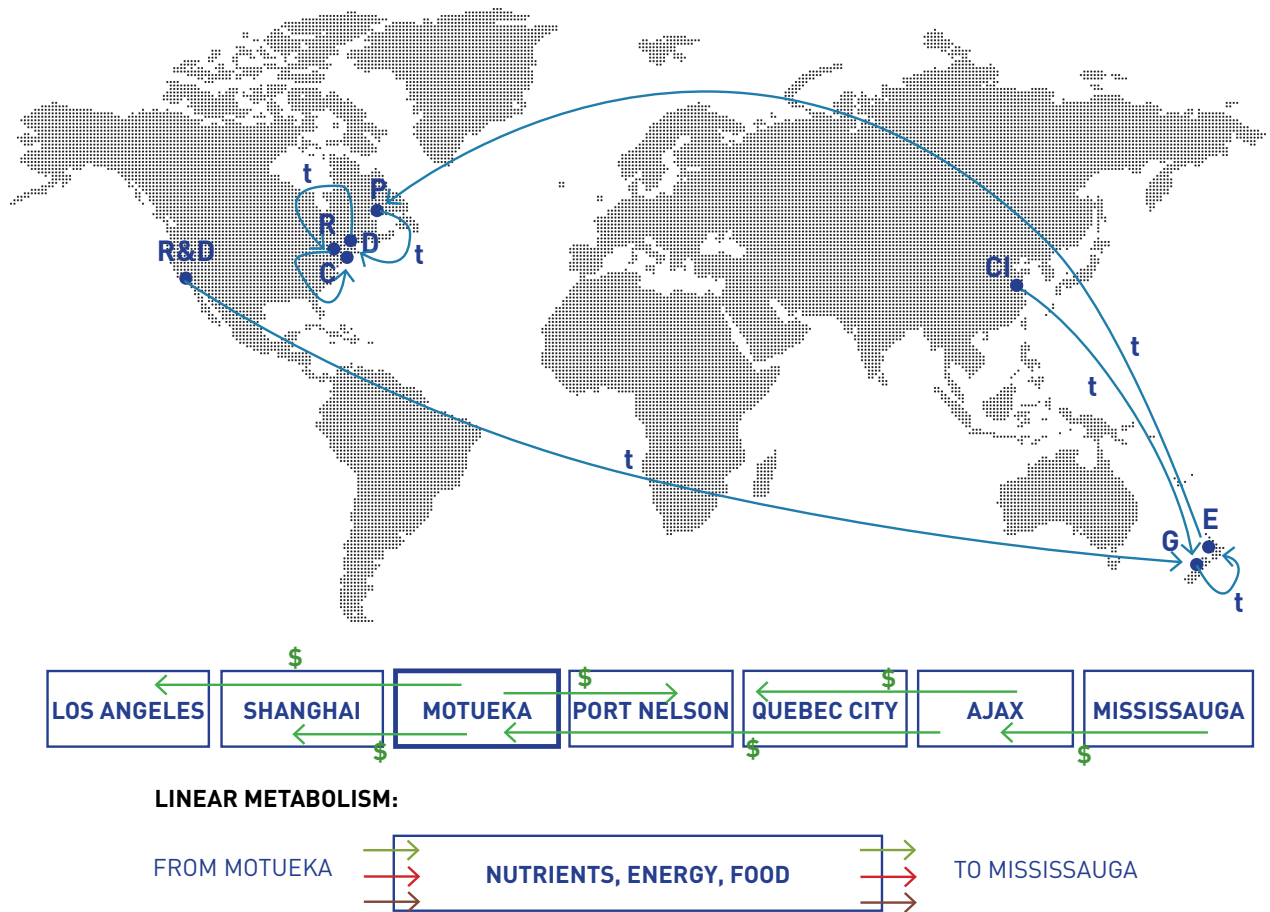


Fig. 41. Simplified existing energetics: Food and economic flows of a typical apple found in Loblaws supermarket

The typical players in the production, distribution and consumption of the apple are the following:

R&D - Research and Development firm (i.e. a nursery that makes hybrids)

CI - Chemical Industry that sells fertilizers and pesticides

G - Grower (i.e. in Motueka, New Zealand)

E - Exporter (i.e. from Port of Nelson)

P - Processor (i.e. a packaging and grading firm)

D - Distributor (i.e. Loblaws Co. Ltd. in Ajax)

R - Retailer (i.e. Loblaws supermarket)

C - Consumer (i.e. Mississauga resident)

t - transporter

The scenario depicted above is:

R&D + CI → G → E → P → D → R → C

An R&D firm in Los Angeles sells seeds to the Grower in Motueka, New Zealand, as the Grower also purchases chemicals from the Chemical Industry in Shanghai, China. Once the fruit has grown, the Exporter in Port Nelson ships them off to a Processor in Quebec City where they are packaged and graded. From there, they are stored in a warehouse owned by Loblaws Co. Ltd. (i.e. in Ajax), and then distributed to the Loblaws chain store (i.e. in Mississauga) where they are sold to consumers. Transporters at each stage help move the seeds, chemicals and apples via ship, plane, rail and/or truck.

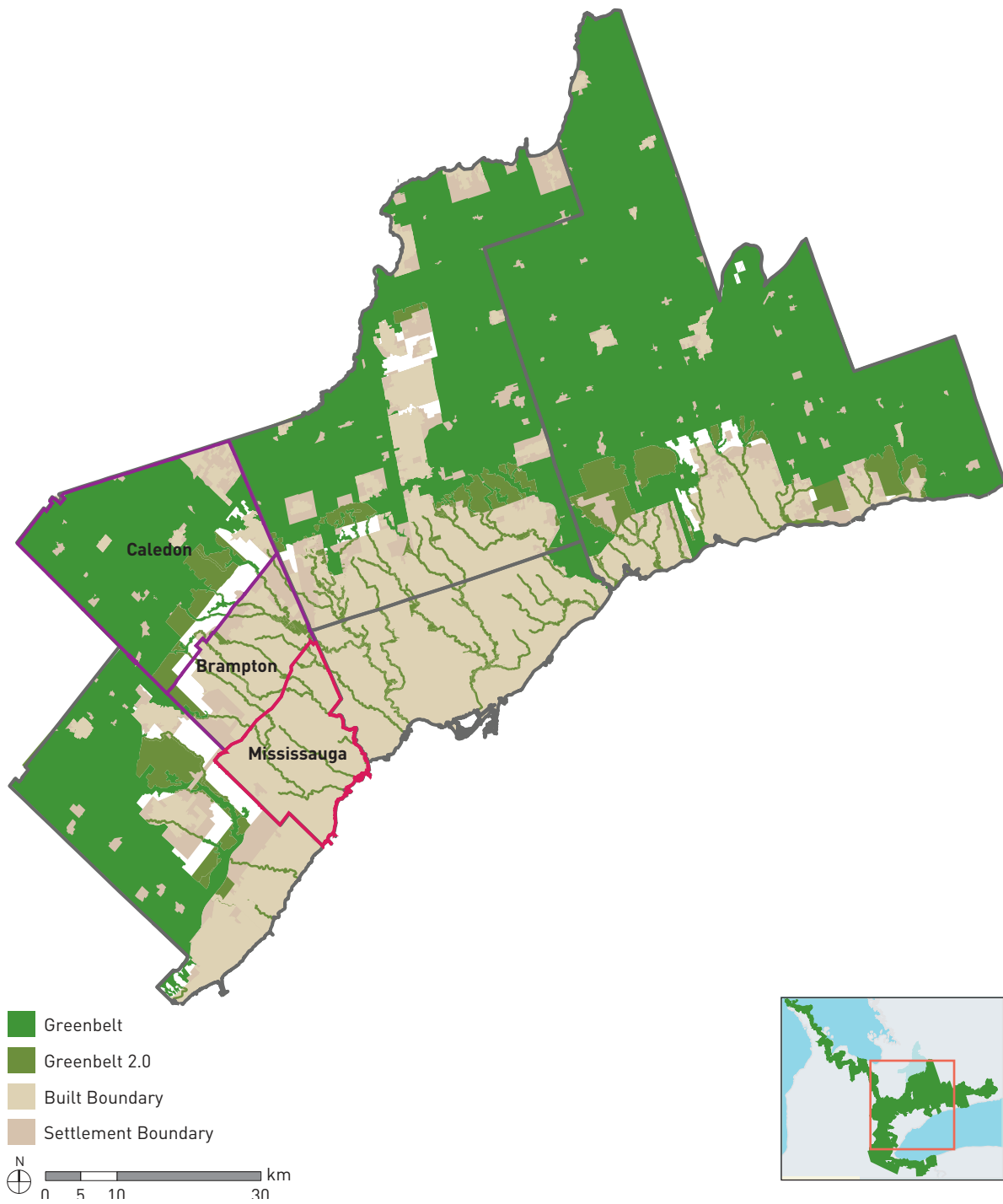


Fig. 42. Ontario's Greenbelt

The Greenbelt is an area of protected lands in Ontario that are restricted to development. Greenbelt 2.0 is a plan that shows the further expansion that is needed in order to meet the goals of the original plan. It proposes that the Greenbelt should increase by 1.2 million acres, or 60%. The Greenbelt is home to a large local food network. The agricultural lands within the Greenbelt, if managed properly, can become a primary source for staple crops for Peel Region.

3.2 Assumptions for Design

This thesis design is intended as a project for the near future of 10-20+ years. In five to ten years it is estimated that the issues outlined in Part 1 will become more urgent and visible, thus prompting more action from governments, organizations, and individuals. As the effects of peak oil and climate change become increasingly obvious and crippling to the suburbs, further assumptions for this work's design include:

1) The Ontario Greenbelt as a major local source of food:

Ontario's Greenbelt is currently 1.8 million acres of protected farmland, green space, wetlands and watersheds located in southern Ontario (Fig. 42). Over the coming years, further policies to preserve and protect agricultural lands in the Greenbelt, including those in Peel Region, will be implemented. The productive lands in the Greenbelt would become the primary source for grains, meats and fruit and vegetable products for the intensifying urban region it surrounds. Monoculture farming would be shifted to more responsible, productive and sustainable methods such as permaculture farming. Products grown in the Greenbelt would also reflect demographic tastes; today, they are already growing ethnic vegetable varieties.

2) Changing attitudes towards food and energy:

A shift would also occur on the cultural front as residents become more aware of food security and energy

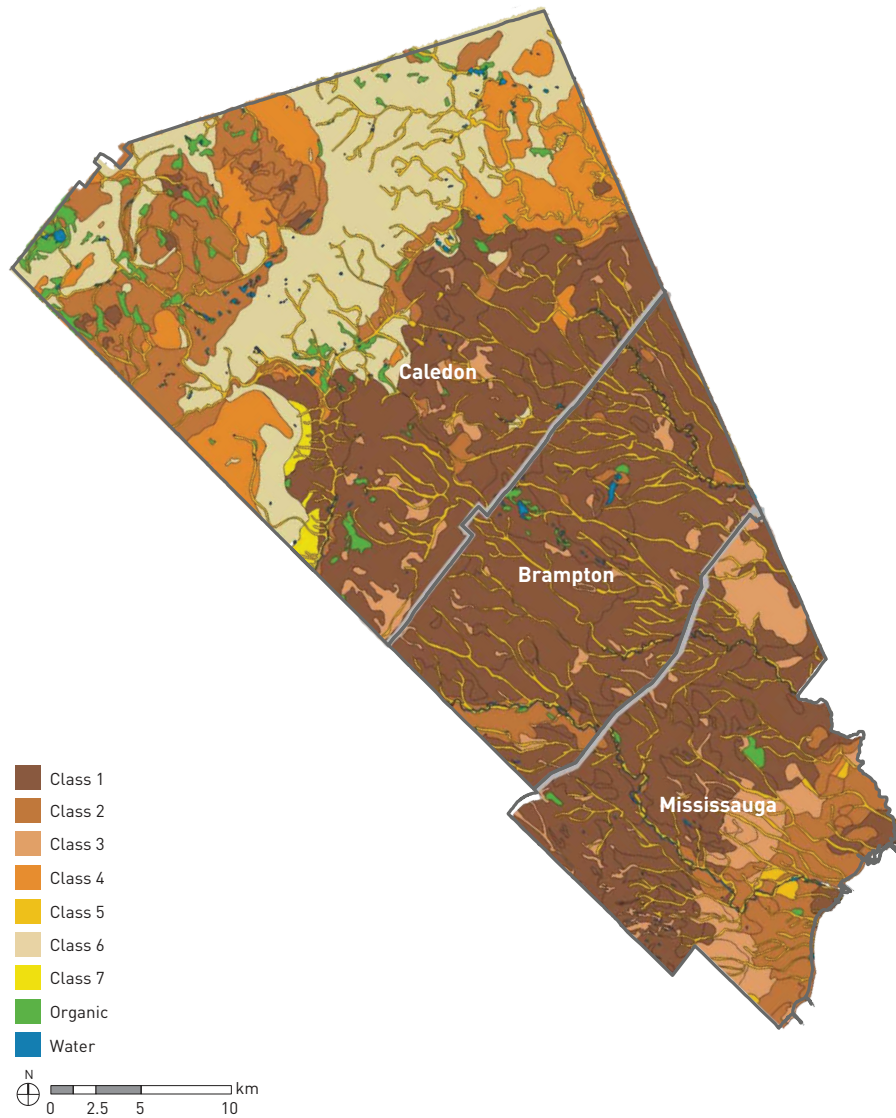


Fig. 43. Soils in Peel Region

The City of Mississauga is home to prime agricultural land -- Classes 1 to 3, as classified by the Canada Land Inventory. Approximately 0.5% of land in Canada is designated as Class 1 soil, and approximately half of this is located in southern Ontario. Most of the City of Mississauga is in the 6a or 6b Plant Hardiness Zone, an index used by Natural Resources Canada to determine what types of plants will survive in certain areas. Zone 0 is harshest while Zone 8 is mildest.

issues. Residents would be encouraged to farm their backyards, as Mississauga lies on prime agricultural land (Fig. 43). This attitude has previously been embraced in times of scarcity. For example, during WWII, over 20 million victory gardens were producing 44% of the fresh produce in the US (Pothukuchi et. al, 1999). In Canadian cities, 52 million kilograms of vegetables were grown in 1943; over 200,000 victory gardens produced an average of 225kg of vegetables each, and 50% of urban households surveyed that year said they planned to have a vegetable garden (Johnson, 2009). Regarding energy, higher efficiency refrigerators, appliances and vehicles will appear on the market as new waves of innovation arise (Fig. 44). This would reduce reliancy on fossil fuel.

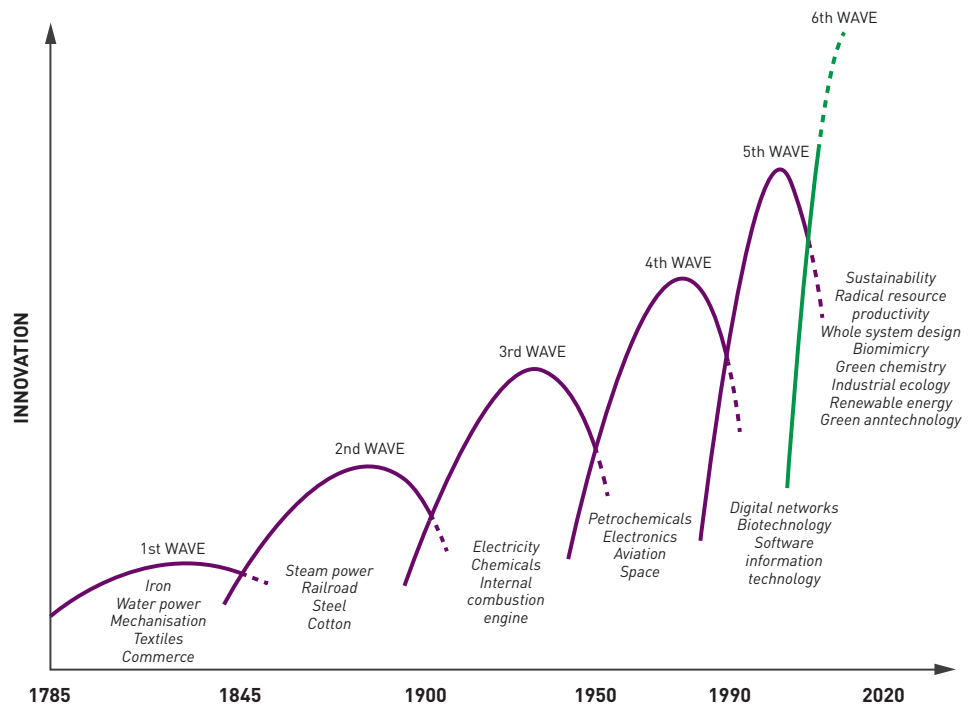


Fig. 44. Waves of innovation into the 2020s



Fig. 45. The proposed Metrolinx network
Heartland Town Centre (highlighted in pink) sits in between two mobility hubs in Peel Region.

3) Reduced Parking Demand at HTC in 2030+

Assumptions that will reduce the need for parking at the HTC are the following:

- a) The implementation of two current public transportation strategies effecting the region

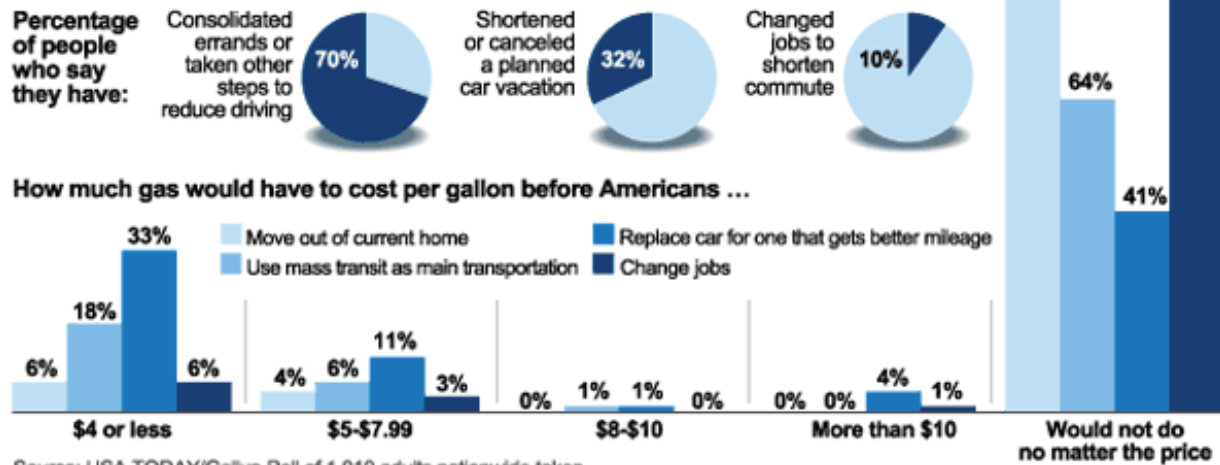
The Big Move project by Metrolinx envisions adding 1,200 km of rapid transit in the Greater Toronto and Hamilton Area, so that over 80% of residents in the region can live within 2 km of rapid transit over the next two decades. To do this, several “mobility hubs” are being built. The plan proposes an anchor mobility hub at Mississauga City Centre (5.5 km to the south of the HTC), and a gateway hub at Hurontario and Steeles, 7.8 km north of the HTC (Fig. 45). As Mississauga intensifies, it is plausible that hubs will slowly grow around major public transit infrastructure and entrances into the City such as the Highway 401 intersections; one of which is directly north of the HTC. Therefore, a secondary hub can be placed at the HTC site to connect it to the proposed network in the next 20 years.

The *Mississauga Transit Strategy*: Mississauga is committed to developing a bus rapid transit program, and a higher order transit program such as light rail, along the Hurontario corridor, as an alternative to the automobile.

- b) Rising gas prices

There is evidence that rising gas prices are causing consumers to change their driving habits. Most changes today involve driving more slowly, consolidating trips, carpooling

Price changing behaviors



Source: USA TODAY/Gallup Poll of 1,010 adults nationwide taken May 4-6. Margin of sampling error: ±3 to 5 percentage points.

By Anne Carey, Chris Fruitrich and Frank Pompa, USA TODAY

Fig. 46. Fuel price and behaviour changes, May 2007

This survey reflects the way Americans perceived their behaviour changes with the increase of fuel costs five years ago. The majority surveyed were willing to make small changes such as consolidating errands, while there was reluctance to make major changes such as taking public transit or replacing vehicles.

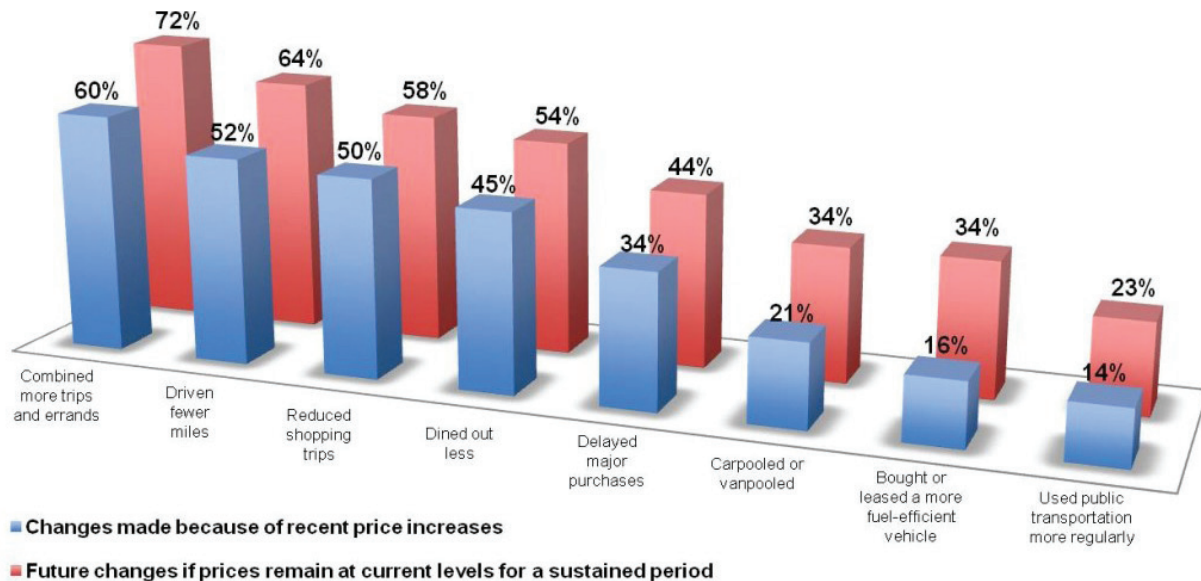


Fig. 47. Fuel price and behaviour changes, March 2012

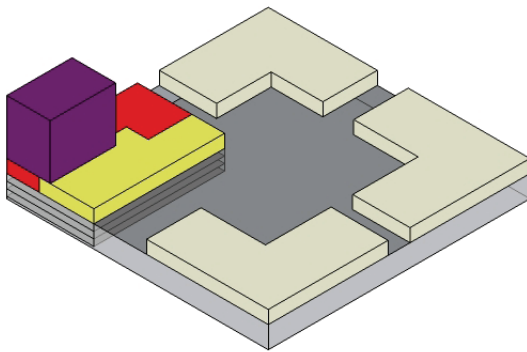
This more recent survey shows incremental and specific changes to driving habits due to current fuel prices, as opposed to hypothetical behaviour changes depicted in the previous figure. The recent data shows more acceptance of making bigger changes in the current economic climate.

and taking public transit (or walking and cycling). More drastic changes include buying an energy-efficient vehicle or moving closer to work/school. A Gallup poll released in March 2012 suggests that \$5.30 per gallon is what most Americans consider to be the tipping point to changing their lifestyle patterns and behaviours when it comes to their automobiles. This number translates to \$1.40/litre, a price Ontarians are already paying. Taking these big transportation moves and lifestyle changes due to rising gas prices into consideration, this thesis assumes a reduced parking ratio requirement for the site. Teresa Kerr, City Planner, City of Mississauga (telephone conversation, April 2011) confirmed that a big-box commercial site not on a main street currently requires 5.4 parking spaces per 100m² of commercial space in the City. A main street commercial/mixed-use site, as is being proposed in this thesis, requires 4 spots per 100m² of commercial space. This thesis assumes this ratio will drop to 3.5 spots per 100m² of commercial space, and 1 spot per residential unit. Since parking requirement numbers are generated by land use, if the number of people who can walk to the site increases, the parking requirements decrease.

These three assumptions of the Greenbelt as a source of local food, paradigm shifts and continued technological innovation, and a reduced parking demand in the coming years as site density increases and alternative transportation is made available, compliment the design intent of this thesis. The design strategies are described in the next section.

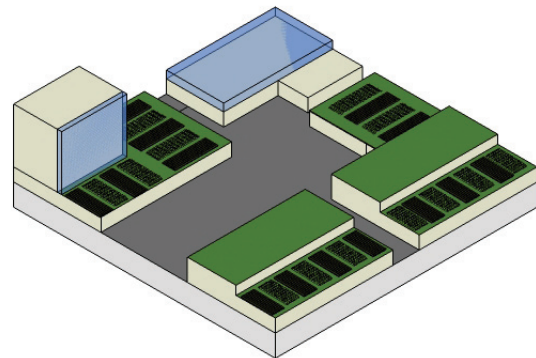
3.3 Urban Site Transformation Strategies

Various urban remediation strategies for the site are illustrated below. This "kit of strategies" is applied to the Heartland Town Centre site in part 3.5.



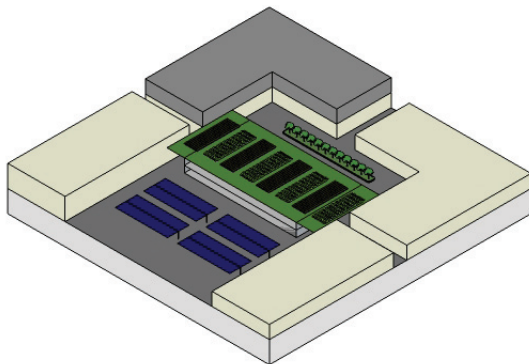
Hybrid Building Typologies

Big-box anchors become dissolved into a hybrid of residential, underground parking, and in the case of Loblaws - food distribution and energy production facilities.



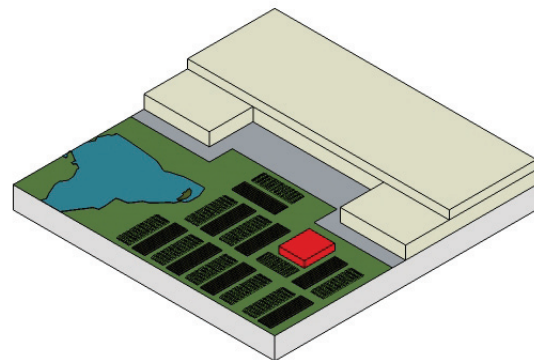
Elevated and Vertical Productive Surfaces

Hydroponic greenhouse facades on residential towers, and productive green roofs. They form a micro-continuous productive landscape network.



Taming Parking

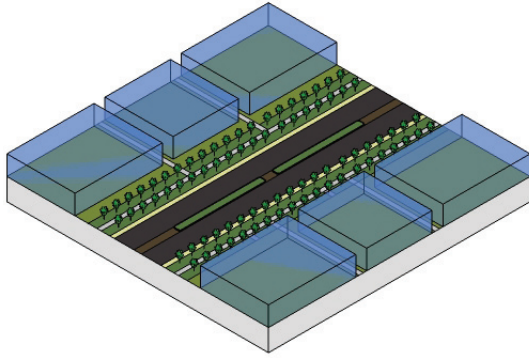
Solar shading, vertical parking structures with productive green roofs, decked parking above ground floor retail, and vegetation in lots to reduce stormwater runoff.



Reclaim Lost Landscapes

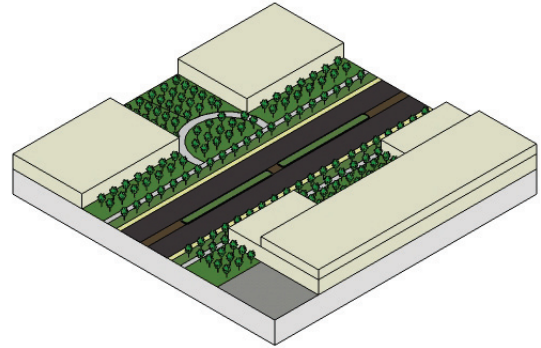
Productive fields with small farms and water management infrastructure, encroach parking. These are reminiscent of historical agricultural plots and buried Credit River tributaries. They form a micro-continuous productive landscape network on the site.

Fig. 48. Urban block repair strategies



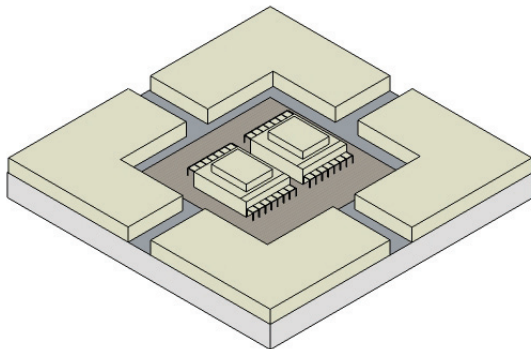
Greenhouse Corridor

The establishment of greenhouses on the east and west sides of the north-south along Mavis Rd.



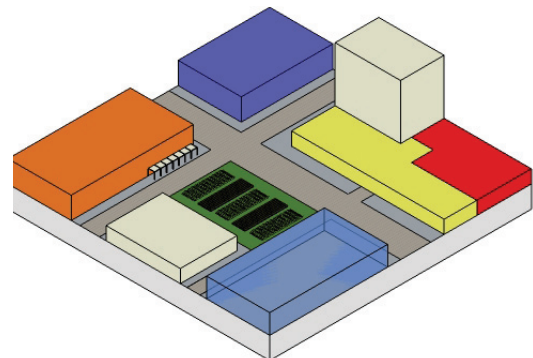
Productive Street Tree Buffer

The establishment of apple orchards (as a tribute to Mississauga's fruit tree history) on the north and south edges along major east-west roads: Britannia Rd. and Matheson Blvd.



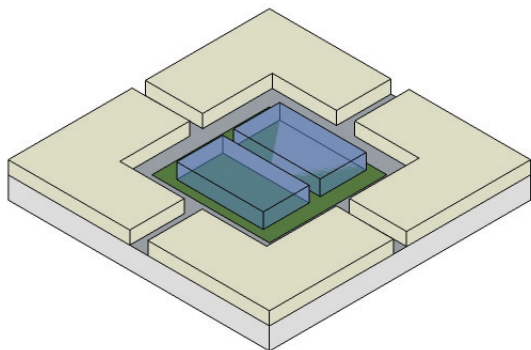
Create Gastronomic Quarters

Courtyard spaces activated by food; 'third places' where the processing and consumption of food is visible and celebrated.



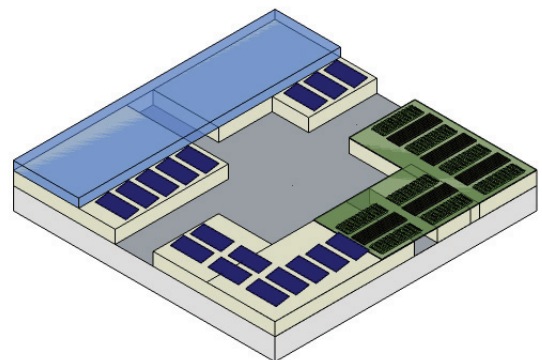
Connect Urban Agriculture Units

Visual and circulatory access to urban agriculture units such as restaurants, grocery, food-to-energy production, and food production units.



Create Food Production Squares

Internal spaces activated by food production, such as greenhouses, so the production of food is made more visible and accessible.



Program Rooftops

The utilization of abundant rooftop space for rooftop gardens, greenhouses, and solar panels.

3.4 Urban Site Transformations

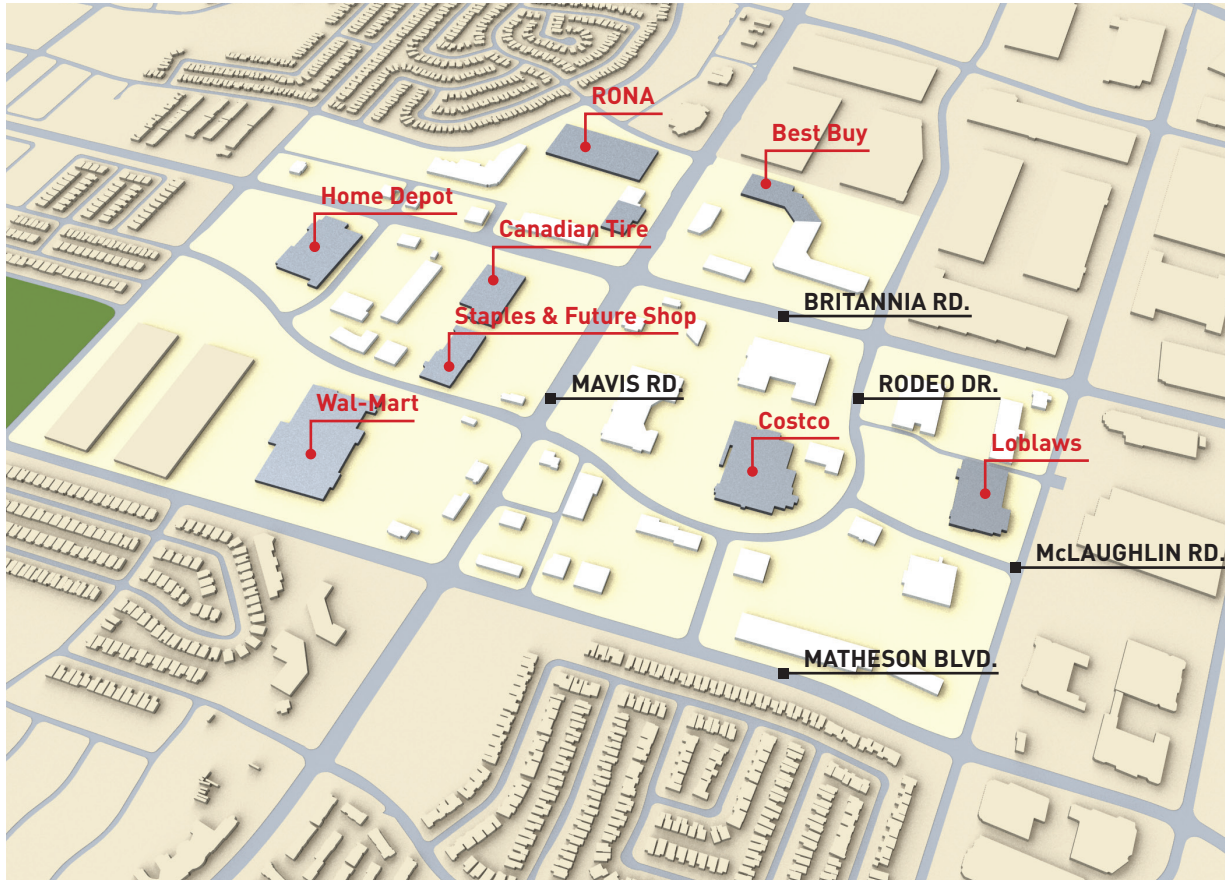


Fig. 49. Existing Heartland Town Centre site
Existing anchors are in grey. Existing retail is in white.



There are currently over 10,530 parking spaces that service its 163+ stores. The major tenant mix includes the anchors shown above, including H&M, Home Outfitters, HomeSense, Michaels, Petsmart, Stylesense, The Brick, and Winners. Food establishments include fast food chains such as A&W, Second Cup, McDonald's and Mr. Greek. Restaurants include: Baton Rouge, Casey's, Milestones, The Keg, Tucker's Marketplace and East Side Mario's.

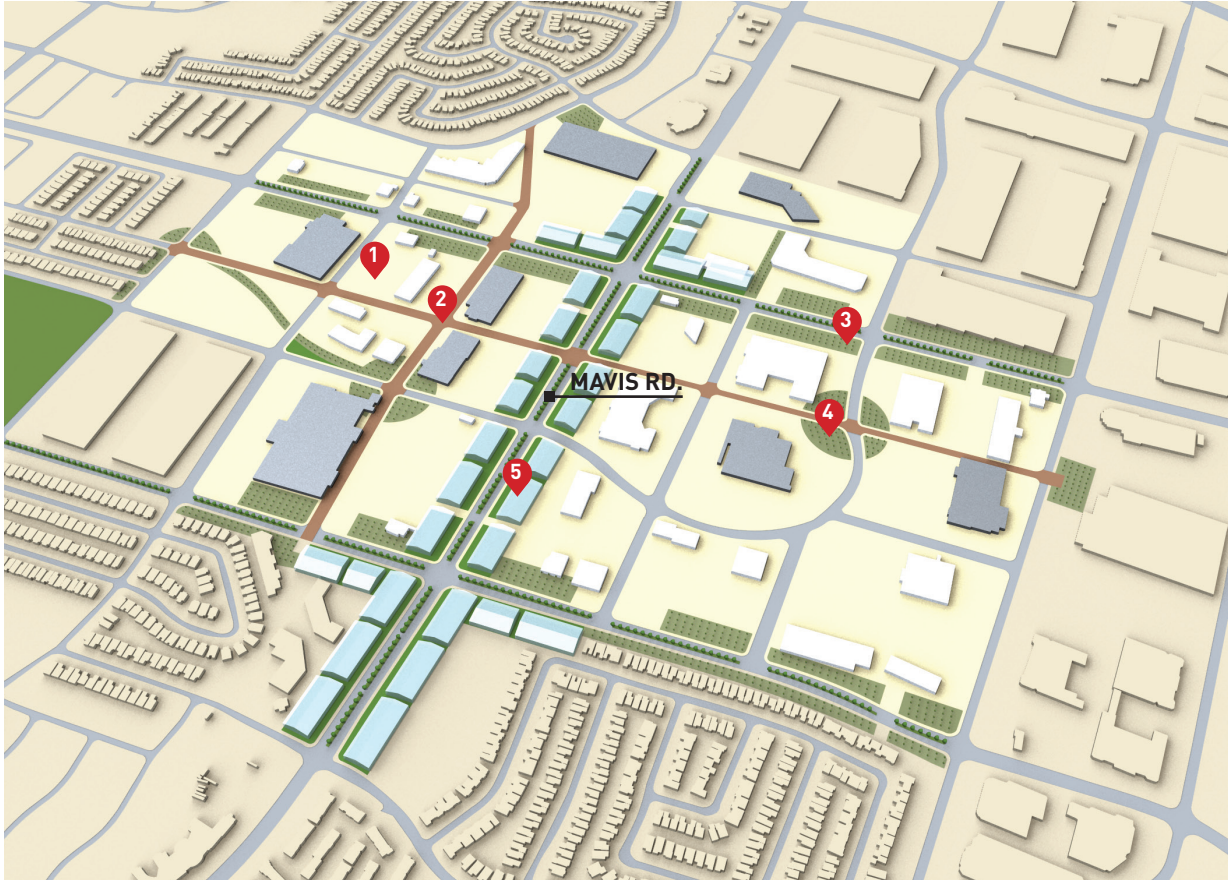


Fig. 50. PHASE ONE



- 1)** The creation of urban blocks and **2)** two main pedestrian-oriented boulevards.
- 3)** The introduction of the productive street tree buffer and **4)** productive landscape network.
- 5)** The implementation of the Greenhouse Corridor along Mavis Rd.

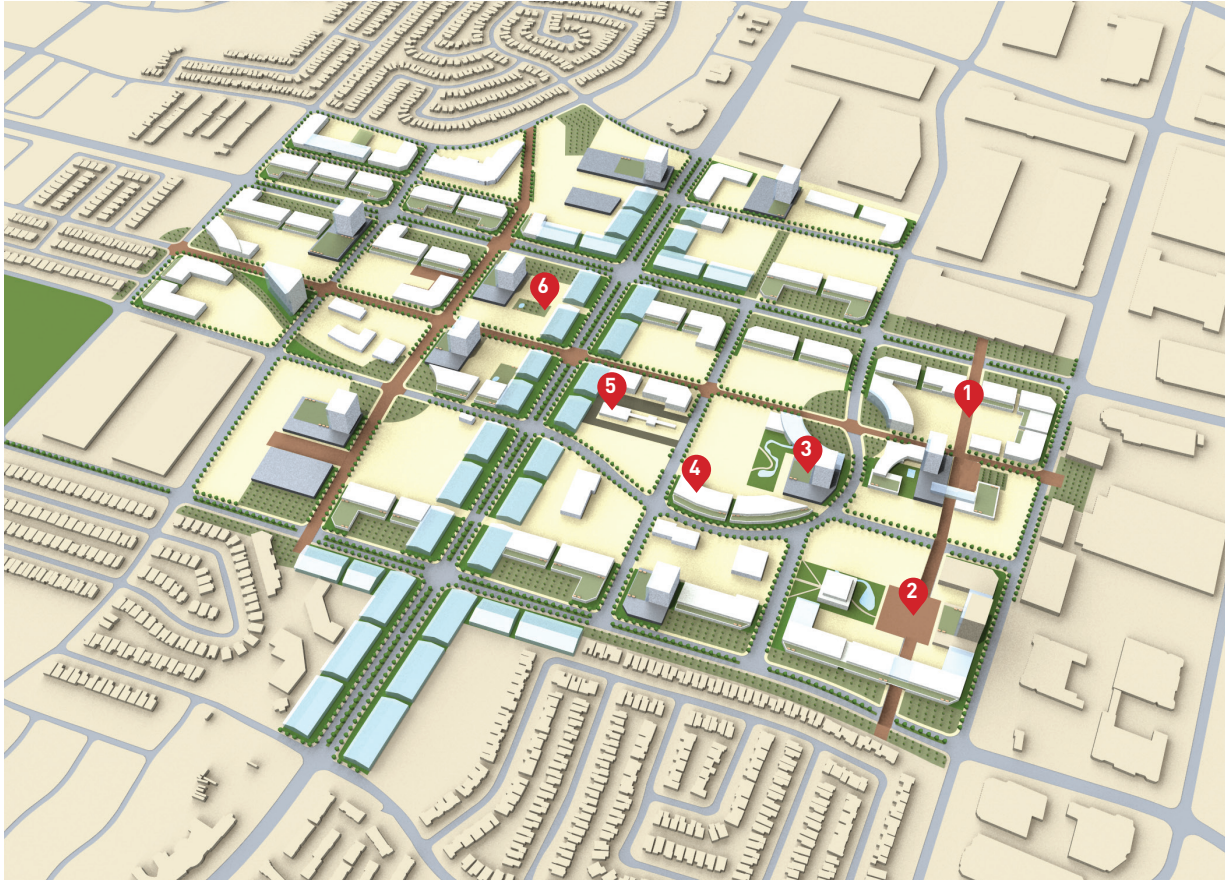


Fig. 51. PHASE TWO



- 1) The creation of a third pedestrian-oriented boulevard, and 2) civic spaces.
- 3) The incorporation of hybridized anchors into the urban block, and 4) infill multi-use buildings (including food units) as parking demands reduce.
- 5) The introduction of a minor mobility hub.
- 6) Continued growth of the productive landscape network.

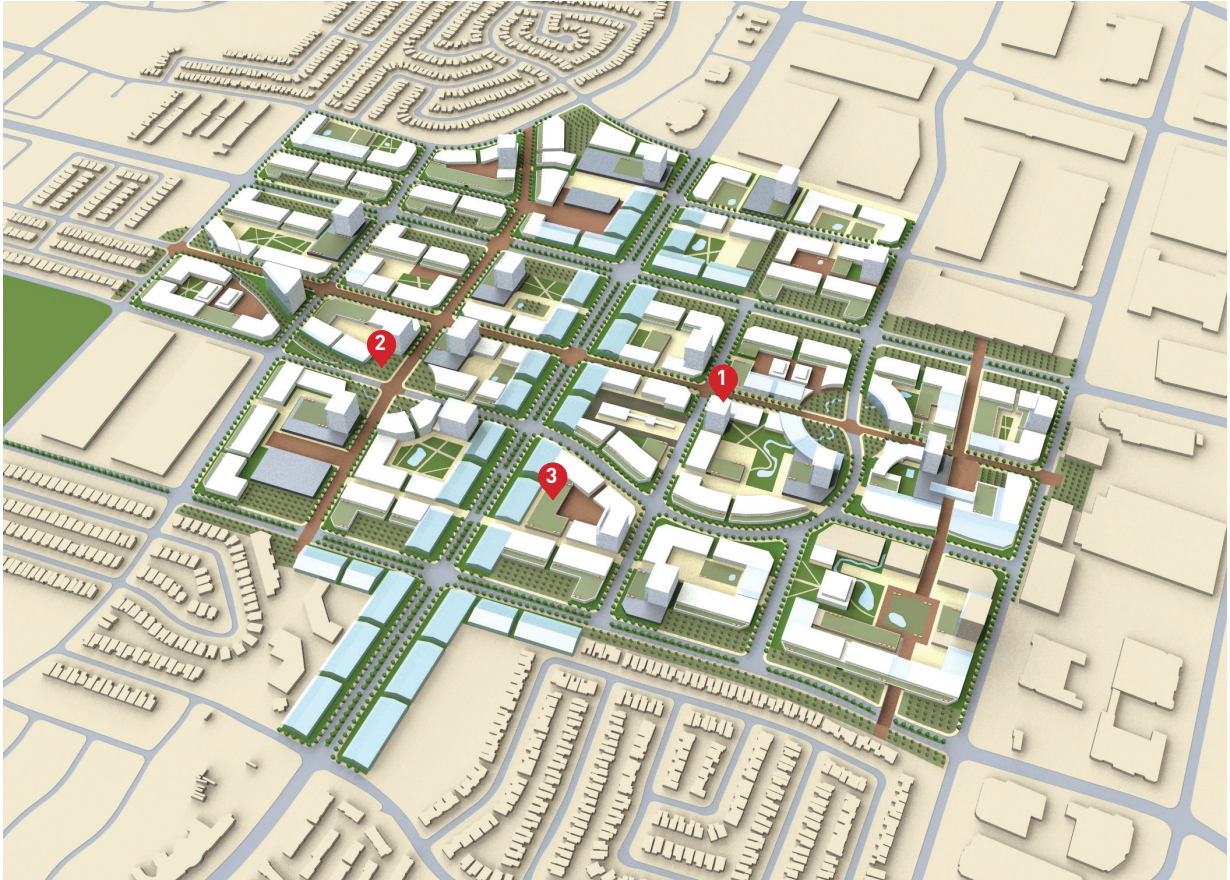


Fig. 52. PHASE THREE



- 1)** Completed urban fabric with infill buildings, including more residential.
- 2)** Mature productive landscape network.
- 3)** Parking structures and decked parking above new commercial units.

Significant elements envisioned on the transformed site are shown below:

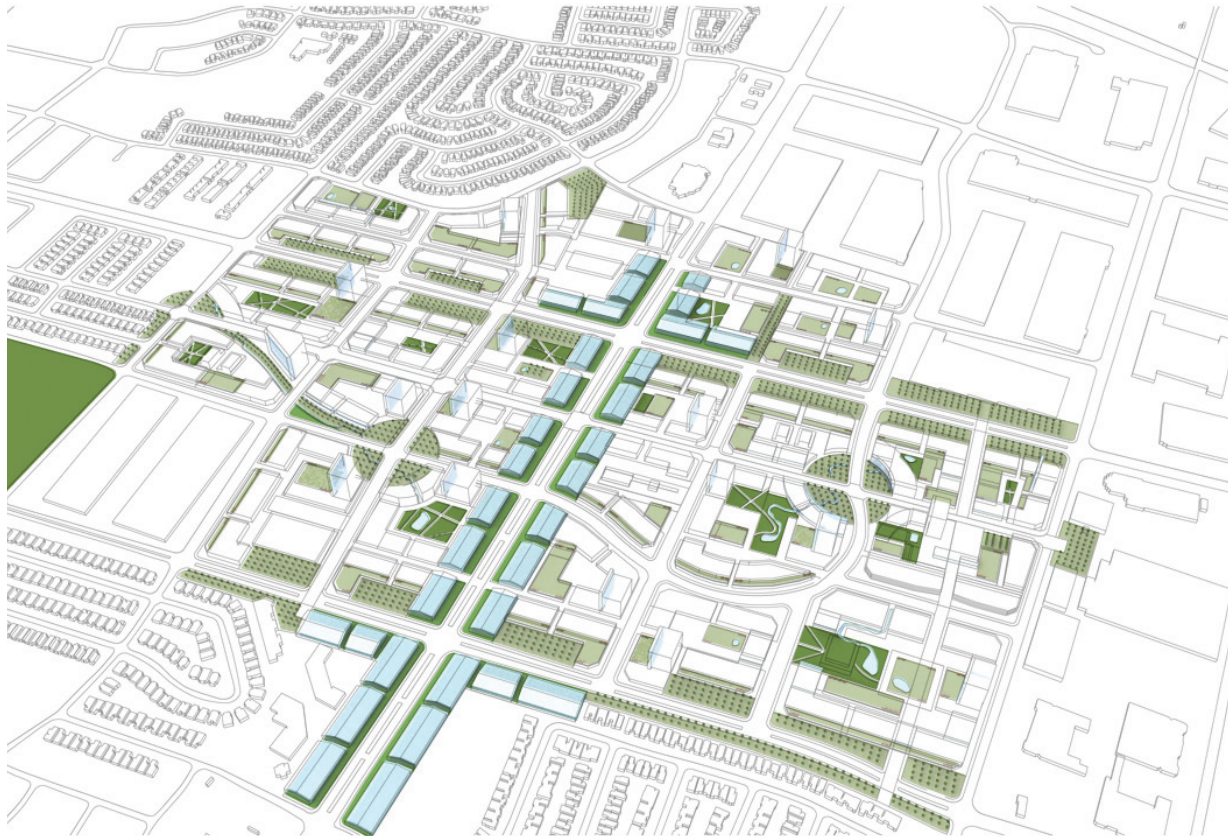


Fig. 53. *The Continuous Productive Urban Landscape network*



Food production spaces include hydroponic and aquaculture facilities, traditional greenhouses, small and micro livestock farms (i.e. poultry and algae), rooftop gardens, traditional soil gardens, and vertical greenhouse facades. Recreational and leisure spaces include parks, tennis courts, race tracks, sculpture gardens, etc.



Fig. 54. *Non-productive urban agriculture units*



Distribution units: Supermarkets, farmers markets, food co-ops, farmer aggregators (Community Supported Agriculture) etc.

Consumption and processing units: Restaurants, cafes, delis, bakeries, abattoirs, packagers, butchers, etc.

Organic waste management units: Compost bins, biogas combined heat and power units.

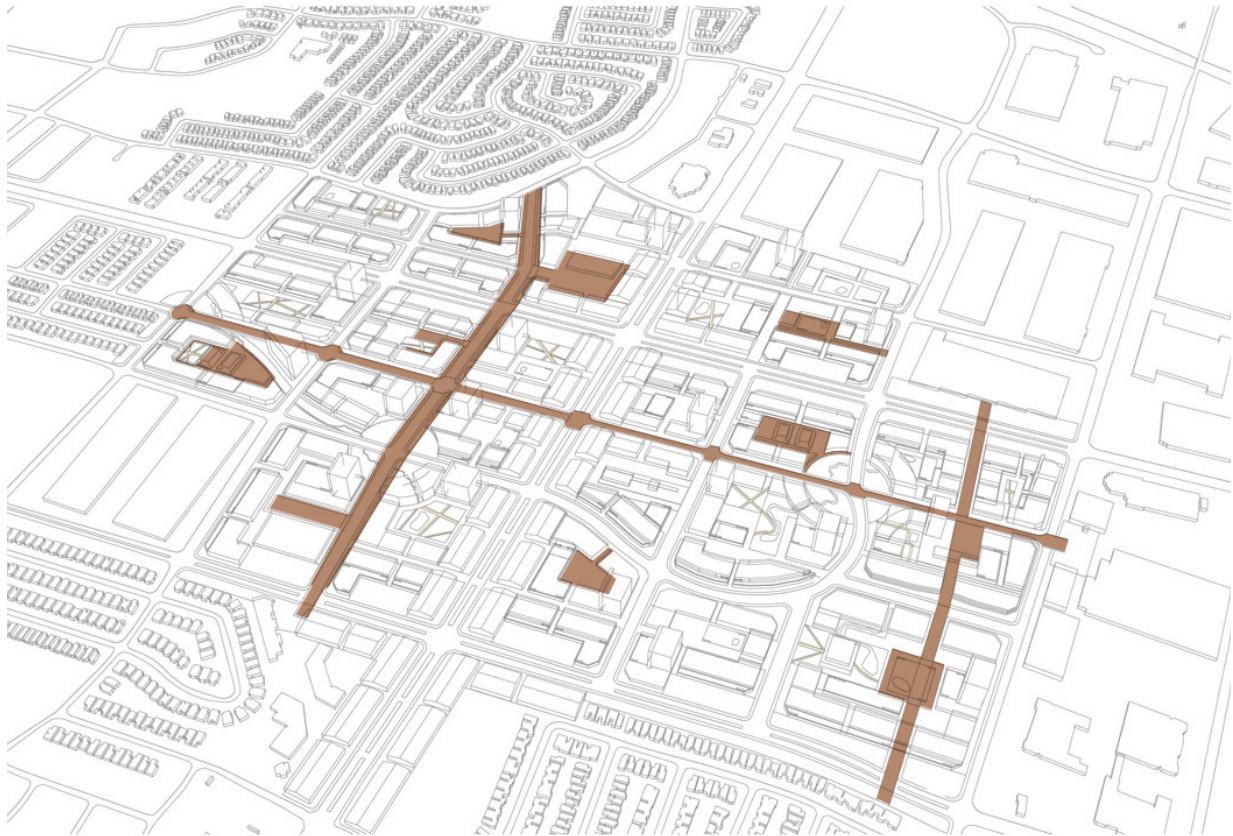


Fig. 55. Major pedestrian network and civic spaces



One north-south and two east-west pedestrian-oriented boulevards unite the main civic spaces found on the site. The pedestrian-oriented boulevards are not closed to vehicular traffic; rather they prioritize pedestrian usage, provide amenities such as street furniture and lighting, and are flanked by uses such as restaurants, retail, and gathering spaces that provide reasons for pedestrians to stop and stay.

3.5 Design of the Loblaws Block

In order to redesign the Loblaws block to create a sense of place in the suburbs, existing lifestyle centres were looked at as precedents for medium-density retail complex design.

Lifestyle centres are functional, mixed-use spaces that often integrate retail, residential, office, recreational and civic uses. Successful lifestyle centres have the following components:

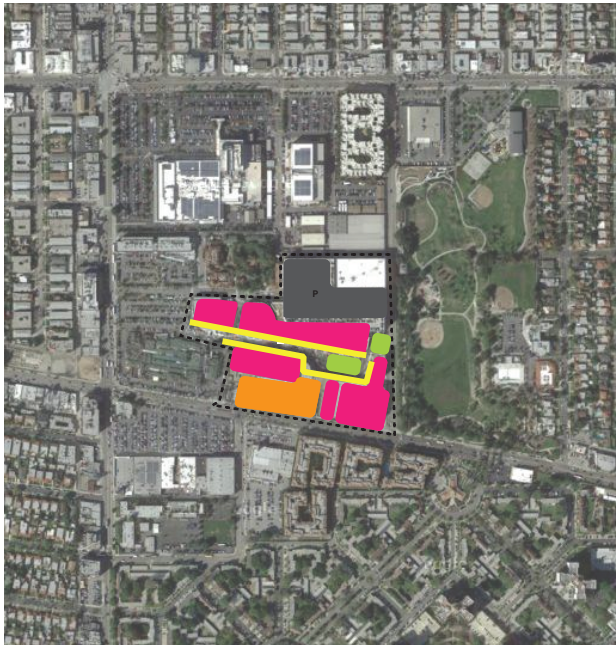
1) A main street that acts as the 'heart' of the centre. Buildings that line this street are generally 2-5 storeys in height with retail and service units on the ground floor.

2) An urban square that establishes a key/central gathering place, often next to or within the main street. These spaces are for public use with features such as quality street furniture and landscaping; and often host civic activities such as farmers markets or street celebrations.

3) A pedestrian-oriented environment which creates a high-quality urban realm with adequate lighting, seating, landscaping and activities. These create an upscale walking and lounging environment.

4) A diverse mix of merchandise and integration of residential/office uses adds to the draw of the centre. This mix supports a variety of functions to a variety of visitors, and avoids becoming a segregated land use.

5) Parking is integrated within the complex, creating a more urban environment. Parking is typically in the form of moderately-sized lots interspersed throughout the development (or along the periphery), and/or stacked parking garages.



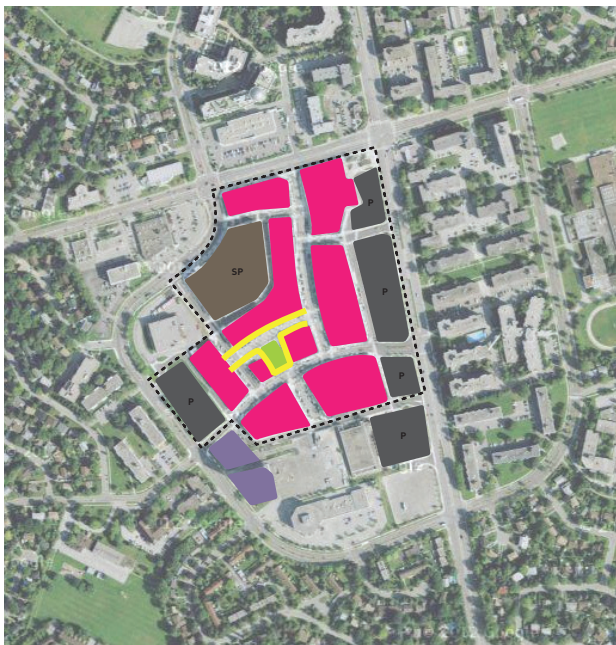
Aerial view and structural diagram

Fig. 56. Retail complex design precedent: The Grove, Los Angeles, California

The Grove is a popular retail-focused destination in Los Angeles. Its main street is characterized by cafes, cobblestones and a large fountain that acts as a public and central gathering space. It also includes a theatre and is adjacent to a historic farmers market. Parking is provided through 160 surface spots, a seven-storey structured parking garage.

The success of The Grove is evident by the fact that it averages nearly 40,000 visitors a day. The length of stay is nearly three times that of traditional shopping centre, and the sales per square foot are 75% above the industry average.

- Retail space
- Mixed-use space
- Public plaza
- Residential
- Main street
- Project boundary
- Structured parking
- Surface parking



Aerial view and structural diagram

Fig. 57. Retail complex design precedent: The Shops at Don Mills, Toronto, Ontario

Opened in 2009, The Shops at Don Mills is Ontario's first open-air centre that includes high street retail, restaurants, residences and a town square. This civic square hosts activities such as dancing and yoga for the public. Structured parking to the north accommodates over 1,000 vehicles, while free surface parking on the periphery accommodates other visitors. A Metro grocery store serves as an anchor tenant. Currently, their residential phase is underway that includes high-rise condominiums and lofts. However, the residential units are not integrated with the main commercial units on the site.

- Retail space
- Mixed-use space
- Public plaza
- Residential
- Main street
- Project boundary
- Structured parking
- Surface parking



Site plan, The Grove



Streetscape, The Grove



Site plan, The Shops at Don Mills



Streetscape, The Shops at Don Mills

The following pages contain design options for the Loblaws block. They take principles of retail, public space, and parking from the lifestyle centres described above, and couple them with urban agriculture infrastructure to fulfill the design intent of contributing to suburban resiliency.

In order to create a more human-scaled environment, the size of the Loblaws supermarket is reduced from 7,800 square metres (84,000 square feet) to approximately 3,710 square metres (40,000 square feet). Its subservices such as PC Mobile, Joe Fresh, its Garden Centre and Photo Lab, etc., are dispersed into the complex in separate retail units in order to maintain clarity of Loblaws as a place for good food. This also has economic benefits. Findings in 2010 by Willard Bishop, retail strategists, suggests that 39,000 square feet covers weekly demands and eliminates unproductive inventory of big-boxes. This means more square footage is profitable, rather than bearing the cost of "having too much variety" that sits on store shelves.

- Distribution (Loblaws food store)
- Food processing/consumption (i.e. bakery, deli, restaurant)
- Food production (i.e. garden)
- Biogas CHP
- Residential
- Pedestrian-oriented streets/squares
- Retail (i.e. Joe Fresh)
- Parking (decked, surface)

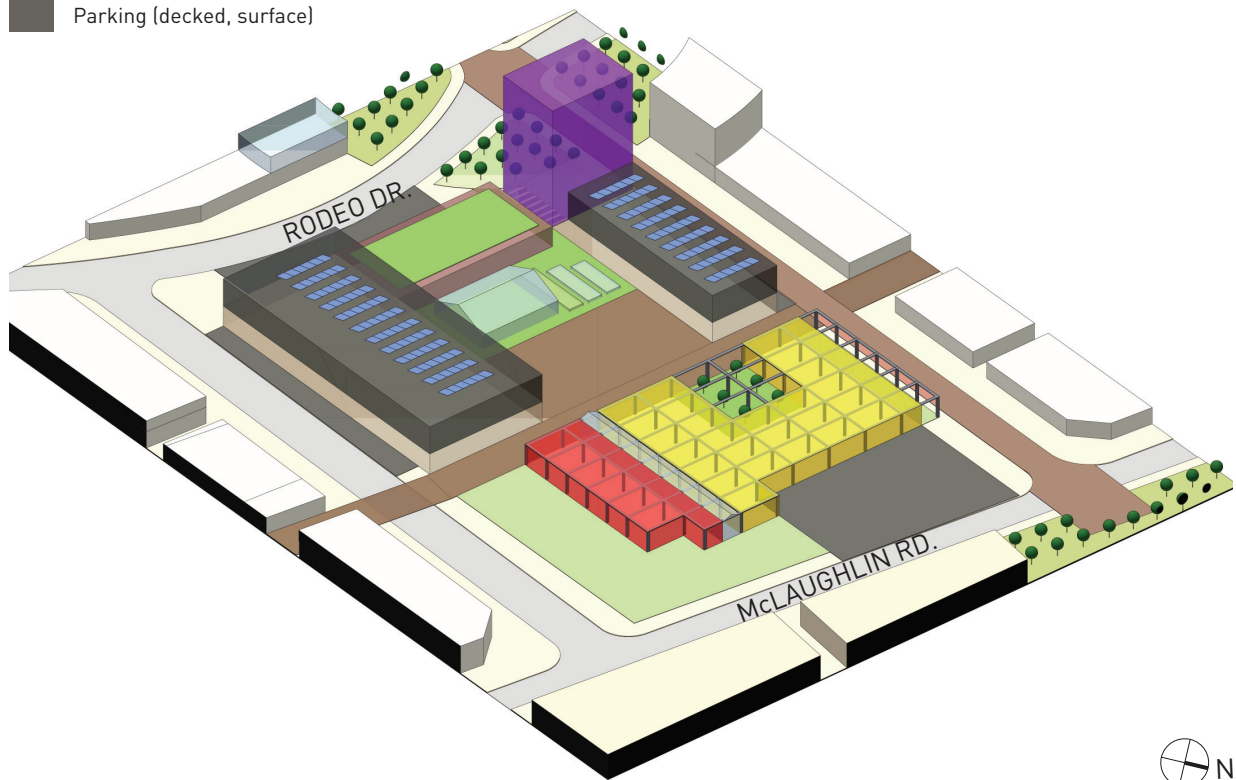


Fig. 58. OPTION 1: Keep existing structure

This option looks at a potential site design where the steel skeleton structure of the Loblaws is retained, while the building envelope is retrofitted to be more efficient. This is in keeping with the idea that retrofitting existing buildings is more ecologically sound than building new. However, whether big-box structures are worth keeping, as they are not built for durability, is questionable.

Food production/residential infrastructure cannot be placed on top of the existing structure without extensive renovation. The current footprint of the store is situated in a way that interrupts good circulation patterns and opportunities for a more defined and active edge.

- Distribution (Loblaws food store)
- Food processing/consumption (i.e. bakery, deli, restaurant)
- Food production (i.e. garden)
- Biogas CHP
- Residential
- Pedestrian-oriented streets/squares
- Retail (i.e. Joe Fresh)
- Parking (decked, surface)

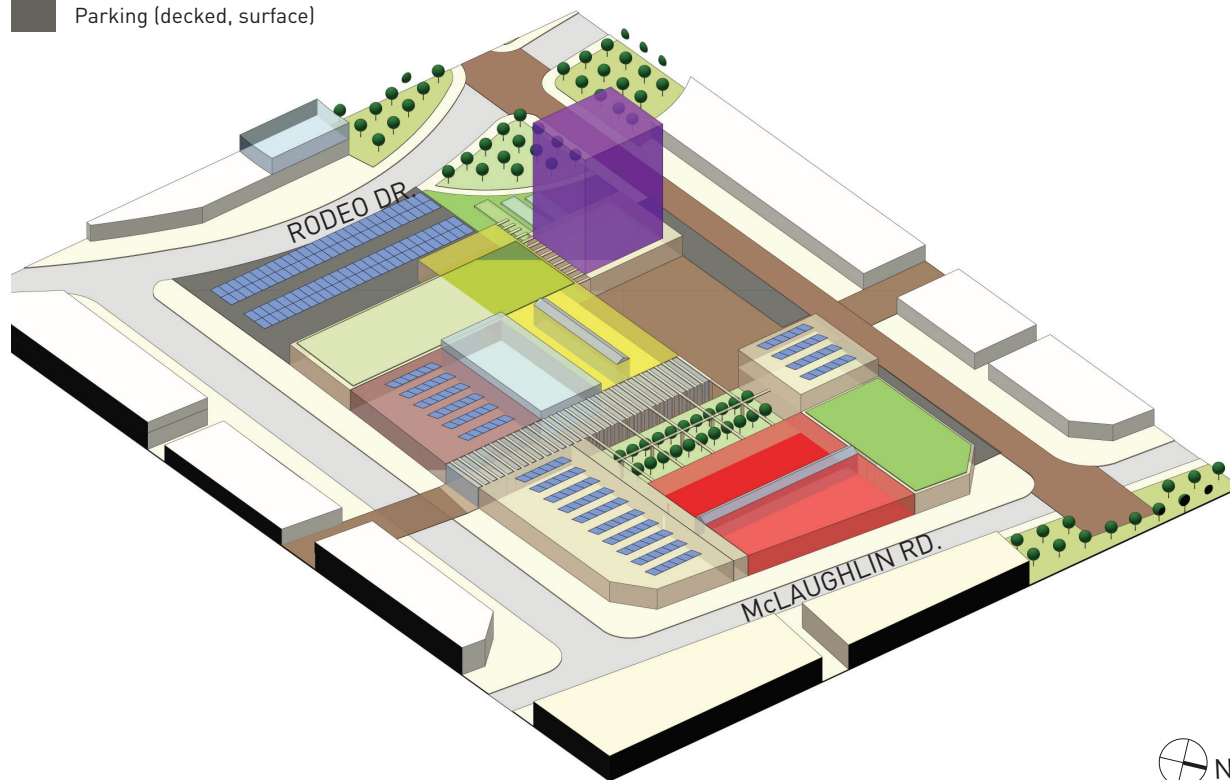


Fig. 59. OPTION 2: Block as a mall

Option 2 considers the site as a primarily enclosed mall-like experience where certain corridors and spaces are highlighted through skylights and atriums. Different commercial functions are connected for the most part through interior passages. However, there is a lack of a continuous productive urban landscape experience, especially if one experiences the site primarily from the inside.

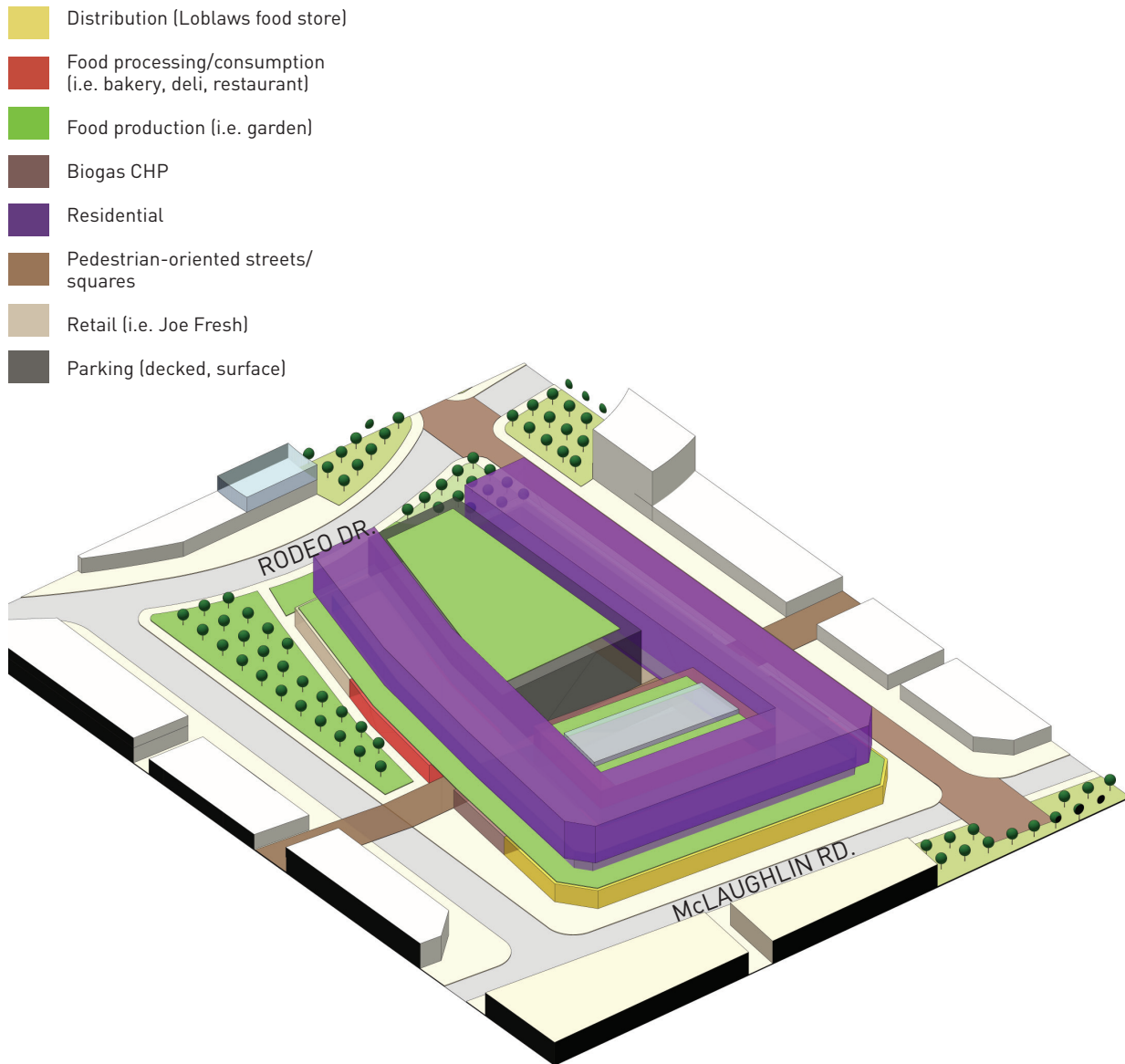


Fig. 60. OPTION 3: Live/work courtyard block

Loblaws and other urban agriculture and commercial units form a large podium which supports medium-density residential above. This alludes to the time-tested typology of live/work units on main streets. The residential units are served by private and public open spaces, and an interior courtyard. Parking is hidden in a decked structure in the interior.

There is a clear street edge; however there is a lack of connection to the rest of the pedestrian-oriented network, and the courtyard space may not be very desirable. There is also a lack of continuous productive landscape connection, and residential density is quite low.

- Distribution (Loblaws food store)
- Food processing/consumption (i.e. bakery, deli, restaurant)
- Food production (i.e. garden)
- Biogas CHP
- Residential
- Pedestrian-oriented streets/squares
- Retail (i.e. Joe Fresh)
- Parking (decked, surface)

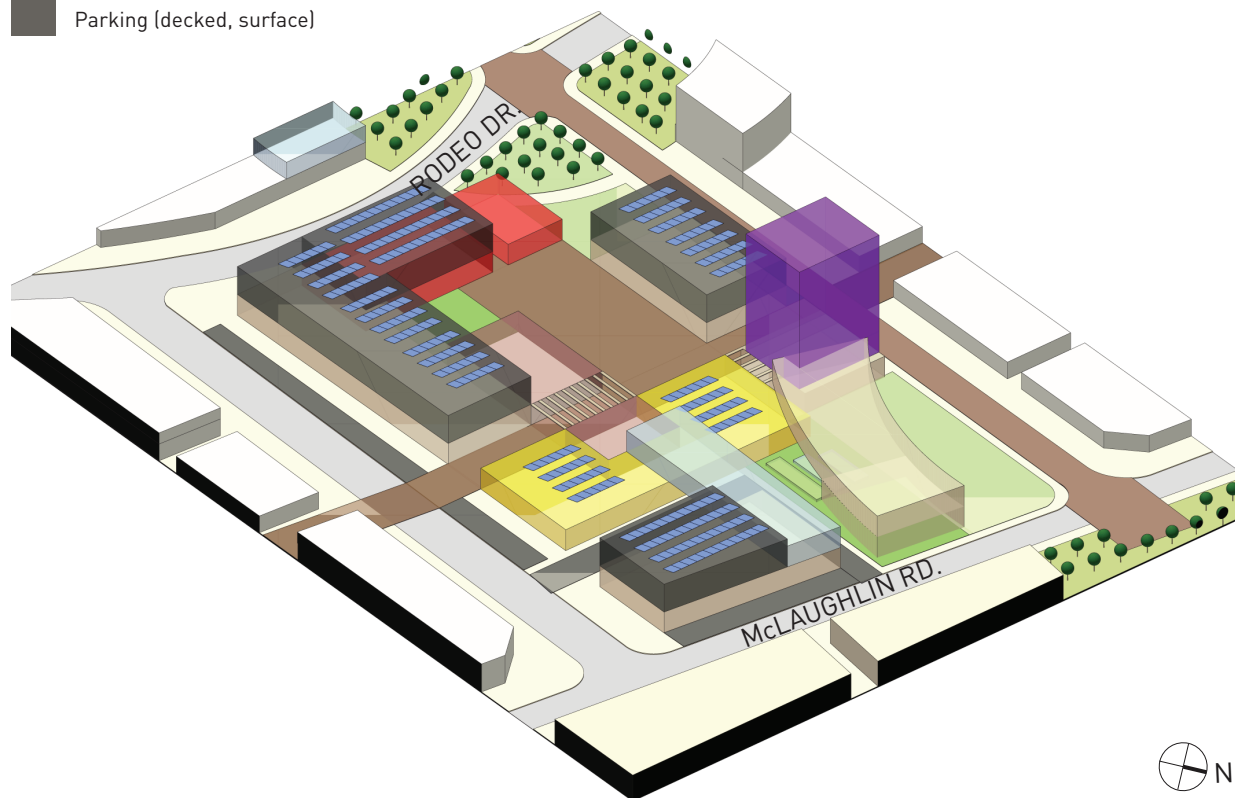


Fig. 61. OPTION 4: Dispersed yet connected around a public square

Loblaws and its holdings (Joe Fresh, PC Financial, etc) are dispersed yet interconnected on the site through visual and circulatory links. Other existing Loblaws programs (kids clothing, community kitchen, florist, etc.) are outsourced to local businesses in the commercial spaces. The physical separation suggests an autonomous yet interdependent relationship to the giant conglomerate, and reduces the space needed for Loblaws food distribution. The residential units, CHP plant, Loblaws food store and a greenhouse are physically connected, symbolizing a complete food system loop (from production to waste as energy). Having this form the central part of the block emphasizes and celebrates this relationship. Recreational and productive open space are interspersed throughout the block to add to the continuous productive urban landscape on the overall site.

- Distribution (Loblaws food store)
- Food processing/consumption (i.e. bakery, deli, restaurant)
- Food production (i.e. garden)
- Biogas CHP
- Residential
- Pedestrian-oriented streets/squares
- Retail (i.e. Joe Fresh)
- Parking (decked, surface)

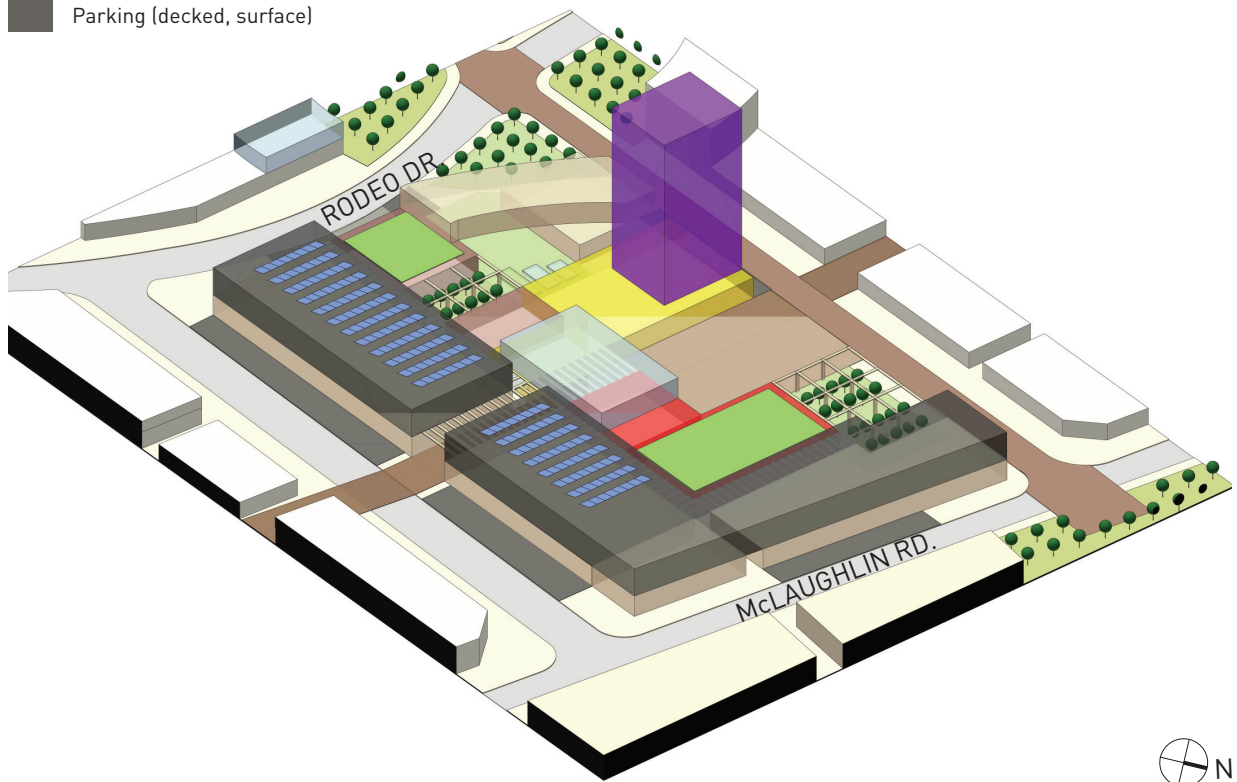


Fig. 62. OPTION 5: Loblaws as a dispersed yet integrated entity with public space (a cross between Options 2 and 4)
 The intent is similar to what is described in Option 4: Loblaws and its holding are dispersed yet interconnected on the site. This option has a stronger, more clear physical form, such as having retail frame the roads with higher/faster vehicular traffic; and having the farmers market square come off the pedestrian-oriented boulevard. It provides more opportunity for connecting roofscapes in interesting ways, and the network of productive landscapes is more visible and connected (one will be able to view at least some component of the network -- like greenery/a greenhouse -- from many points on the site).

3.6 Design Proposal for the Loblaws Block

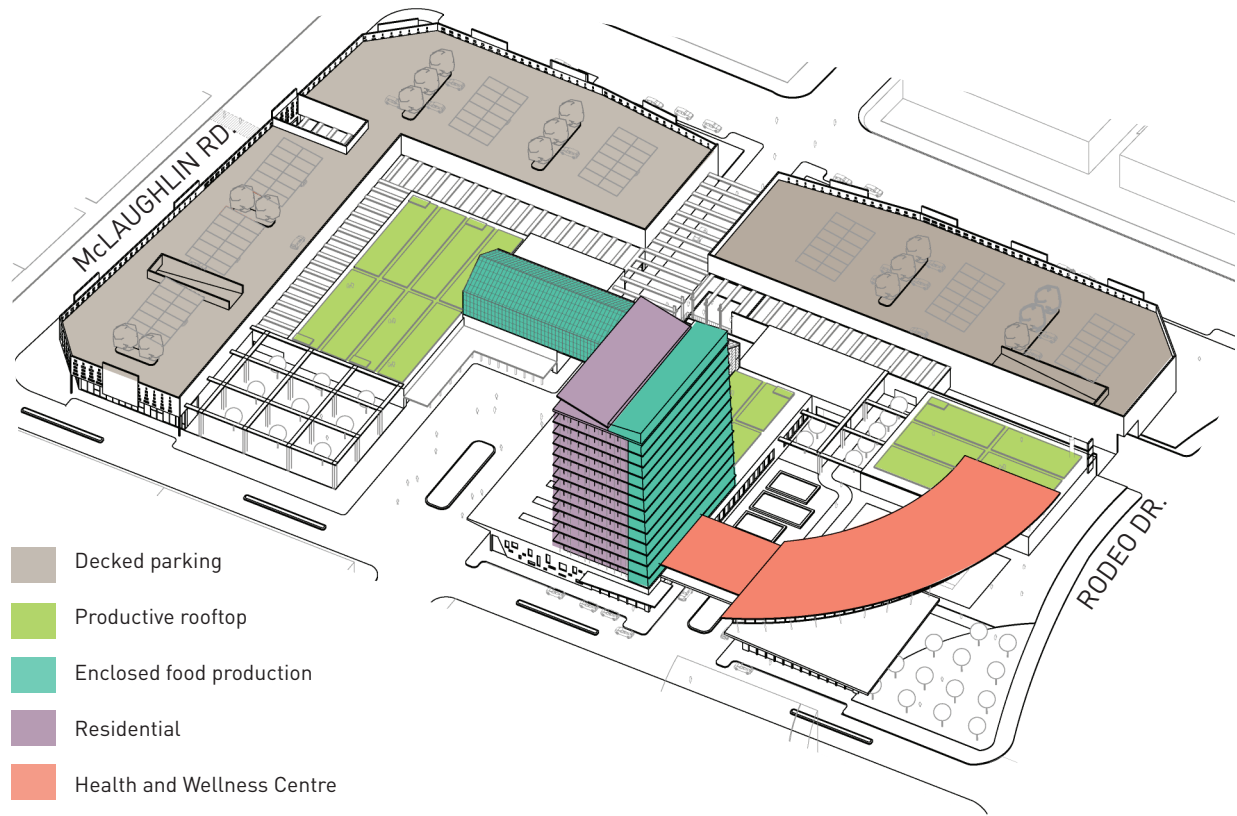


Fig. 63. Rooftop program elements



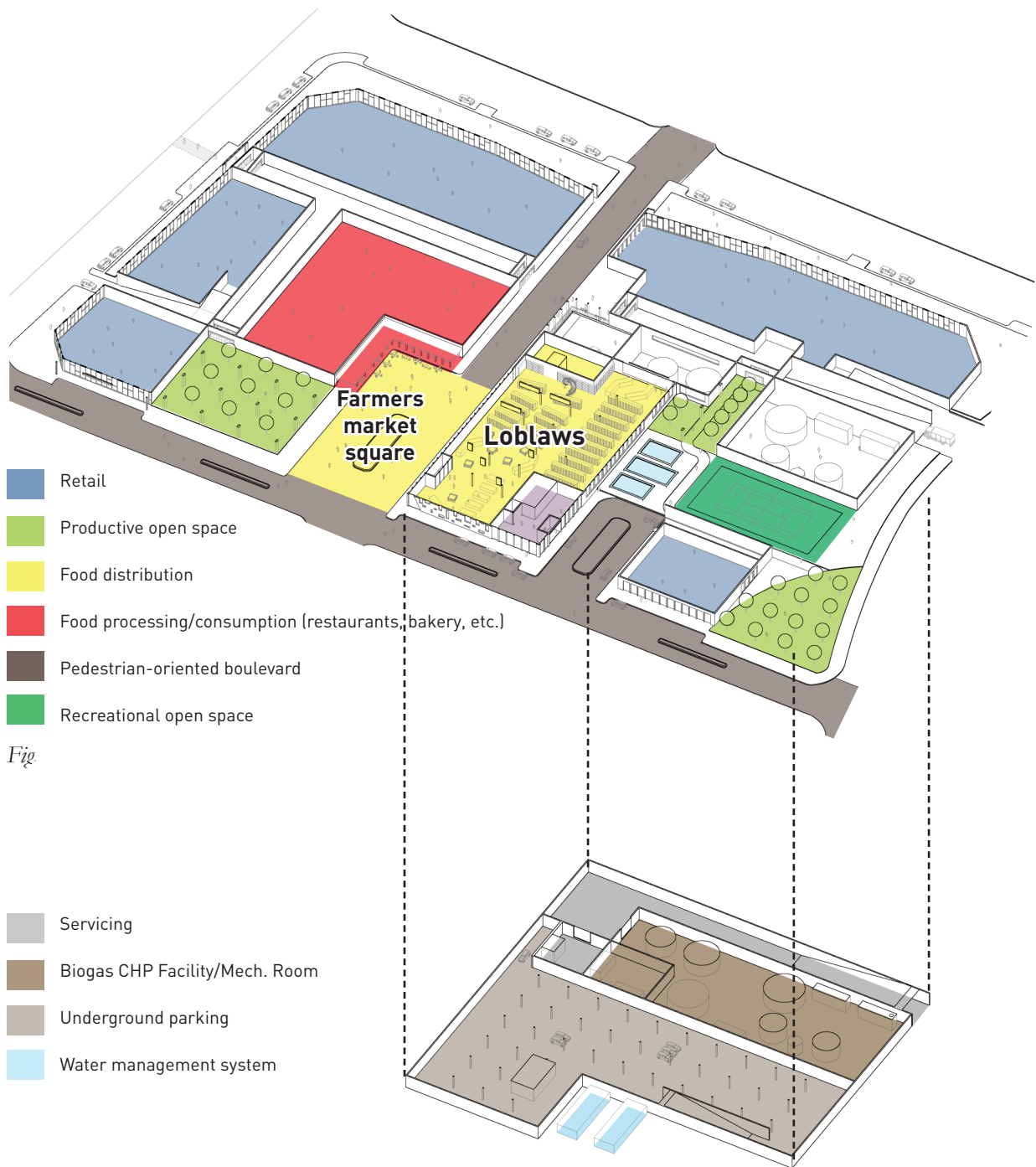


Fig. 65. Underground parking level program elements

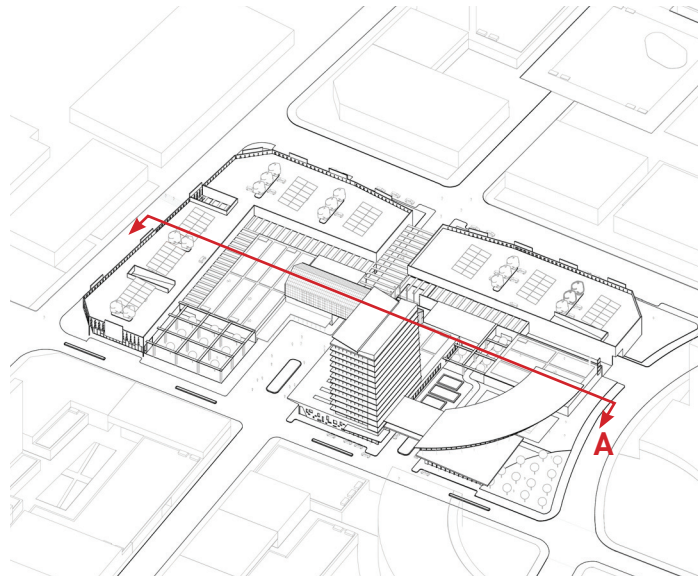


Fig. 66. Section A

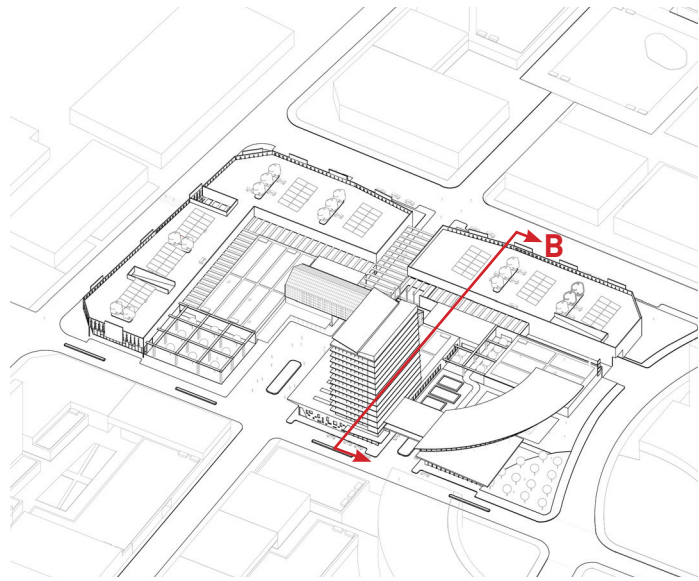
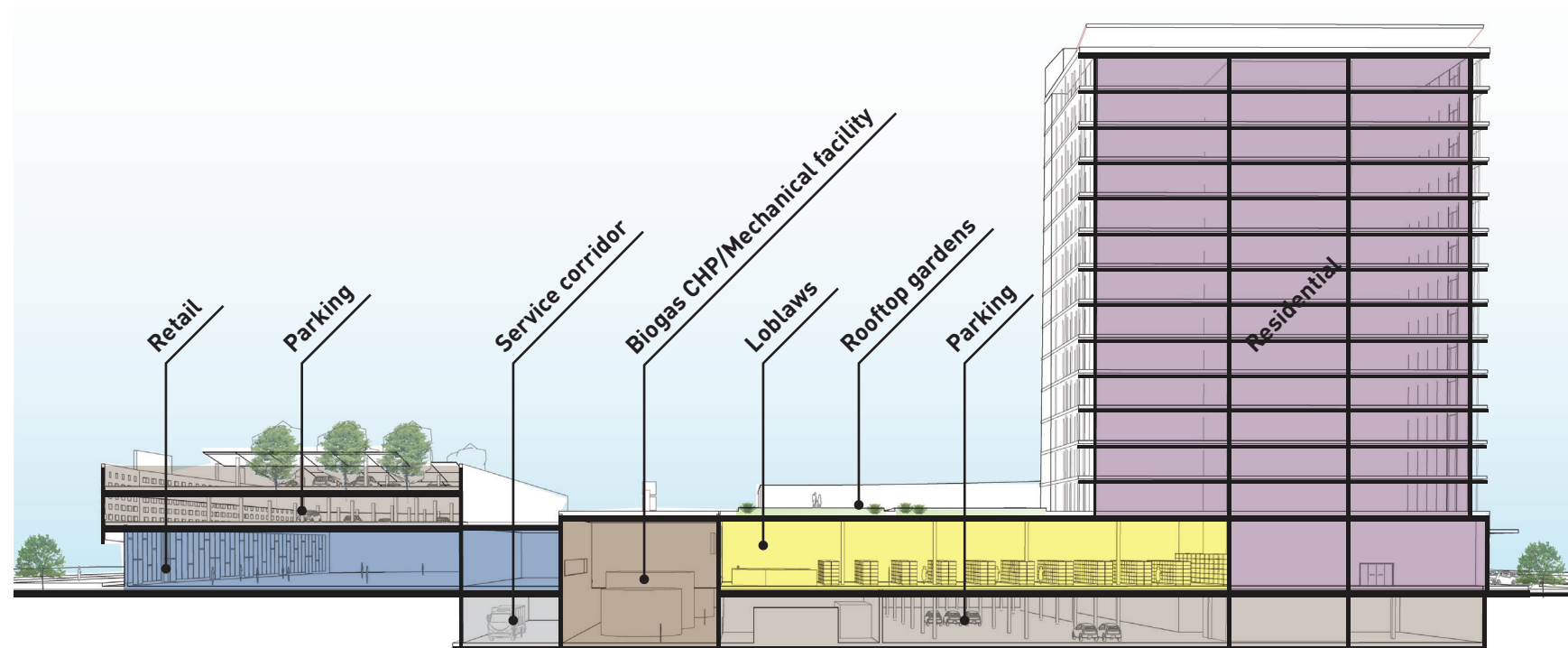
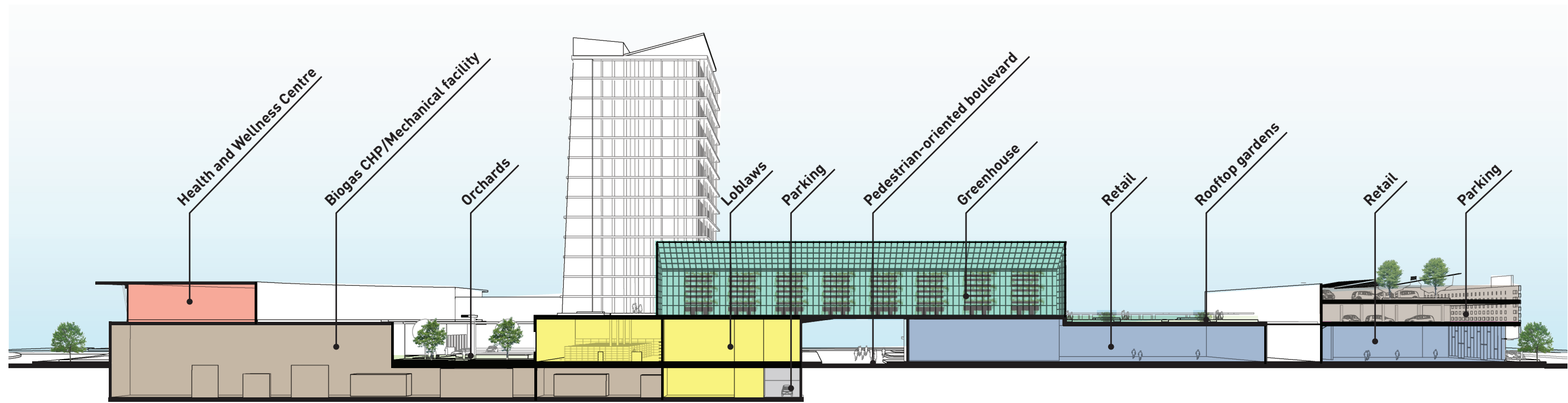


Fig. 67. Section B



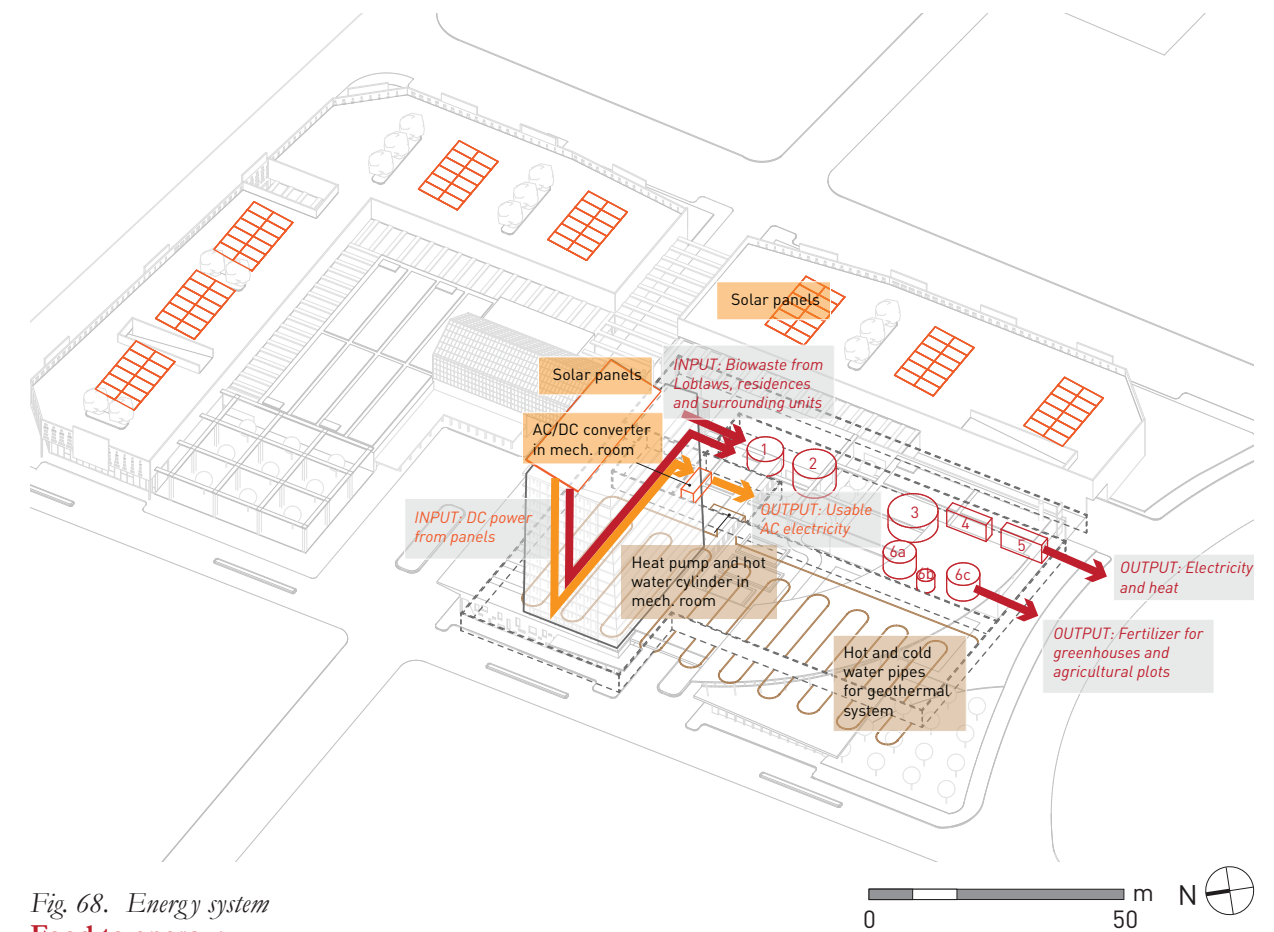


Fig. 68. Energy system

Food to energy:

Biostock (food and other organic waste) is collected from Loblaws, residences and the surrounding area, and stored (1). The stock is pretreated (2) and then sent to an anaerobic digester (3) which outputs biogas: methane and carbon dioxide, and digestate (1 lb of food waste = 3.5 ft³ biogas). The carbon dioxide is used in the greenhouse above. The biogas is treated in a gas treatment module (4), where it is then passed to a (5) compact biogas Combined Heat and Power (CHP) unit such as the 2G *agenitor*[®]. The CHP unit generates electricity and thermal energy, which can be used to heat the building (currently, approximately 11% of Loblaws' energy requirements come from space heating). The digestate from the anaerobic digester is stored (6a) and then turned into fertilizer (6b), which is then stored (6c) before being sold or used.

Solar energy:

Photovoltaic (PV) cells on the roof of the Loblaws and residence convert sunlight into DC power, which is then transformed into usable electricity via a DC/AC converter unit.

Other systems that ease the energy requirements of a conventional building include increasing daylighting, and installing a **ground source heat pump system** to contribute to heating and cooling of the building.

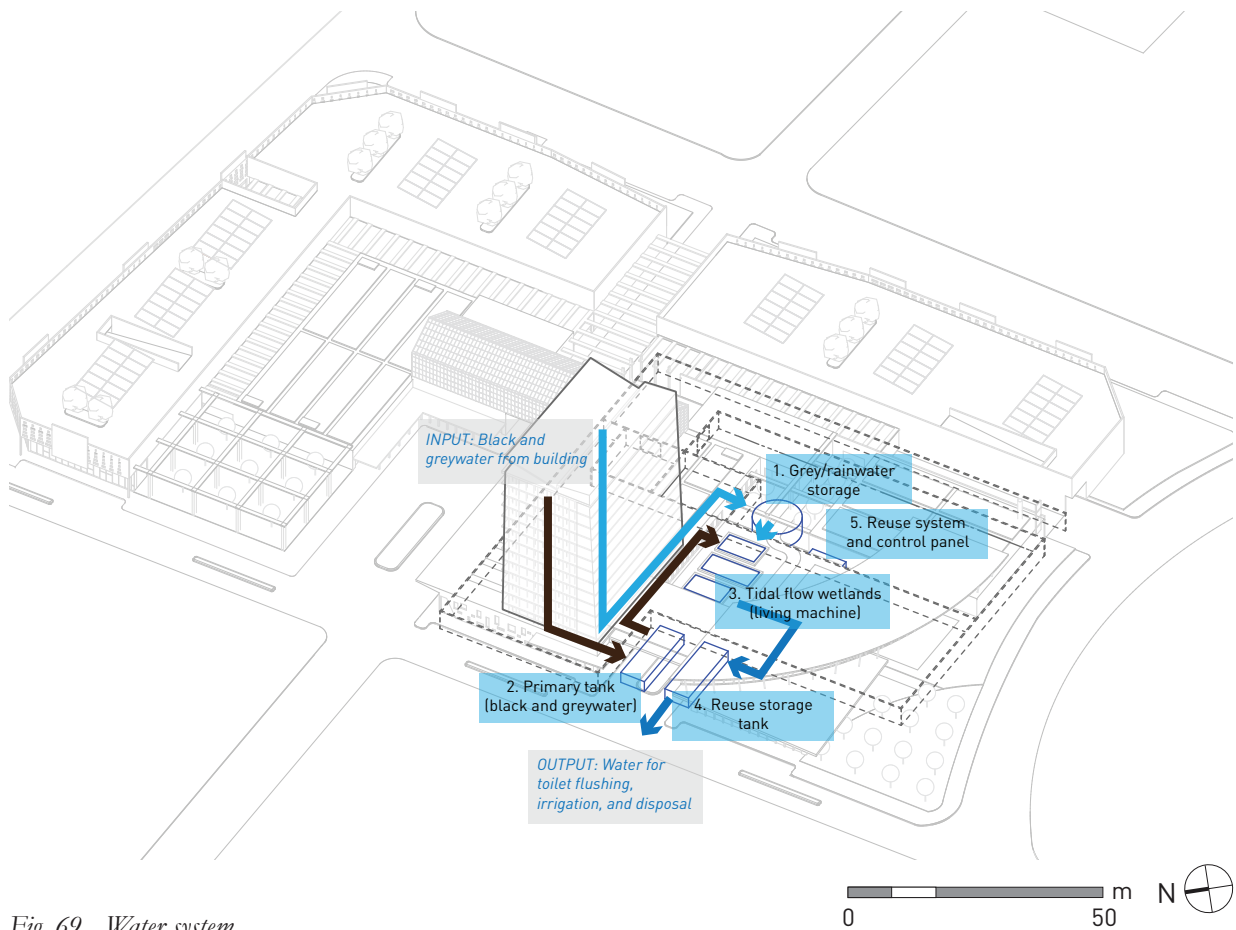


Fig. 69. Water system

Wastewater (black and greywater) is collected (1), and then stored in a primary tank underground (2). The water is then taken through a “tidal wetland” living machine feature (3) located outdoors, where aggregate-filled cells with plant species disinfect the water through alternating fill and drain cycles, nitrification and denitrification. The treated water is then stored in a reuse storage tank (4), where its release is controlled (5). The output is water that is suitable for toilet flushing, irrigation and disposal.

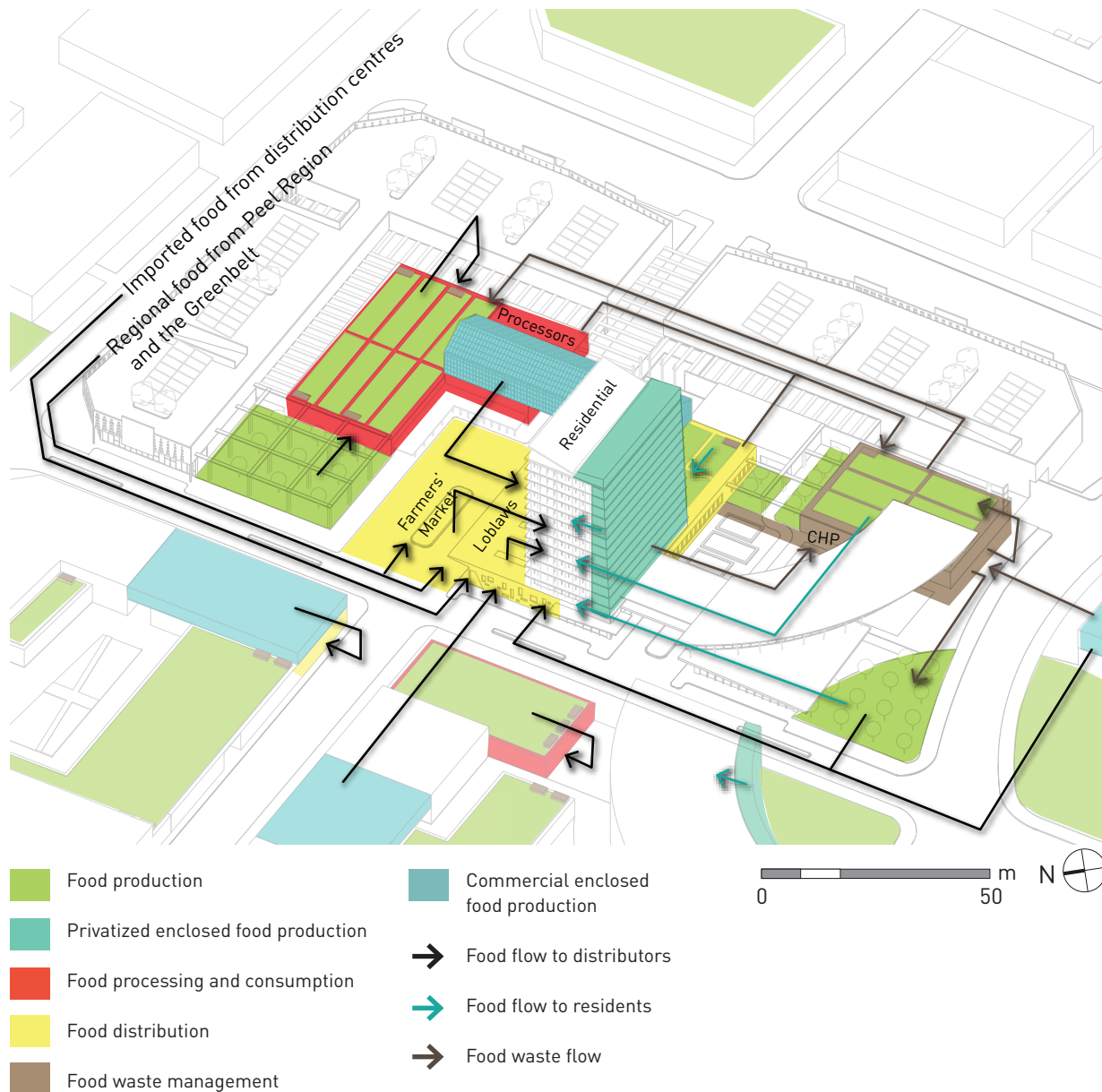


Fig. 70. Urban agriculture elements and food flows

Local urban agriculture units help promote local economic development. As food producers sell to local processors, distributors, and consumers, money is kept within the region. Furthermore, large anchor retailers serve as an attractor to the site, which smaller retailers can use to their advantage to offer niche food items not covered adequately by the supermarket.

Food and food waste flows in a circular loop on the site as shown by the arrows. With regards to Loblaws, food is still imported to distribution centres, yet at a smaller scale, as procurement from the Greenbelt increases, and as on-site food production infrastructure is built.

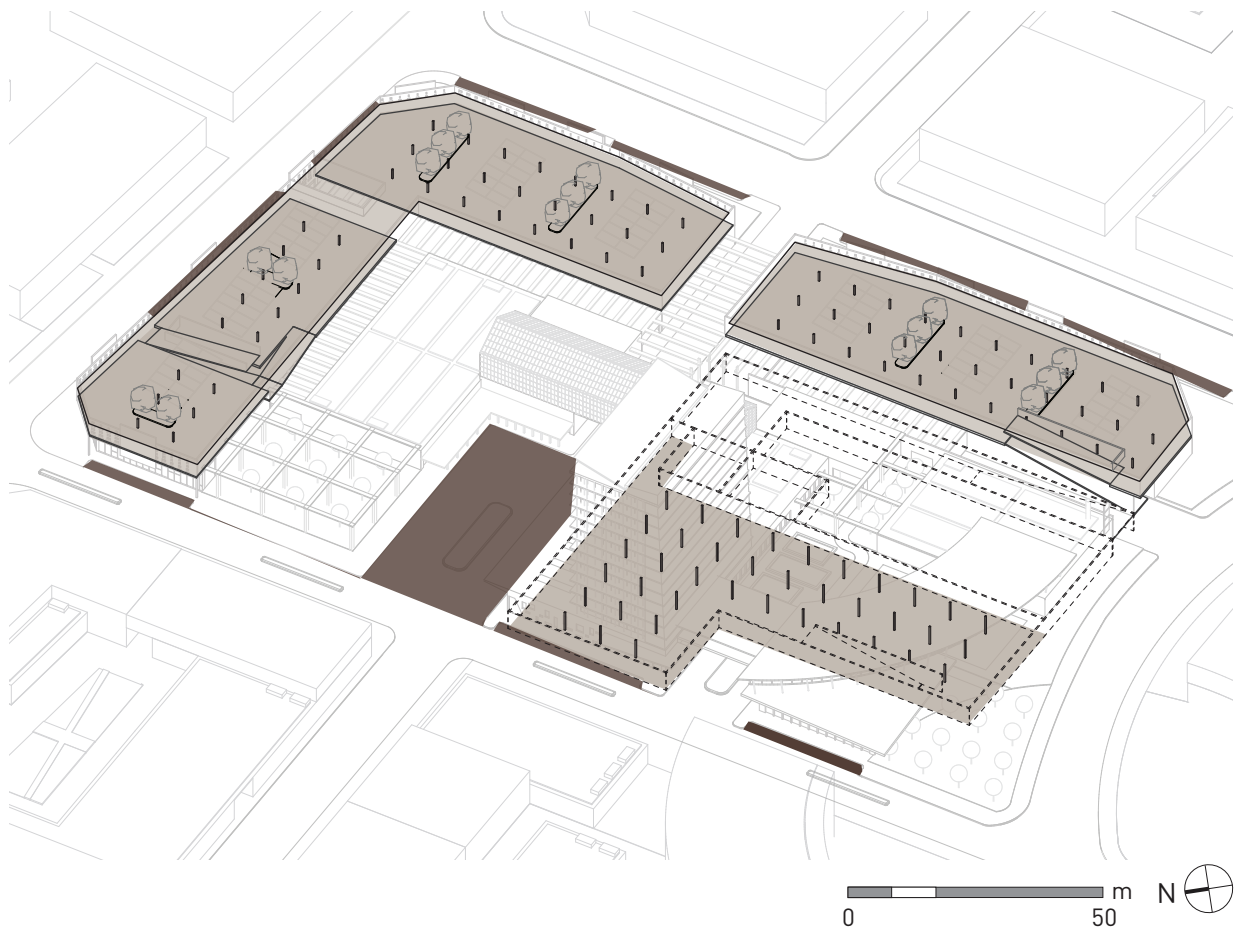


Fig. 71. Parking

Parking on the site is dealt with in three ways:

- 1) Decked parking above retail units (490 spaces);
- 2) Underground parking below Loblaws (148 spaces; to accommodate the 130 residential units above), and
- 3) Surface parking along the street edge (30 spaces) and in the civic square (46 spaces) when it is needed during peak times.

There are 714 parking spots available on site.



Fig. 72. The micro-food network at the Heartland Town Centre
Urban agriculture units and the CPUL.



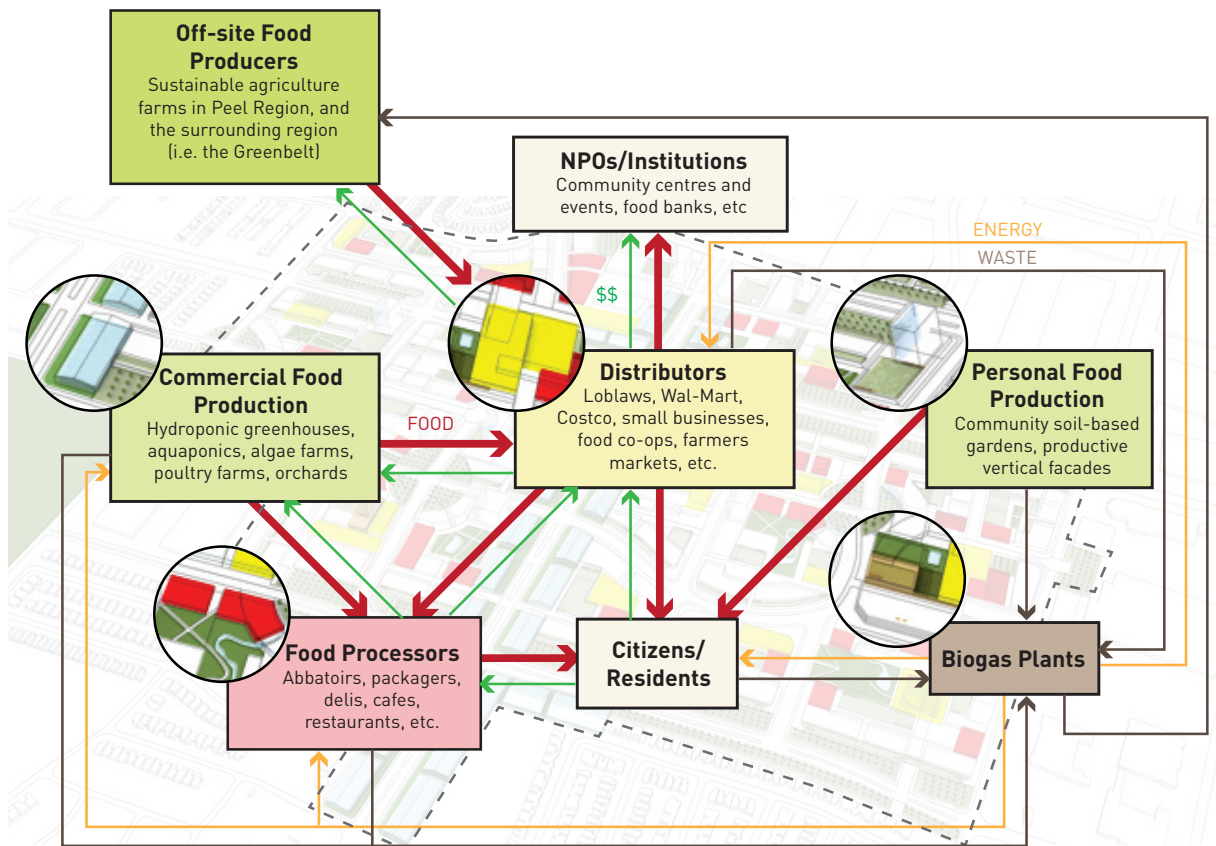


Fig. 73. Resource flows in the micro-food network

Resource flows, such as food, energy, money and waste, at the Heartland Town Centre are largely contained within the site through the localization of urban agriculture units, and within the wider Ontario region such as the Greenbelt.

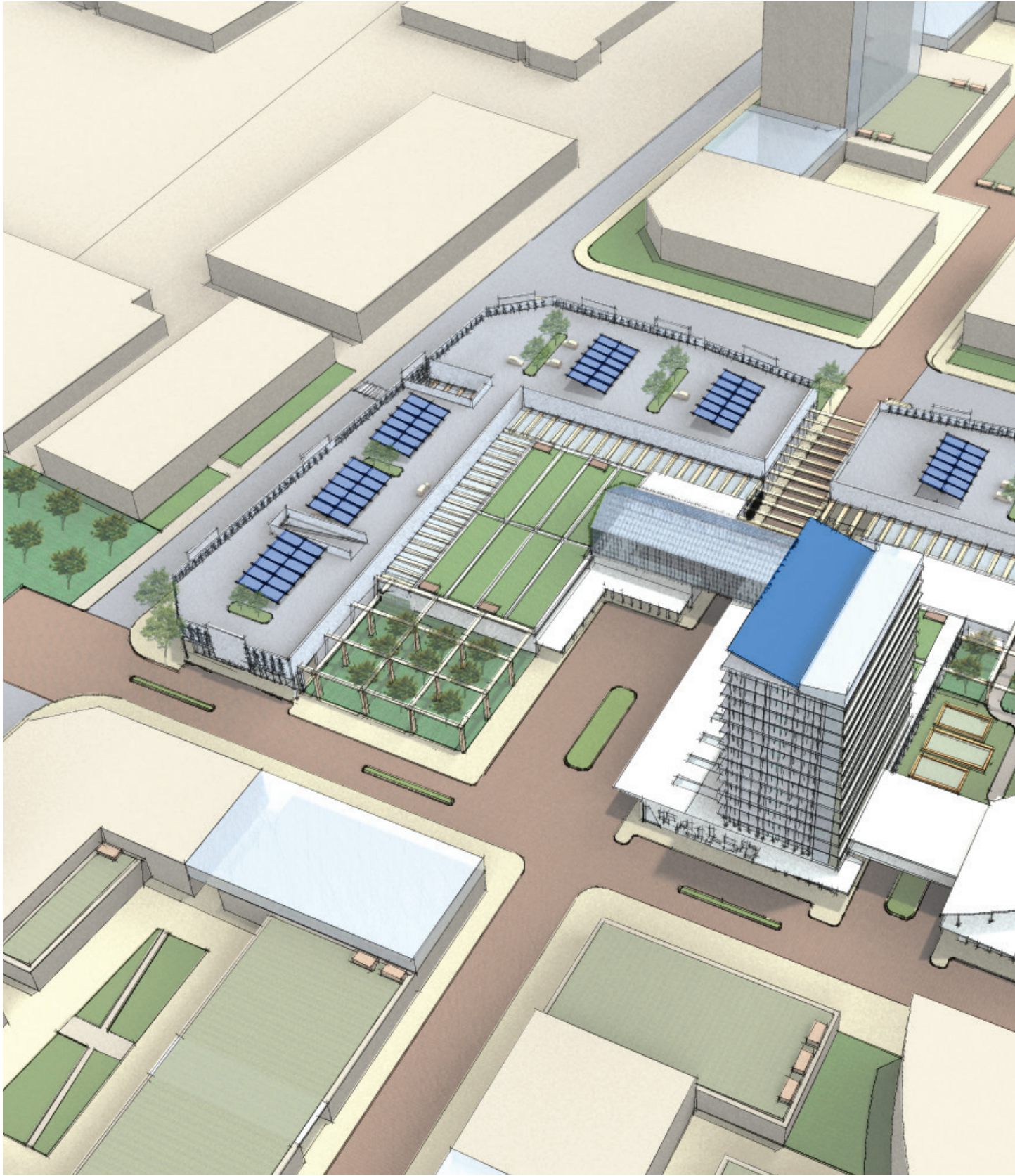


Fig. 74. Overall site view

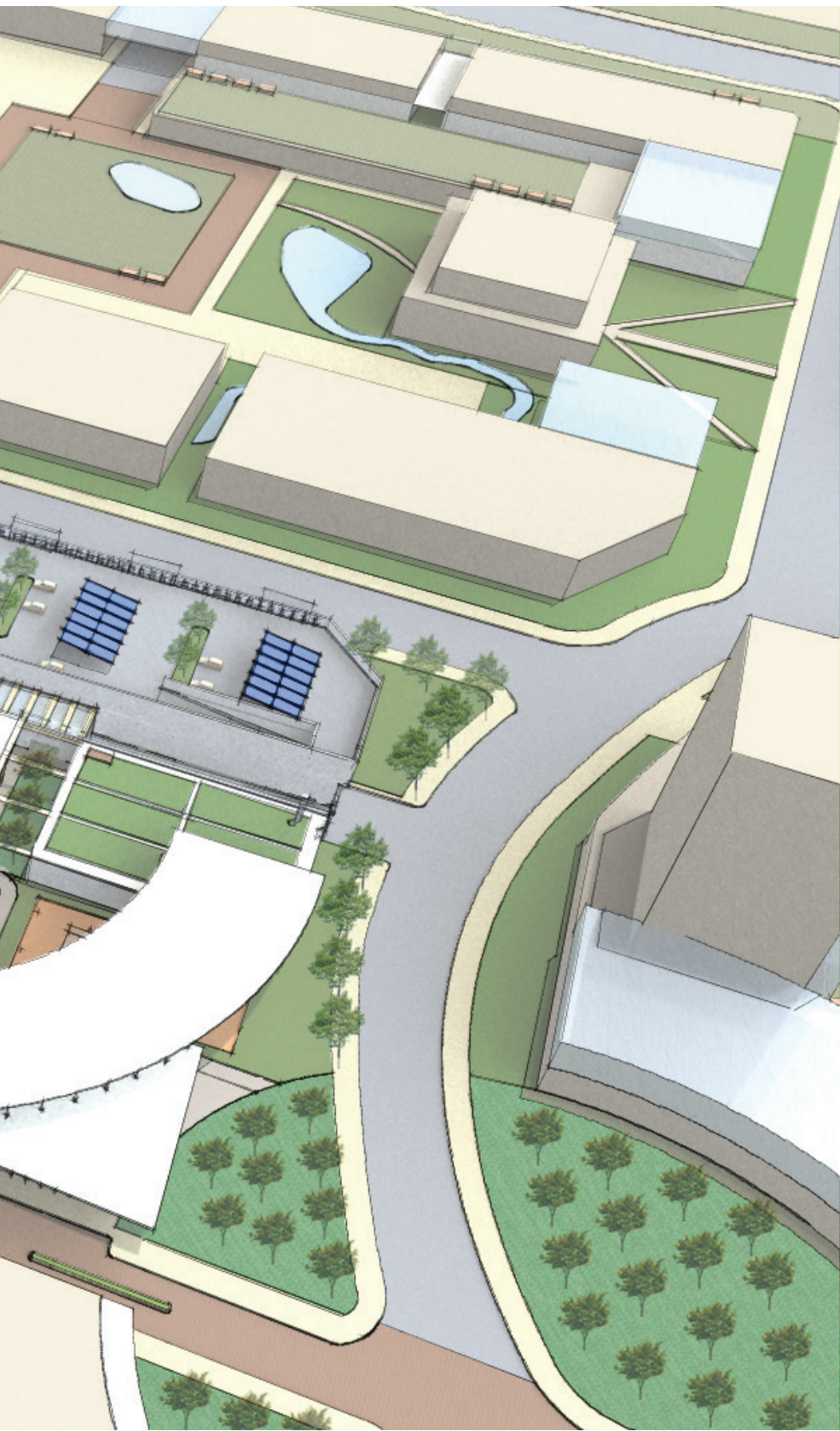




Fig. 75. Farmers market in the civic square in front of Loblaws
The civic square flanks one of the pedestrian-oriented boulevards in the HTC site, making it easily accessible to pedestrians. During peak retail hours, the square can be used for surface parking.

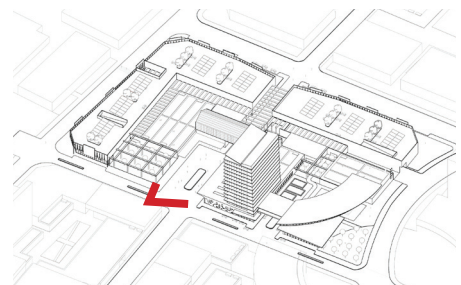




Fig. 76. Retail edge along McLaughlin Rd.

Instead of having the service area of the Loblaws block facing McLaughlin Rd., a major road flanking the HTC, retail stores with parking decks above create a human-scaled environment to attract pedestrian activity, and to create a more permeable street edge. Signage on the parking decks would be "smart" and reflect real-time data such as retail outlet sales and number of parking spots available, and can also include information for the public good, such as health and nutrition information. The pedestrian-oriented boulevard culminates into a public apple orchard across the street where business parks are situated, tying the HTC to its context.

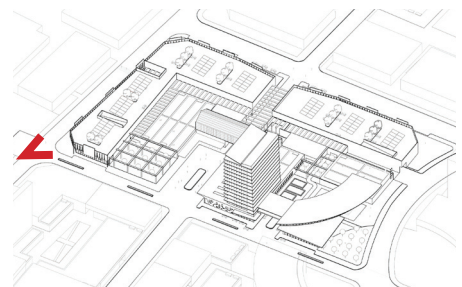




Fig. 77. Residential drop-off area

The drop-off area for the residential tower above the Loblaws supermarket is off a pedestrian-oriented boulevard. It serves as a buffer zone between the public boulevard, and the more private space of the entrance lobby and open recreational area adjacent to it.

Residential towers are used on the site to increase density. It is estimated that Mississauga's population will grow from 668,500 (2006) to approximately 769,000 people in the year 2031, and that growth will occur in the medium-to-high density housing market (Hemson Consulting Ltd.).

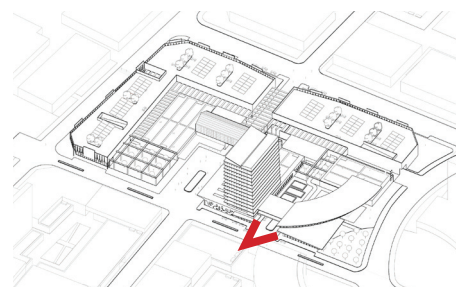




Fig. 78. Inside the Loblaws supermarket

The fresh produce section is at the main entrance, acting as an indoor extension of the farmers market. Loblaws' current supplementary departments, such as the pharmacy and florist, are dispersed outside of the supermarket and run by local business owners. This enables the reduction of the store footprint from 84,000 square feet to 40,000 square feet, keeps the inventory focus on food, and helps support small, local businesses.



Towards the back is a viewing area into the CHP facility. By having the waste-management mechanism visible from the produce floor, a visual link is established to the "seed to waste" closed-loop cycle. This is done so consumers can become aware of where their waste ends up and how much energy can be generated from it. Real-time energy information would also be on display.

Lastly, the produce featured in the supermarket would reflect a local, sustainable food procurement policy. This would also reflect sensitivity to local demographics, and include sourcing ethnic vegetables from regional sources such as the Greenbelt. Mississauga's population is highly diverse in terms of ethnicity, where over 51.3% of the population are immigrants (see Appendix C).

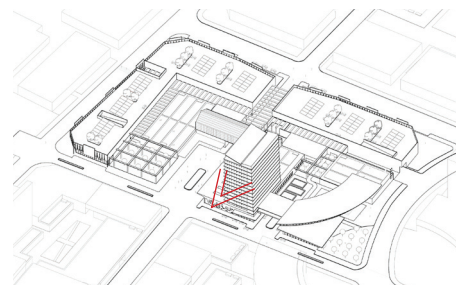




Fig. 79. Southern entryway into the site

A more human-scaled and pedestrian-friendly environment is created through a connected boulevard system, elevated parking, street amenities, signage, and activated facades.

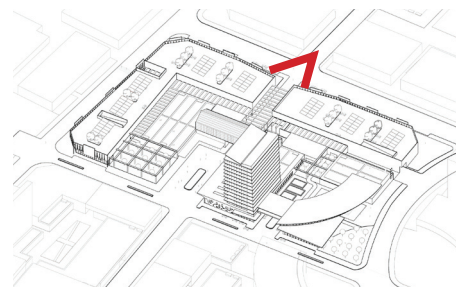




Fig. 80. Loading area below flanked by retail and the pedestrian-oriented boulevard above

The corridor which services the CHP facility, Loblaws, and the underground parking, is hidden beneath street level. Yet the loading area is kept open to the air in a high foot traffic area, so it becomes visible and a part of the pedestrian experience. This is to emphasize transparency. By showing the coming and goings of food (and food waste), it is hoped that these aspects of the food system become embedded in the public conscious.

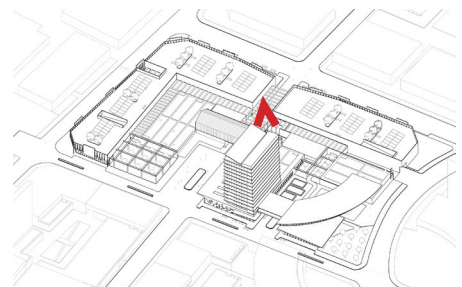
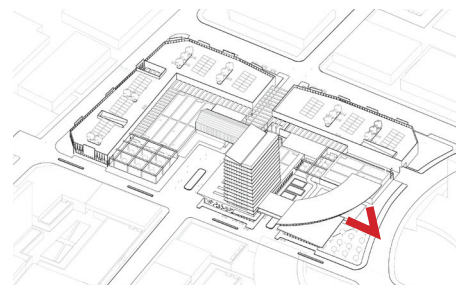




Fig. 81. Recreational open space under the Health and Wellness Centre

A healthy, livable environment includes green space and facilities that encourage exercise. Hence, a Health and Wellness Centre that is connected to the residential tower above the Loblaws supermarket, and that rests atop the CHP facility, is included. It can be imagined that it would be run by a third party - a public, private, or non-profit organization - and would serve to teach residents about health and provide spaces for exercise.

The recreation and green space below the Centre abuts a public apple orchard, therefore making it part of the micro-CPUL on the HTC site.



CONCLUSION

This thesis explores a transition strategy to a post-carbon world in the next 10-20+ years. In a world where several issues such as food security, climate change, peak oil, environmental degradation, urban intensification, and population growth, are converging, it is evident that new ways of thinking and designing to sustain our cities is much needed.

Two aspects crucial to our sustenance: food and shelter, are at stake. These two aspects have formed a relationship since the dawn of civilization: the securing of a food supply has allowed for the growth of cities. Since the onset of a cheap and abundant oil supply, however, the relationship between food and cities has drastically changed, and has come at numerous costs described in Part 1.

Our current, carbon-based food system is failing. It needs to not only provide sufficient and adequate food for all, but do so in such a way that does not threaten planetary health or add stressors to an already vulnerable global system.

As more Canadians populate the suburbs, the question of how these suburbs can adapt to the issues mentioned above becomes a very important one. Especially so since the growth of the suburbs are also driven by, and highly dependent on, cheap oil.

This thesis takes these two systems that are failing – global food and suburbia – and imagines what could happen if a key player, the supermarket, took a large role in improving

both. Part 2 of this work described how these power players have the muscle and influence to implement local community food systems. They can implement local procurement policies, contribute to local economic development, and they also have the real estate to re-imagine spaces conducive to healthy lifestyles, healthy food, and a healthy planet.

The design presented in Part 3 is one of the ways that a Loblaws supermarket complex in the City of Mississauga can be re-imagined. The ultimate goals of the design are threefold: 1) To contribute to the resiliency of the suburbs in the face of issues such as peak oil and climate change; 2) To create a sense of place in the suburbs, and 3) To create positive social, health and economic impact, through localizing food.

Regarding the first goal, the design proposes decentralized, on-site, renewable energy production. This takes the form of solar panels on rooftops, which convert sunlight into usable electricity. It also takes the form of a biogas combined heat and power (CHP) plant adjacent to the Loblaws supermarket. The plant takes organic waste produced from the surrounding buildings, and converts it into electricity, heat and fertilizer. The facility that hosts the CHP plant is situated in such a way that it is visible from street level, within the Loblaws supermarket, and to pedestrians walking within the retail structure. The loading area, with separate docks that receive food for Loblaws and biowaste for the plant, is visible in the public realm, instead of being hidden away. This celebrates

the movement of food and the closed-loop system of food transforming into energy; so that where food comes from, and where it goes, is no longer such a mystery. The process is made more transparent. It can be imagined that the CHP plant also has an educational component, available to the public for tours.

The design of the buildings themselves assume passive and ecological design, such as efficient lighting, heating and cooling; improved ventilation; adequate day-lighting; use of recycled materials; efficient building envelopes; smart controls; cool/green roofs, etc. The building science component of the design was not explored in detail in this work however, as the focus remained on the urban realm.

Finally, on-site food production and management, in the form of hydroponic greenhouses, productive vertical facades, and productive rooftops, contribute an important role in the achievement of suburban resiliency. Localized food systems are less oil-dependent than the current global food system. The urban agriculture units that comprise this alternative local system have ecological, economic and social benefits, which have been described in Table 1. The spaces for local food production and distribution ensure access to healthy and local food.

The proposed design helps celebrate local natural identity by implementing apple orchards and water features where river tributaries once ran, and recalling Mississauga's agricultural roots. The block is transformed from housing a

single, large box-like volume in the midst of a sea of parking, to being more human-scaled with enjoyable and pedestrian-oriented environments. These environments include leisure space, green space, and a public square that can accommodate a farmers market and the patio activity of restaurants and cafes. Rooftops are also transformed into public spaces to host communal vegetable gardens.

The design is further intended to create a positive social, health and economic impact. The human-scaled environment creates a more enjoyable place to live, shop, and recreate, and encourages walking. The automobile, while accommodated, does not take precedence in the design. As the automobile becomes more and more efficient, it can be imagined that the parking lots also become electric vehicle charging stations. Or, as car ownership declines in another plausible future, the decked parking can be converted to production of another type – such as mushroom farms for consumption, or algae for energy production.

While the thesis proposal does not detail the economic partnerships between large corporations, such as Loblaw Companies Ltd., and small businesses, such as locally-owned food processors, the arrangement and proximity of the spaces imply a relationship between the two. One such relationship can be that Loblaw owns the entire site, and leases it to business owners for a profit. The supermarket essentially acts as an anchor that draws in consumers, who then also visit

the small businesses surrounding it since the supermarket no longer houses “everything under one roof”. Furthermore, the supermarket’s local procurement policies would mean that they source their products from the small businesses surrounding them. These procurement policies would also reflect the diverse ethnic demographic that the supermarket serves. By having an urban environment conducive to these partnerships, the idea is to increase local economic development, where money from the community stays within the community. Further, the larger corporations can sponsor/fund some of the community spaces and events, such as cooking classes in the Health and Wellness Centre.

In terms of feasibility; this thesis presupposes a situation where collapse is recognized and big players are willing to make bold moves towards resiliency. Currently, these players, such as Loblaws and Wal-Mart, are merely in the stage of piloting solar panels on rooftops -- hardly a huge step forward.

Despite lack of corporate might, bits and pieces of transition strategies to a fossil-fuel-independent world have been sprouting all over the world, such as the implementation of community gardens and a counter-consumer culture. However, a systemic and holistic approach with large, key players is also needed; not simply small interventions. This thesis posits one possibility of how one type of key player can get involved in providing a solution to fossil-fuel dependence and creating enjoyable, resilient and responsible environments -- beyond just the implementation of solar panels on rooftops.

This work does not intend to undermine the importance of understanding consumer behaviour, financial markets, politics, green technologies, the role of community groups, etc., when it comes to creating radical, system-wide change.

As Richard Heinberg, a journalist, educator, and senior fellow at the Post Carbon Institute, writes in *Beyond the Limits to Growth*:

The post-carbon transition must entail the thorough redesign of our societal infrastructure, which today is utterly dependent on cheap fossil fuels. Just as the fossil-fuel economy of today systemically and comprehensively differs from the agrarian economy of 1800, the post-fossil-fuel economy of 2050 will profoundly differ from all that we are familiar with now. This difference will be reflected in urban design, land-use patterns, food systems, manufacturing output, distribution networks, the job market, transportation systems, health care, tourism, and more. It will also require a fundamental rethinking of our financial institutions and cultural values.

The author hopes that this work can contribute to the fundamental rethinking needed for a post-carbon world. It hopes to provide insight into what a sustainable food-based strategy in a post-fossil-fuel economy can look like, and where architects can and need to be involved.

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APPENDICES

Appendix A - Actors & Attractors in the Food System

Appendix B - Loblaw's CSR Initiatives (2010)

Appendix C - Demographic Profiles of Mississauga
(2006)

APPENDIX A - ACTORS & ATTRACTORS IN THE FOOD SYSTEM

In order to achieve a resilient food system, there needs to be a readjustment of actors and attractors (influential nodes) in the current system. What this might look like is below:

ATTRACTOR	THE GLOBAL SYSTEM (current)	THE RESILIENT SYSTEM (proposed)
Cheap energy	The grand scale of this system is possible due to the availability of cheap energy (oil). Several aspects of this system rely on this supply of cheap energy for uses such as transportation, packaging, and the making and operation of agricultural equipment and chemicals. Food from the global system is heavily embedded with carbon.	De-centralized and renewable sources of energy are needed on a city and neighbourhood scale as peak oil and climate change become an ever-increasing reality.
Access to land	Current land use policy makes favourable conditions for an industrialized and global system; as suburban sprawl encroaches prime agricultural land, there becomes an increasing reliance on power centres with large food retailers to meet the demands of food access. Consumers are drawn into the supermarket structure as it is the most convenient, visible, and easily accessible due to land use policies which permit the disappearance of farmland.	With next to little agricultural space left in Mississauga, other viable options need to be explored with supporting land use policies such as mandating productive landscapes in public and private parks.
Governance	There has been of a shift in the way decisions regarding food are made: private firms now have more control than national governments. Regulations on food quality are also going from the public sector into the private one. Third-party certifiers and retailers now have more power than farmers regarding food standards.	The governance that remains in the public arena, such as safety and agreements on trade, need to be strengthened. Grain reserves should be publicly owned and managed, or co-operatively owned. There needs to be an increased involvement of suppliers (i.e. farmers) in setting food regulations and a shift back into the public sector to allow for more transparency.
Access to markets	Small farmers or suppliers risk being closed out of access to input markets (seeds, fertilizers and chemicals) and commodity markets (live stock, grains).	Support for small farmers and niche markets can be strengthened with labeling laws (geographical indicators of where food is coming from), and competition policy changes.

ATTRACTOR**Intellectual property****THE GLOBAL SYSTEM (current)**

A control over life-forms has led to an appropriation of power. It is legal to put patents on life (i.e. genetically modified soybeans), which can disempower other farmers.

THE RESILIENT SYSTEM (proposed)

It is important to challenge the concept of genetically modified food and the right to 'own' life. Public breeding programs should be supported to challenge this.

Logistics

The modern transportation system has allowed food to be free of its geography. Moving large quantities over great distance in a relatively short time has become easier, as people now rely on food from elsewhere for subsistence. A huge logistics infrastructure is established to manage this, yet, the control of this infrastructure is more in the hands of transnational corporations than the public. It has also allowed for food to be moved away from vulnerable populations.

Public policies in areas developed at the expense of the public, such as waterways, can be promoted. Public investment into transportation routes by farmers can also be an option.

Labour

Labour in this system is controversial, tense and fragmented as it often involves the exploitation of people. The lack of organization reduces the power of the labourers in this system.

Encouraging collective bargaining, supporting niche markets based on fair labour and developing labour coalitions can help empower workers.

ACTORS

Multinational corporations, foreign and national agricultural producers; big box retailers/supermarkets; shipping companies; freight companies; distributors; multinational banks; federal government; foreign manufacturers; agro-chemical companies; food processing companies; marketing and branding companies; consumers

Local agricultural producers (i.e. farmers); anti-poverty organizations; environmental and conservation groups; farming, soil and crop associations; food banks and community centres; food processing companies; food retailers; distributors; gardeners; government departments of agriculture, media, municipal housing authorities, academic institutions, restaurants, consumers

APPENDIX B - LOBLAW'S CSR INITIATIVES (2010)

Major retailers are recognizing the issues listed in the table below, as the market demands more corporate social responsibility (CSR). The data in these tables, taken from the Loblaw 2010 Annual Report and the Loblaw Corporate Social Responsibility Report 2010 unless otherwise stated, reflect how Loblaw Companies Ltd. is currently responding to these issues.

ENVIRONMENTAL

Transportation	Investigating diesel-free tech for refrigerated trucks, and testing a hybrid truck; achieved a 2.3% improvement in fleet fuel efficiency; 2011 goals: reduce fuel consumption by 5%, create a plan to add infrastructure in ON and QUE for Liquid Natural Gas tech, design and pilot a non-diesel burning unit for all reefer trailers, introduce driver incentives to reduce fuel emissions, reduce empty miles
Carbon Footprint	In 2010, reduced refrigerant leaks by 5.1% relative to 2009; 2011 goals - reduce refrigerant leaks by 5% relevant to 2010
Energy Usage	Achieved a 3.2% reduction in electricity use per sq. ft. relative to 2009; achieved 3.2% reduction in carbon emissions associated with electricity consumption per sq. ft. relative to 2009; 2011 goals - reduce total energy consumption by 3% per sq. ft. in existing stores, complete lighting retrofits in 70 corporate stores, complete lighting retrofits at five corporate distribution centres
Energy Production	Solar energy pilots with Northland Power Inc in Ajax, Orleans, Toronto, Whitby - installed PV panels on rooftops in Toronto and Ajax in 2010 (5); 2011 goals - validate business model to roll out future solar power projects in Ontario
Supply Chain	Created Sustainable Food Production at the University of Guelph (gifted \$3 million); Establishing a direct relationship with suppliers has reduced transaction costs for large food retailers; for example, Loblaws Co. Ltd. owns a large share in Nielson's Dairy and employs its own procurement office to purchase perishable products directly. (Zafiriou, 2005).
Store Construction	All new store and distribution centre construction projects have a budget allocated for sustainable technologies.
Packaging	Goals: reduce packing of control brand products by 5% over 5 years; remove 50% non-recyclable packaging from control brands by 2013; work with industry partners to establish common metrics for packaging reduction and recycling; introduced 6 new PC G.R.E.E.N products - 37 new products made from 100% post-consumer recycled plastic/paper
Waste Management	Nothing indicated in Loblaw reports.
Water Management	Nothing indicated in Loblaw reports.

ETHICAL SOURCING

- Local Brands** Loblaw control brands include: President's Choice, no name, Joe Fresh, President's Choice Financial/PC Financial MasterCard/PC points loyalty program; Exact; and Teddy's Choice. Loblaw has also introduced "Too Good to be True" (now "Blue Menu") for nutritious healthy products, and "Green" for eco- friendly products.
- Local Manufacturing** Goal - work with regional Canadian growers and governments to further increase volume of Canadian produce sold; execute programming in promoting Canadian-grown produce. Loblaw successfully ran the "Grown Close to Home" campaign for the third straight year. Started a draft of a Canadian sourcing policy in 2010; finalizing it in 2011.
- Seafood** Goal - procure sustainable seafood (100% by 2013). Loblaw introduced WiseSource Salmon, continue to monitor and create a plan of action for at-risk species, launched a public awareness campaign, changed procurement practices for swordfish and developed a plan of action for East Coast cod. They also showcased the "End of the Line" documentary to students; launched www.oceansfortomorrow.ca website and started a Sustainable Seafood Facebook page. They increased the number of Marine Stewardship Council (MSC) products on store shelves from 14 in 2009 to 22 in 2010. 2011 goals - increase MSC certified products by 100%, introduce MSC and ASC (Aquaculture Stewardship Council) fish in fresh counters
- Other** 99% of active offshore factories are CSR compliant through audit - follow-up and correction are underway. Goal - source 100% of all beef and pork from Canada by end of 2012 (excluding hard discount), work with industry to transition all PC eggs to 100% cage-free; implement the "Great Food" initiative in Ontario

COMMUNITY IMPACT

Partnerships Sustainable Food Production at the University of Guelph; PC Financial has a joint venture with CIBC - no standalone branches; Joe Fresh (clothing and cosmetics) founded by designer Joe Mimran and has standalone Joe Fresh stores; PC Mobile - operates as a Mobile Virtual Network Operator on the Bell Mobility network; DRUGStore Pharmacy and Loblaw Pharmacy, PC Cooking School - community room/cooking school

Charity/Social Investment PC Children's Charity (PCCC) assisted almost 2000 families through grants and supported 5000 nutrition programs through Breakfast for Learning; granted \$10.1M to families with children with physical disabilities; provided \$4M in sponsorships; rolled out national gift card program to support fundraising of local charities, invested \$5.5M in initiatives like Loblaw After-School Grant, Food Banks Canada, YMCA Canada and PCCC. Loblaw continues to alleviate hunger in Canada through "Extra Helping" food drives and donations to Food Banks Canada; donated \$2.8M to local community programs initiated by stores - all stores are connected with local food banks; 100% of stores support local food banks. Goals for 2011 include: PCCC to implement a children's health strategy, support national and local programs to reduce the incidence of childhood obesity, and launch a new national scholarship program.

SOCIAL TRENDS/CONCERNS

- Food Safety** 2011 goals: Achieve 100% Global Food Safety Initiative (GFSI) certification for control brand vendors, launch an ingredient traceability system for control brands, all vendors to sign the Loblaws Standard Terms and Conditions (LTSC)
- Healthy Products** Include calorie counts, recipes, information about food and how to prepare it; “Blue Menu” and “PC Organics” products. In 2010, developed 80 new “Blue Menu” products; reduced sodium in 132 control brand products. 2011 goals: All direct import offshore factories to be CSR audited at minimum once a year, and to adhere to the Loblaw Supplier Code of Conduct; implement new health and wellness strategy and programming which includes: a pilot for consumer nutrition scorecard system, establish partnership with the Canadian Diabetes Association, add in-store dietitians (pilot in 10 ON stores), Corporate Wellness online program for colleagues
- Affordability** Private label products, range of store formats and banners to address different income levels and shopping experiences (i.e. No Frills to Loblaws Great Food)
- Diversity** Acquired T&T to serve ethnic tastes; have plans to open three within 2011; sensitive to providing recognizable brands from various countries
- Labour** 2010: Collaboration with the United Food and Commercial Workers Union (UFCW) to deliver new labour contract that maintains Loblaws as the highest-paying employer in industry, and gives enhanced scheduling flexibility. Store Time and Attendance System (STAS) - management tools. The stores reflect the communities they are locating in by recruiting locally. Woman@Loblaw network launched via Facebook. More people with disabilities were hired and the Inclusion Toolkit was launched nationally. 2011 goals: Develop and implement an Aboriginal recruitment plan, increase female store managers by 25%, mirror local community demographics in employee base, employ more with disabilities, be more inclusive of older works (50+)

APPENDIX C - DEMOGRAPHIC PROFILE OF MISSISSAUGA (2006)

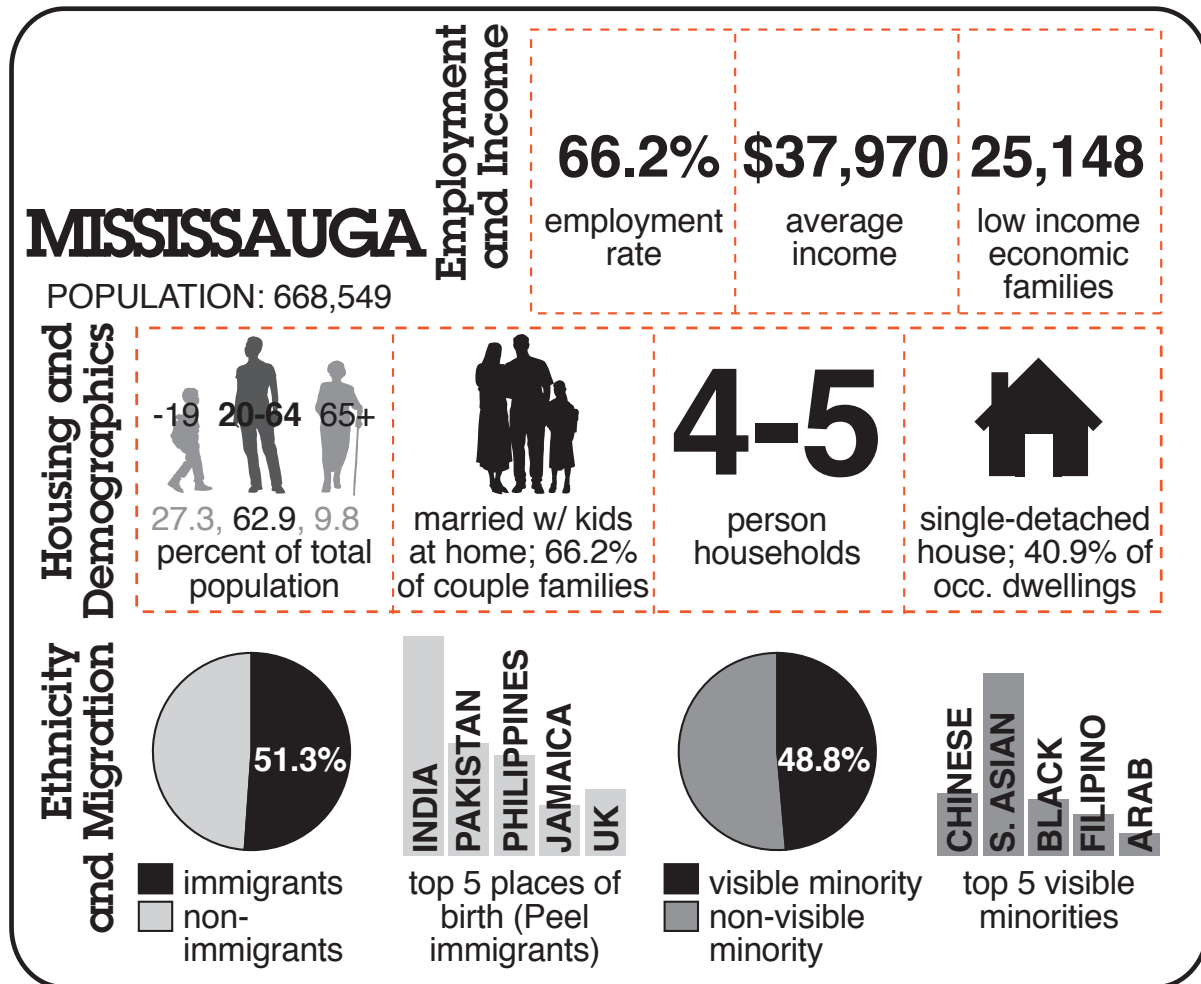


Fig. A Overall demographic profile of the City of Mississauga

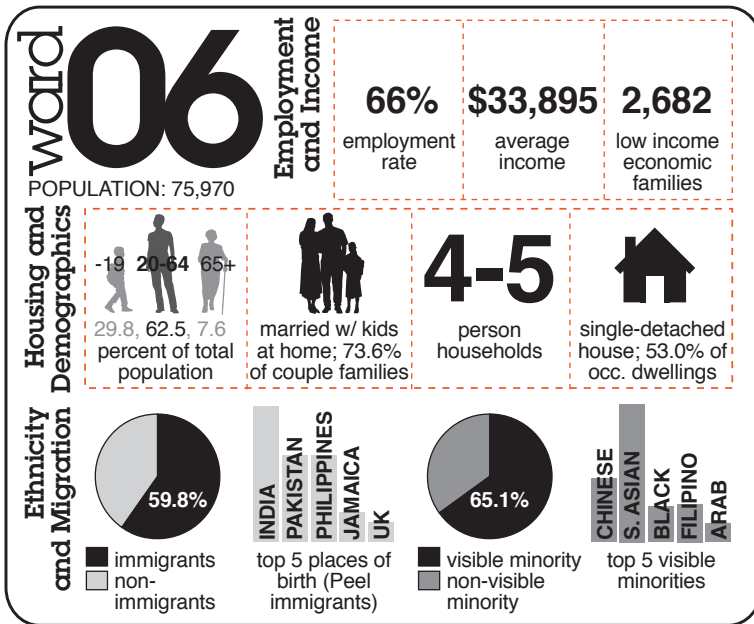
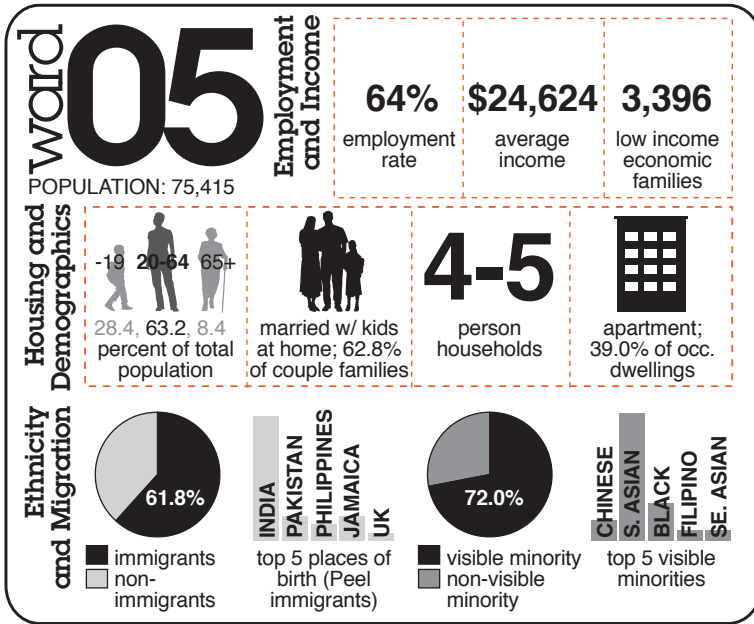


Fig. B Demographic profiles of Ward 5 and Ward 6, the two wards that the Heartland Town Centre sits in